

FULCIRCLE

ENGINEERING NEWS FOR ALUMNI AND FRIENDS FALL 09

Global Impact on
Quality of Life



ASU Ira A. Fulton
Schools of Engineering
ARIZONA STATE UNIVERSITY

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On the Cover:

Anthony, a Malawian villager, receives his new custom aluminum-framed tricycle, designed by a two-student team from the 2008-09 ASU bioengineering class.

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Deirdre R. Meldrum, Ph.D.
Dean, Ira A. Fulton Schools of Engineering
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Dear Alumni and Friends,

This fall, Arizona State University experienced a record total enrollment exceeding 68,000 students. The Ira A. Fulton Schools of Engineering welcomed its largest freshman class ever, more than 900 students.

These numbers demonstrate the continuing demand for our top-notch programs, but they also present a special challenge: translating opportunity into results. With more than 4,200 undergraduates and 2,000 graduate students, and greater than \$70M in externally funded research, we are in a unique position to drive innovation and have impact through education and research on global quality of life.

Through the creation and delivery of medical devices to a remote African village, our bioengineering faculty and students have demonstrated the potential for engineering solutions that change lives. As our mechanical engineering students develop tools to enhance vehicle efficiency and safety, they advance learning while improving existing technologies.

In all of our dynamic education and research efforts, the Ira A. Fulton Schools of Engineering are committed to producing the future engineers and new discoveries the world needs. Leveraging the resources of one of the largest universities in the nation, our faculty and students continue to seek solutions to the grand challenge problems facing society.

To further advance the focus on the global challenges identified in the National Academy of Engineering's "Grand Challenges for Engineering", we have been selected to host one of only five national NAE Grand Challenge Summits in spring 2010. I encourage you to attend this gathering of great minds from across many disciplines, including faculty, students and industry leaders, with a shared vision of engineering a better global future.

The world's challenges require engineering solutions. I invite you to learn more about our efforts, and join us.

Deirdre R. Meldrum

Grand Challenge Summit Series 2010

Universities across the U.S. are answering the call to action raised by the National Academy of Engineering (NAE) in partnership with the National Science Foundation. That call has focused public attention on the NAE Grand Challenges, a critical grouping of problems that must be addressed and solved in order to maintain our national security, quality of life and sustainable future.

The Ira A. Fulton Schools of Engineering are honored to be a Grand Challenge Summit Series organizer and host, in conjunction with Duke University; Illinois Institute of Technology; Olin College of Engineering, Wellesley, and Babson College; University of Washington; and University of Southern California's Viterbi School of Engineering. The Ira A. Fulton Schools of Engineering will host a Summit in **Tempe/Phoenix, Arizona, April 8-9, 2010.**

The series represents a commitment to sustain critical dialogue and engagement with grand challenge problems and to change the way we educate our students in order to better prepare them for the challenges ahead. Addressing issues this complex requires innovation and cooperation from engineers of all kinds, as well as policy makers, economists, geologists, biologists and sociologists.

summit-grand-challenges.pratt.duke.edu/phoenix-summit

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Vision

Leading engineering discovery and innovative education for global impact on quality of life.

Mission

Provide an environment rich in transdisciplinary research, education, entrepreneurship, and leadership resulting in successful engineers and technologies that benefit society.



Major grant enriches engineering education



(from left to right) Hulas King, Director of GO PLM and Global Community Relations at Siemens PLM Software, Engineering Dean Deirdre Meldrum, Engineering Professor Jami Shah, and Dave Shook, Senior Vice President and Managing Director, Americas, Siemens PLM Software.

ASU is enriching its engineering education, providing students more advanced preparation to enter the work force through an in-kind software grant from Siemens PLM Software to ASU's Ira A. Fulton Schools of Engineering. With a commercial value of nearly \$245 million, it is the largest in-kind grant in the university's history.

The grant was made through the Siemens PLM Software Global Opportunities in Product Lifecycle Management program – called GO PLM™ – and includes engineering software, student/instructor training and specialized software certification programs.

"Today's leading manufacturing and technology companies compete on the basis of time to market, product cost, quality and innovation," says Dave Shirk, the executive vice president of Global Marketing for Siemens PLM Software. "It's quite clear that today's best students in top programs, such as the program at ASU, must benefit through opportunities to gain experience with technology that supports these objectives."

The academic license program allows students to use engineering analysis packages such as NX, IDEAS and Nastran to perform critical engineering tasks such as stress and failure simulation, vibration and dynamics analyses and thermal analyses.

Troy Howe, a senior studying mechanical and aerospace engineering, uses the program at work to build 3-D models and draw schematics, and says the computer-aided design program has been invaluable to his progress.

"Advanced tools such as the PLM Software are essential to preparing our engineers for the challenges they will face in an increasingly complex and global economy," says Deirdre Meldrum, Dean of the Ira A. Fulton Schools of Engineering. "They will be able to meet demand for designing and analyzing systems that transcend traditional boundaries."

Adam Dixon, an ASU graduate student studying engineering design, thinks that being able to train on the PLM software will make engineering grads more

marketable and offer a clear advantage when applying for positions at major engineering companies.

"The software is a great teaching tool because it makes everything transparent," says Jami Shah, a professor in Ira A. Fulton Schools of Engineering and director of the Design Automation Lab. "It clearly shows the student how the results of any design work or engineering analysis were computed. You can see and control the workings of the software packages."

ASU joins other leading universities with which Siemens has similar academic partnerships or has made similar in-kind gifts, including the Massachusetts Institute of Technology (MIT), the University of California at Berkeley, Michigan State University, Brigham Young University, Rutgers, Virginia Tech, Carnegie Mellon and Purdue.

Siemens PLM Software is a division of the Siemens Industry Automation Division and a leading global provider of product lifecycle management (PLM) software and services.



ASU student Tessa Causland (yellow), Dr. Jan Snyder, Ed.D. (ASU shirt), locals and Malawian villagers organizing the planting of 1000 beans as part of the Jatropha Plantation Project.

Engineering innovation, compassion

CHANGING LIVES IN AFRICA

Jan Snyder first visited Africa as an undergraduate biology student in the 1960s. He was drawn by the continent's plants and animals, but "became equally interested in the people," he says.

Years later, while visiting his daughter, who worked with the Peace Corps in Malawi from 2003-2005, he and his family lived for six weeks in a village in the Nkhotakota region of central Malawi. There, they witnessed firsthand the problems of poor sanitation, the severe lack of health care and resulting health problems. AIDS, tuberculosis, malaria and polio still afflict many, and estimates are that seven to 10 percent of the more than 13 million Malawians are physically disabled in some way, Snyder says.

Vincent Pizziconi, an ASU associate professor of bioengineering, learned of Snyder's desire to help the

Malawians and suggested Snyder videotape interviews with disabled villagers to gain a deeper insight of the nature of their disabilities. Pizziconi shared the videos in class and challenged his students to take on the assignment as a senior-year research project and engineer devices for those individuals.

Under the supervision of Snyder, a science education program manager in ASU's School of Mechanical, Aerospace, Chemical and Materials Engineering, there have been two shipments in the past three years of customized wheelchairs, orthopedic braces and therapeutic instruments designed and built by ASU engineering students, and delivered to the village of Njewa.

Leila Kabiri, who earned her bioengineering degree in 2008, says she felt a strong connection when she saw the people on the videos. "It made me want to be successful for them." Everything was produced with materials that would enable

the Malawians to repair or rebuild devices in the future using the limited materials available in their country.

Kabiri's project team used bicycle tires for the wheelchair, along with a cushion stuffed with pinto beans coated with a chemical that helps keep the cushion dry in a humid climate. The equipment design needs to adapt to the unique conditions of the disabled individuals, yet be resilient enough to hold up in the rough terrain and environmental conditions of the region. As part of the project, each student team consulted specialists in medical fields, and tested the devices to ensure each adhered to strict design specifications stipulated by government regulatory agencies.

Mona Aoufe, who plans to pursue a dual master's degree in business and health care administration, worked with a team that built a customized tricycle for a partially paralyzed Malawi woman named Elizabeth. "The project was one of the most rewarding experiences I've had," she says. "All we cared about was making something for Elizabeth."

Elizabeth received her tricycle in 2007, and has since been able to return to school due to her new mode of transportation and now wants to start a poultry business.

"It is not enough to make people like this mobile," Snyder says, "it would be a mistake to end the story at this point. Our goal is to help them get to a new level of self-sustainability."

Snyder's five-week trip to Malawi this past summer was aided by \$5,000 in support from Ira A. Fulton Schools of Engineering Dean Deirdre Meldrum, which helped pay for the overseas transport and delivery of the medical devices.

"I saw the benefit of that support in the faces of the people who received our devices," Snyder says. "To them, the devices meant that they would be able to overcome the effects of their physical disabilities. They would be able to walk again, to go back to school, to go to work and travel. The impact of the funding was demonstrated by the joy and heartfelt gratitude they expressed for this improvement in their lives."

He now wants to make the medical-device project a first step toward larger goals. He is talking to educators in Malawi about teaming with ASU to provide the country programs to train its own engineers. He sees opportunities for engineers here to work with Malawians on employing modern technologies to provide the country with better infrastructure and sources of energy.

"Education and the sharing of technology can offer the people in African countries opportunities to become economically sustainable," he says. "The

Another Malawian named Anthony, disfigured from childhood polio, was presented with his new tricycle this past summer. He is now able to travel the daily 12 miles more efficiently from his home to his wood-carving shop, and inspires all those he meets along the way.



The gear box on his new tricycle is encased in a dust proof hub and the shifter is mounted near his hands, enabling him to easily glide through the gears.

Everything was produced with materials that would enable the Malawians to repair or rebuild devices in the future using the limited materials available in their country.



Alexander (left) has polio and rides a locally built hand powered tricycle for transportation. He is a high school graduate who teaches kindergarten and would like to return to school to earn a college degree.

solution to their problems has to start with instilling in them the spirit of innovation, imagination and self-sufficiency. You can say that our goal would be to eventually become unnecessary as an outside source of devices, training, technology and skills.”

Until recently, the effort had been funded solely by Snyder and his wife, but they now have additional financial support through a fledgling nonprofit, Sustainable Resources Ltd., founded by the Snyders and James and Alice Broscheid, who share similar interests in humanitarian efforts for Africa.

James Broscheid is a project manager with Siemens AG, one of the world’s largest engineering and electronics conglomerates, and currently studying at ASU’s downtown Phoenix campus for a degree in nonprofit organization management. His wife, Alice, works with a mental health counseling facility.

ASU faculty mentors involved in the project include: Kristinn Heinrichs, a specialist in rehabilitation neuroscience and rehabilitation engineering; Richard Filley, director of the engineering school’s Global Futures Initiative; Jiping He, a professor of bioengineering and director of the Center for Neural Interface Design; Ranu Jung, an associate professor of bioengineering and co-director of the Center for Adaptive Neural Systems; and Joseph Peles, an adjunct professor in the bioengineering department.

Visit sustainableltd.org for more information on these projects.

Elizabeth, paralyzed on her side, with her yellow tricycle that she says changed her life. She has been able to return to school due to the transportation capability it provides. With the basket on the back, she can carry food from the market and supplies for school.



Consortium paves way for global opportunities



Arizona State University (ASU) has joined an international consortium to enable extraordinary alliance with some of the world's leading university engineering programs, and offer international learning opportunities for its engineering students. The Global Engineering Education Exchange – also known as Global E3 – invites only a small number of universities to become new members each year.

ASU's Ira A. Fulton Schools of Engineering will partner with leading U.S. universities including Penn State, Clemson, Purdue, Georgia Tech and University of Washington, in addition to educational institutions across Europe, Asia and Latin America.

"Participation in Global E3 is a major step toward our school's five-year goal of providing each of our students an international educational experience before they graduate," says engineering Dean Deirdre Meldrum.

Beginning in spring 2010, eligible engineering, computer science and construction management students may study abroad for a semester or a full academic year, with an option to complete an internship in a foreign country following one complete semester of study. In turn, five students from member universities in the consortium can spend up to a full academic year at ASU.

"The Global E3 membership gives us high-quality academic partnerships in Asia, Europe, Australia and elsewhere," says Jeff Goss, assistant dean and director of the engineering school's office of Global Outreach and Extended Education. "These institutions can provide our students a global engineering education experience that's going to be especially valuable to them in pursuing their careers."

Participating students will be able to transfer all approved credits earned abroad to their program of study, without delaying their graduation date. 'Tuition swaps' will allow students to study abroad but pay regular tuition at their home universities. Host schools help provide inexpensive housing, and some financial aid is available for U.S. students. Some institutions also provide assistance in finding internships with foreign industries or university laboratories.

"The engineering field in the 21st century will increasingly demand cross-cultural skills and experience in international business environments," says Cori Oversby, who graduated from ASU in 2008 with a degree in civil engineering. As a student, he worked with the organization Engineers Without Borders to design a water-system infrastructure for a village in a remote region of the Amazon jungle in Ecuador.

"I discovered that it's one thing to learn how to interact and live with people in a different culture for a short period of time, but it's a much bigger challenge to understand how to implement a culturally appropriate and sustainable engineering solution," Oversby says.

Michal Ziv-El, a doctoral student in environmental engineering, also worked on the project in Ecuador. "Experiences in foreign countries give engineering students a broader perspective," she said. "You learn that we really need to start doing engineering in ways that make sense for the whole world, in terms of using our resources wisely and being energy-efficient."

For more information about Global E3, visit fulton.asu.edu/global.

Rittmann bringing big things to fruition by manipulating smallest organisms



Professor Bruce Rittmann is living large and small at the same time.

He's tackling some of the world's biggest and most critical technological challenges with some of the tiniest tools.

Rittman directs the Center for Environmental Biotechnology in ASU's Bidesign Institute and teaches in the School of Sustainable Engineering and the Built Environment in ASU's Ira A. Fulton Schools of Engineering.

He and his research partners are using microorganisms to develop ways of providing the world more abundant and clean energy, ensuring the quality of water resources and improving human health.

Progress in the laboratory, along with knowledge of advances in biotechnology that Rittmann brings to the classroom, earned him a Regents' Professor title earlier this year. It's the highest honor bestowed on faculty at Arizona's state universities.

"Bruce's work on the kinetics and design of biofilm reactors is groundbreaking," says ASU environmental engineering professor Peter Fox. "It's the basis for hundreds of design models used for practical design and fundamental research. His use of molecular biology for the analysis of biological reactors has become common practice today."

When he earned a Ph.D. in environmental engineering from Stanford University three decades ago, the areas in which Rittmann specializes were only just emerging from their infancy. Today, he says, these fields are exploding – giving engineers a sense of exhilaration but also intensifying their challenges.

Rittmann is extraordinary for more the "amazing range" of his expertise, says Paul Westerhoff, interim director of the School of Sustainable Engineering and the Built Environment.

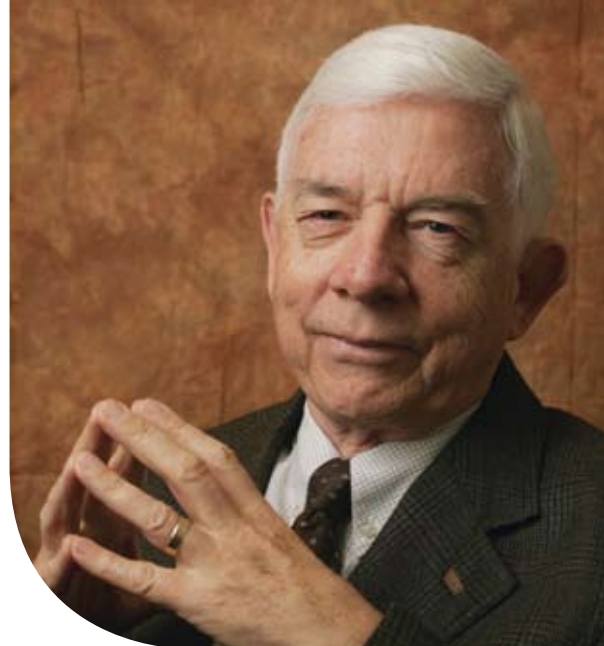
"Bruce is envisioning large-scale, long-range solutions that have the potential to greatly improve our environment. He is

defining new frontiers in environmental biotechnology," Westerhoff says, "and he is making this possible through his skill in collaborating with colleagues and mentoring students who are working in diverse areas of engineering and science. This productive interaction is Bruce's signature trait. He motivates people to learn and contribute."

In 2004, Rittmann was elected to the National Academy of Engineering. He is a Fellow of the American Association for the Advancement of Science, a recipient of the Clarke Prize for Outstanding Achievement in Water Science and Technology, and winner of the prestigious Huber Research Prize.

This year Rittmann was presented with the Simon W. Freese Award, the highest honor bestowed by the Environmental Water and Resource Institute, for his innovative work on using microorganisms to improve water quality, and the 2009 Award for Research Excellence from the Arizona BioIndustry Association.

Past accomplishments don't stop Schroder from focusing on the future



Dieter Schroder may be the proverbial victim of his own success.

Schroder, an electrical engineering professor, jokingly expresses suspicion that his selection this year as a Regents' Professor – the highest recognition for state university faculty members in Arizona – may be a way to coerce him to stay beyond the 28 years he's already been at ASU.

More seriously, Schroder says he remains motivated by the same kinds of goals he set for himself when he came to the university in 1981.

He wanted to publish 100 articles in science and engineering research journals, give 100 presentations at engineering conferences and see at least 100 of his students go on to earn master's and doctorate degrees.

He has exceeded each objective. Along the way he has earned five engineering teaching excellence awards – and numerous other teaching accolades – helped make ASU a leader in solid

state electronics research and launched some of the university's first online education courses.

In addition, he has given hundreds of students valuable experiences participating in his semiconductor technology research.

"I still love to teach," Schroder says. "I enjoy the challenge, and I like working with young people."

Demand for Schroder's expertise has risen with such accomplishments as the technological advances made under his direction at the Center for Low-Power Electronics, which he led at ASU from 1996 to 2004.

Despite a typically full schedule of research pursuits and classes to teach, Schroder has answered the call frequently over the years to help guide the development of engineering education at ASU.

"Dieter is one of those talented people who have never learned to say no," says

Gerald Heydt, who is also a Regents' Professor. "He is invariably elected and re-elected to departmental and university-wide committees because of his leadership qualities."

Despite a long list of past achievements, Schroder focuses on the present and future.

"In the past, engineers could be loners and get by on expertise in one or two technical fields," he explains. "Today's engineers must be skilled communicators and collaborators with people outside their specialties. Educating students to be engineers in the 21st century still drives me."

Rising stars honored with National Science Foundation awards

CAREER Awards are the National Science Foundation's most prestigious award "in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their organizations."

Five up and coming engineering faculty members earned this mark of distinction for 2009:



Junseok Chae, assistant professor of electrical engineering, is tackling fundamental questions about the use of molecular probes in biosensors by using micro-electro-mechanical systems (MEMS) technology. MEMS are tiny machines typically made of components between one and 100 micrometers in size.

Generally, biosensors use molecular probes such as DNA, RNA, enzymes and antibodies to capture specific molecules that scientists and engineers want to examine.

These probes offer selectivity, but have many limitations. The reagents that must be used are expensive. The probes have limited life spans, and it requires highly trained technicians to operate them. Above all, it is almost impossible to find probes to target each kind of molecule researchers want to study.

Chae is solving the problem by utilizing nature's "smart system." His protein proposed probe-less biosensor has high selectivity, and is packaged in a way that makes it resistant to environmental changes such as temperature, humidity and vibration. This biosensor is a new concept that Chae says can lead to new and improved instruments for biological research.

Yi Chen, assistant professor of computer science and engineering, wants to improve the accessibility of Internet data for search engine users.

Internet users, Chen points out, use Google to access millions of HTML documents accessible on the World Wide Web. In addition to this easily searched information, there is a "hidden web," she says, that includes information stored in databases not easily accessed by search engines such as Google.

Chen would like to develop a single interface that can search both HTML documents and databases using simple keyword searches. Her work promises to be "tremendously useful to everyone because search engines could potentially no longer be restricted to a subset of information available in HTML," she says.

The NSF cites Chen's work as a potentially transformative advance because it would allow the user to cut across the boundaries between information that is stored in distinctly different modes, and it would overcome some of the problems associated with traditional databases and methods of information retrieval.

Pictured from top to bottom:
Junseok Chae and Yi Chen



Hanqing Jiang, assistant professor of mechanical and aerospace engineering, conducts research that promises to deepen fundamental understanding of how nano-scale structures can be made to function and improve the effectiveness of various mechanical systems on a macro-scale. That knowledge will enable discoveries in nanoscience and nanoengineering to be more broadly applied in practical pursuits. The work focuses on carbon nanotubes macroscopic assembly — specifically carbon nanotubes macro-films. These macroscale structures with nanoscale details are proving highly effective in accomplishing myriad intricate technological tasks.

Learning how to better manipulate and assemble carbon nanotubes also will allow researchers to improve construction of the devices they use to achieve advances in nanotechnology. Such research could lead to the development of design guidelines for the assembly of larger-scale carbon nanotube-based networks that will expand the applications of nanotechnology in areas such as solar cells and energy storage devices.

Baoxin Li, assistant professor of computer science and engineering, works in the areas of computer vision, multimedia processing and statistical methods in visual computing. He is researching technology to aid visually impaired people.

Li's approach is to use computer technology to allow a person with visual impairments to read text or view web site content on-demand. His research team is attempting to render representations of graphics usable by the visually impaired. One project is the development of software designed to "read" an image and render a tactile representation of that image.

Initially, Li is focusing on textbooks used by students in science, technology, engineering

and mathematics (STEM) courses. STEM education materials, heavy with diagrams and illustrations, present a challenge for sight-impaired students who must seek out services to assist them in comprehending the illustrations that are central to STEM studies.

The effort to aid STEM students will have a broad range of applications in the areas of computer vision and pattern-recognition research.

Henry Sodano, assistant professor of mechanical and aerospace engineering, centers his work around a discovery made in his laboratory that led to development of a process to increase the strength of fiber-reinforced composite materials.

The method uses nanowires to form an interface that bonds and blends fibers with other materials. The effect of the nanowires gives the composite materials more strength, including better tensile strength and the ability to bear more weight and stress.

Fiber-reinforced composites provide higher strength per weight than other structural materials such as metals. The improved strength-to-weight ratio is typically capitalized upon in high-performance devices, vehicles and sporting equipment such as military aircraft, golf clubs, tennis racquets and high-performance automobiles.

Learning more about the influence of the nanowire interface on the properties of fiber-reinforced composites promises to lead to broader applications of materials developed through this process. These new types of interfaces may pave the way for designs for improved biological implants and prosthetics that can better mimic the naturally occurring interfaces in our bodies.



Pictured from top to bottom: Hanqing Jiang, Baoxin Li and Henry Sodano

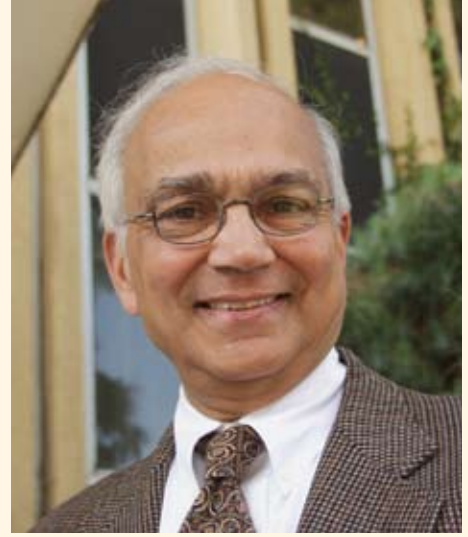
Mahajan named Technical Fellow

Dr. Subhash Mahajan, a Regents' Professor and a member of the National Academy of Engineering, has been appointed Technical Fellow in the Ira A. Fulton Schools of Engineering. This new role created by ASU President Michael Crow is reserved for faculty who have demonstrated significant technical achievements in their career and demonstrated outstanding leadership.

In his new role, Professor Mahajan will work to advance the engineering research agenda by helping to build large research teams and stronger relationships with government funding agencies. He will also work with the Engineering leadership team to develop a strong junior faculty through mentoring, and provide vital expertise and service to help advance the ambitious agenda of the Ira A. Fulton Schools of Engineering.

After joining ASU in 1997, Mahajan was Chair of the Department of Chemical and Materials Engineering from 2000 to 2006 and founding Director of the School of Materials through June 2009. He recruited top-flight faculty, as evidenced by most of his junior faculty hires receiving prestigious NSF CAREER Awards. He previously held positions at the University of Denver; The Atomic Energy Research Establishment in Harwell, England; AT&T Bell Laboratories at Murray Hill, New Jersey; and Carnegie Mellon University.

Mahajan was given the 2004 Educator Award by TMS for his excellent contributions to education in materials science and engineering. He is a fellow of TMS and ASM, delivered the Campbell Memorial Lecture of ASM in 2007 and recently the Lee Hsun Lecture of the Chinese Academy of Sciences. He is also



a Member of the Board of Trustees of ASM International and serves on some of the committees of the National Academy of Engineering.

Internationally known for his studies on structure-property relations in functional materials and deformation behavior of solids, Mahajan has published extensively on these two topics. He received the John Bardeen Award and the Albert Sauveur Achievement Award from TMS and ASM, respectively, recognizing his outstanding contributions to research and leadership in electronic materials and his pioneering achievements in materials science.

Fulton Schools join Grand Challenge Scholars program

In 2008, the National Academy of Engineering (NAE) identified 14 Grand Challenges for Engineering in the 21st Century. These challenges serve to raise awareness and call attention to opportunities to impact and improve our quality of life.

The NAE Grand Challenge Scholars program is a combined curricular and extra-curricular program with five components, designed to engage and encourage exceptional students to step up as leaders of the generation that solves the grand challenges facing society in this century. The program was endorsed by the National Academy of Engineering in February 2009.

The Ira A. Fulton Schools of Engineering at Arizona State University have been selected as the first non-founding partner

in the program. Founding schools include Duke University's Pratt School of Engineering, The Franklin W. Olin College of Engineering, and the University of Southern California's Viterbi School of Engineering.

ASU Professor Subhash Mahajan will serve as chair of the GCSP Oversight Committee, which will be responsible for all aspects of the program including student scholar selection and eligibility certification. Dr. Mahajan is a Technical Fellow in the Ira A. Fulton Schools of Engineering, Regents' Professor and a member of the National Academy of Engineering.

For more information on the program visit grandchallengescholars.org.



Recent graduate helps others overcome obstacles

Only eight years ago, the odds seemed against Guadalupe Ramirez being a university graduate in 2009 – particularly one with sufficient achievements to pursue a master’s degree in aerospace engineering.

Ramirez spoke only Spanish when she came to Somerton, Ariz., from her native Mexico in 2001. The language barrier dropped her a year behind during high school. But eventually, she earned a college scholarship and graduated with distinction from Arizona Western community college in 2004.

Then came enrollment in ASU’s Ira A. Fulton Schools of Engineering, where she excelled not only in her studies but also outside the classroom.

She joined ASU’s chapter of Women in Science and Engineering and became vice president of its robotics team, which won a regional event and competed in international robotics events. “I was grateful to have found such a club at ASU where I could apply things I learned in class to real-life situations,” she says.

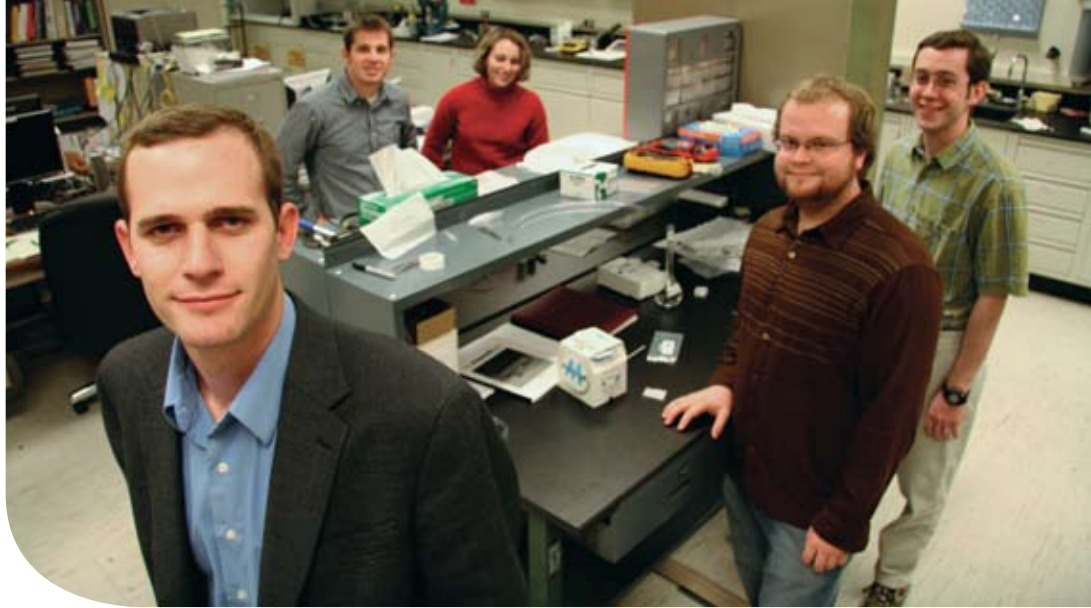
Ramirez also has made time to help others discover the opportunities she found at ASU.

She works as a mentoring program coordinator at the Motivated Engineering Transfer Students Center, which recruits and retains engineering students – especially women and others from groups underrepresented in the engineering profession.

“It helps community college transfer students, like myself, to have a smooth transition into ASU,” she says.

In 2008, Ramirez was as a presenter in the ASU Hispanic Mother-Daughter Program Conference, a university student endeavor to raise education and career aspirations among Hispanic women.

Beyond her own education, she says the chance to help others overcome obstacles and go to college “made being at ASU one of the most rewarding experiences of my life.”



Associate Professor Cody Friesen (left), with undergraduate students in the lab.

Engineering professor and ASU alumnus lauded for innovation

Advancing technologies that could more reliably and efficiently power electronic devices, electric cars and renewable-energy systems has earned Arizona State University faculty member Cody Friesen a place on a prominent list of the world's top young innovators of 2009.

Friesen, an associate professor in the School of Mechanical, Aerospace, Chemical and Materials Engineering in ASU's Ira A. Fulton Schools of Engineering, has been named among the "TR35" by Technology Review magazine, one of the leading technology news publications.

Before earning his Ph.D. at MIT, Friesen received his undergraduate degree in materials science from ASU.

He is one of only 35 people – all under the age of 35 – chosen from more than 300 nominees around the world for the award recognizing scientists, engineers, technologists and entrepreneurs who "exemplify the spirit of innovation."

Editors of the magazine, published by the Massachusetts Institute of Technology

(MIT), were impressed with Friesen's work with a method that solved a long-time problem of how to recharge zinc-air batteries.

This type of battery – using zinc metal for an anode and an alkaline paste for an electrolyte – had proven to be simple, nontoxic, inexpensive to produce and durable, but not rechargeable. Friesen fixed that using a porous electrode with a liquid solution of zinc ions and additives as an electrolyte.

Friesen's goal is to see batteries that will store twice the energy as those currently used in laptops and some hybrid electric cars, out on the market in about two years. He has co-founded Fluidic Energy to commercialize his new design for a rechargeable metal-air battery, and testing of a prototype is planned for later this year.

Eventually, he said, the metal-air technology could produce a battery capable of storing 10 times as much energy as today's lithium-ion devices – and be less expensive to produce than conventional batteries. There's also great

potential for using the new batteries to improve storage of energy from wind-generated and solar-generated electricity.

"Entrepreneurial spirit, risk-taking and the desire to make a positive impact on society are the key factors driving the growth and evolution of our school. Cody Friesen embodies these traits," said Kyle Squires, interim director of the School of Mechanical, Aerospace, Chemical and Materials Engineering.

Friesen's recognition by Technology Review "is a validation of the environment that is being shaped at ASU, where we promote entrepreneurship and researchers are encouraged to boldly pursue innovative solutions," Squires said.

Friesen and the other TR35 winners for 2009 were honored in September at the EmTech@MIT 2009 Conference in Cambridge, Mass.

Entrepreneurial alum pursues success with tech startup



Alumni Adam Ayers (right) and Paul Kenjora, the company's founder.

Earning a bachelor's degree in mechanical engineering from the Ira A. Fulton Schools of Engineering gave Adam Ayers a wellspring of confidence that he's found valuable for more than tackling technological challenges.

"Engineering courses were difficult, and they forced me to really think and learn to focus," he says. "It taught me problem-solving skills. It's something that helps me every day in business."

When he graduated in the spring of 2009, Ayers joined a tech startup called Arkayne, a venture based on a novel idea for an Internet "content recommendation engine" that helps users extend the reach and relevance of the information on their web sites.

Ayers is involved in marketing, sales and communications for the company, whose founder is Paul Kenjora, a 2002 Arizona State University graduate with a degree in computer systems engineering.

While at ASU, Ayers founded Entrepreneurs@ASU, a networking resource for students, faculty and community members interested in business startup endeavors. "It started as my way of trying to find an excuse

to connect with business leaders and investors," Ayers says.

He also volunteered to work with the Arizona Technology Investor Forum, a project of the engineering schools' Office of Entrepreneurial Programs, and joined the Economic Club of Phoenix through ASU's W. P. Carey School of Business. He was a student representative on the engineering schools' alumni board. "All of [these outside activities] kept me more interested in school, motivated me to apply what I learned and made me unafraid to try new things," he says.

Arkayne is the biggest new thing for Ayers. He and his partners are developing and marketing a "content-clustering, cross-linking, super-cloud-computing" web site. It's designed to link and distribute content from web sites all over the world to serve needs of business, organizations, bloggers and others.

Arkayne essentially offers clients a way of coping with the information overload on the Internet, helping find and link to the information most meaningful to them and their customers. Clients get access to myriad web site posts, online articles and other information relevant to the interests of users of their web sites.

The Arkayne concept impressed Arizona Technology Investor Forum members, who helped the company refine its business model and invested \$250,000 in the venture.

Ayers confidently express his hopes for the venture. "Some people have told us we need to be in Silicon Valley," he says, "but we want to be a startup that helps put the Phoenix area on the map" in the high-tech industry.

Says Arkayne president and CEO Nicholas Aretakis, "When I met Adam through ATIF, I saw more than a young man ready to graduate and enter the work force. I saw someone ready to be an integral component of our enterprise."

Ayers is "equipped with the technical prowess of an engineering graduate from a leading university, and he grew up with the Internet and social networking," Aretakis says. "He's exactly what Arkayne needs in marketing, sales and business development to complement a few of the 'grey hairs' raising money and building the business."

To learn more about Arkayne, visit arkayne.com.



Spotlight on: G. Edward (Edd) Gibson



G. Edward (“Edd”) Gibson Jr., a member of the National Academy of Construction with decades of teaching, research, administration and project management experience in the field, is the new Del E. Webb School of Construction Programs Chair at Arizona State University.

The program is a key component of the School of Sustainable Engineering and the Built Environment in ASU’s Ira A. Fulton Schools of Engineering.

Gibson sees his new role as “being an enabler of the faculty and students in refocusing education and research on the most critical challenges” facing the construction industry today.

Among those challenges, he says, are ensuring students gain expertise in computer-aided construction design and planning that is in high demand in the industry, helping find solutions

to the nation’s problems with aging infrastructure, and incorporating sustainability practices into all phases of construction management.

Equally as important is preparing students for careers and leadership roles in what will increasingly be a global industry – one that demands professionals skilled in working across geographical and cultural borders.

“All these challenges offer great opportunities for prospective students looking for meaningful careers, and for ASU to contribute to meeting local and global needs for sustainable engineering and construction,” Gibson says. “I think these growing needs provide us a solid potential for eventually doubling the number of construction graduates and for greatly expanding the program’s relationships with industry.”

Gibson was attracted to the school by the solid reputation of its construction program and faculty, along with the industry support it has earned amid a rapidly developing Southwest region. He says he has been impressed by the incredible support from alumni of the program, and feels that will be key to opening up a pipeline of jobs, opportunities and significant industry connections for graduates.

"Edd is joining us at a critical time," says Engineering Dean Deirdre Meldrum, "we have restructured to better fulfill our mission to produce students and new knowledge that lead to solutions to the difficult urban infrastructure challenges facing society."

By recognizing the strategic plan of the school, he is poised to "better connect the construction programs to ASU's engineering, design, business, and sustainability programs at ASU," says Paul Johnson, Engineering Executive Dean. Gibson "brings the vision, leadership, and experience needed to take our nationally recognized construction programs to the next level," Johnson says.

Gibson was a professor in the Department of Civil, Construction and Environmental Engineering since 2006 at the University of Alabama, where he led a newly established construction engineering program to an enrollment of more than 130 undergraduates and 15 graduate students, and raised more than \$1.6 million in endowments. He had spent the previous 15 years at the University of Texas at Austin; three of those years he was associate chairman of the Department of Civil, Architectural and Environmental Engineering.

Gibson's experience also includes work as a project engineer for Texas Instruments and the U.S. Army Corps of Engineers. He holds an MBA in engineering management from the University of Dallas and a Ph.D. in civil engineering from Auburn University.

Twice named the Construction Industry Institute's Researcher of the Year, Gibson is a licensed professional engineer and a Fellow in the American Society of Civil Engineers. He was elected to the National Academy of Construction in 2005 as its youngest member.

He has won several teaching awards, including the Construction Industry Institute's Instructor of the Year and the National Society of Professional Engineers' Outstanding Engineering Educator.

Paying it forward

Mark Shiya graduated from ASU's construction management program in 1971. Five years later, he and friend, Bob Strepshans quit their jobs to start their own underground pipeline contracting company, Shiya-Strepshans Contracting Inc. The rest is history.

Celebrating 30 years of service in 2006, their business integrity and industry knowledge built a corporation that has developed into one of the largest and most well respected contractors in Arizona. Sadly, one year later, Mark Shiya passed away.

Bob Strepshans, now president of Shiya-Strepshans Contracting Co., wanted to honor his long-time business partner and friend, and to acknowledge the great impact that Mark had made on the industry as well as the community.

Through a generous gift of \$50,000 to the Ira A. Schools of Engineering to support the construction of a new facility for the Del E. Webb School of Construction, he feels that he is doing just that. Strepshans is excited to be able to give back to the community and hopes this donation will allow another generation of contractors to contribute to further the growth of Arizona.

"I am proud of my involvement in the development of this valley; we've been around a long time, and while there have been ups and downs, we've done well," he says.

Mark Shiya was an annual scholarship donor and active member of the DEWSC's Industry Advisory Council, which continues to serve and guide the construction program in selecting progressive curriculum options, funding, marketing expertise, and promotion of its mission.

"The gift from Shiya-Strepshans is an incredible testament to the commitment from the construction industry for our construction management program," says Paul Johnson, Engineering Executive Dean. "It has even greater meaning as it was made in recognition of Mr. Strepshans' late business partner, Mark, who was a graduate of the Del E. Webb School of Construction and member of their Industry Advisory Council."

New Faculty



Georgios Fainekos

Assistant Professor
School of Computing, Informatics, and
Decision Systems Engineering

Ph.D. Computer and Information Science
University of Pennsylvania 2008
B.Sc. & M.Sc. Mechanical Engineering
National Technical University of Athens
M.Sc. Computer and Information Science
University of Pennsylvania

Before joining ASU Dr. Fainekos held a Postdoctoral Researcher position at NEC Laboratories America in the System Analysis & Verification Group. He previously held a Postdoctoral Researcher position at NEC Laboratories America in the System Analysis & Verification Group. He was finalist for the best student paper in ICRA 2007, and recipient of the 2008 Frank Anger Memorial ACM SIGBED/SIGSOFT Student Award.

Current research interests focus in the area of Cyber-Physical Systems, to include formal methods and logic, control theory and hybrid, embedded and real-time systems with applications to robotics and unmanned aerial vehicles. =

"The very active and diverse research environment provides an opportunity to collaborate with numerous faculty whose work borders my research interests as well as with industry partners. I think the concept of the New American University is exciting."

Pitu Mirchandani

Professor
School of Computing, Informatics, and
Decision Systems Engineering

Sc.D. Operations Research, MIT
B.S. Engineering
University of California, Los Angeles

Dr. Mirchandani joined ASU from a similar position in the College of Engineering at the University of Arizona. He is also the Director of the ATLAS (Advanced Transportation and Logistics: Algorithms and Systems) Research Laboratory.

Over 30 years of academic and professional experience including theories, models and algorithms in networks, logistics, location and scheduling, transportation engineering, and real-time information and control systems. A principal investigator on a large number of research programs, receiving total funding of over seven million dollars in the last 12 years and the support of federal, state and private agencies.

"I came to ASU because this is a big urban metropolitan area, where urban services need to be better and more efficiently managed and I think I can help."

David Nielsen

Assistant Professor
School of Mechanical, Aerospace,
Chemical and Materials Engineering

Postdoctoral Fellow, MIT, 2006 – 2009
NSERC Fellow, Prather Research Group
Ph.D. Chemical Engineering
Queen's University at Kingston 2006
B.S. Chemical Engineering
University of Colorado at Boulder 2001

Dr. Nielsen was previously in the Chemical Engineering department at MIT. In 2006, he received the Xiaoting Liu Award from Queen's University, Chemical Engineering Department, for "enhancement of the quality of the teaching and learning environment for students".

Current research interests are in the development of bio-based technologies for the production of fuels and fine chemicals. This focus encompasses work at the molecular scale, engineering bacterial metabolism to produce new products; as well as work at the process scale, exploring design solutions to enhance productivity and economical product separations.

"I was attracted to the Ira A. Fulton Schools of Engineering because of its exciting research atmosphere and multi-disciplinary approach to the world's most pressing problems. Already I find myself forming collaborations with researchers of other specialties that I never before imagined possible."

Dr. Bernard Harris visits science summer camp.



Astronaut's new mission: inspiring youngsters



An appearance by veteran NASA astronaut, scientist, physician, and educator Dr. Bernard Harris was the highlight at summer science camp for nearly 50 Arizona middle school students. The campers heard tales of his experiences as an astronaut and the adventures of space exploration. ASU's Ira A. Fulton Schools of Engineering was selected as one of the 30 national hosts for the camp because of its continuing commitment and growing efforts to promote education in science, technology, engineering and mathematics (STEM) for K-12 students in local communities.

Key to the program is raising awareness among youngsters about career possibilities in STEM careers as well as to nurture students' leadership potential, creative problem-solving, citizenship skills, and their abilities to work in teams. To participate, students had to be academically qualified, recommended by their teachers as genuinely interested in math and science, and complete a competitive selection process. More than 200 applications were received.

This year's camp introduced the topic of sustainability, offering insight into some of the ways that solar energy impacts our ability to support and preserve life, as

well as a glimpse of ASU's leading efforts in sustainable research and education. "We're providing these students with an amazing two weeks on our campus, and working to help develop the next generation of creative thinkers and inventors," said executive camp director Stephen Rippon, the engineering school's assistant dean of student services.

Harris was a crew member on a Space Shuttle Columbia mission in 1993, and on a Space Shuttle Discovery mission in 1995, the first flight of the joint Russian-American Space Program. On the latter mission he became the first African-American to walk in space. In all, he has logged 438 hours and traveled more than 7.2 million miles in space.

He now is chief executive officer and managing partner of Vesalius Ventures, Inc., a venture capital firm that invests in health care technologies and companies, and founder of the Harris Foundation, a nonprofit organization that supports math and science education, and crime prevention programs for America's youth. He also is on the board of the National Math and Science Initiative and the National Space Biomedical Research Institute.



Rocketry club wins top award at NASA competition

The ASU student rocketry club Daedalus Astronautics won the “closest to altitude” award at the National Aeronautics and Space Administration’s 2009 University Student Launch Initiative rocket competition.

Seven club members traveled to NASA’s Marshall Space Flight Center in Huntsville, Ala., to compete last April. The Daedalus rocket reached one mile and 13 feet, beating 18 other colleges and universities across the country, including Auburn University, Iowa State University, University of Alabama and Florida Institute of Technology.

The competition is designed to inspire students to pursue careers in science, technology, engineering and mathematics, all areas of expertise deemed critical to NASA’s mission.

The ASU team, made up of about 20 engineering students, most studying aerospace and mechanical engineering, competed with students from other colleges and universities across the country. Teams had to design, build and launch a reusable rocket with scientific payload (cargo) and try to reach an altitude of one mile. They were evaluated on rocket performance, design, and scientific value of the payload.

“We enrolled in this competition to give our new members a chance to take charge in the design, construction and launch of a high-powered sounding rocket,” said James Villarreal, founder of the club.

Daedalus Astronautics also recently garnered recognition when Villarreal won a top prize at the American Institute of Aeronautics and Astronautics Foundation International Student Conference.

The team’s participation was made possible by sponsorship from Raytheon Corp., Orbital Sciences Corp., ATK, and Freescale Semiconductor.



Daedalus is a student-run organization dedicated to the design, manufacture, and launching of sounding rockets.



Mechanical engineering student Paul Phelps works on a flywheel-based tire pump device that attaches to an automobile wheel.

Use-inspired design: student innovation

ASU mechanical engineering students who enroll in the program's design classes quickly discover their creative side. During the two-semester course, students must complete a rigorous, hands-on project to design and build a device that meets a set of performance specifications.

Students perfect their design throughout the course's first semester, progressing from handmade paper sketches to a complete three-dimensional, computer-aided design model. Using the undergraduate MAE machine shop in the final semester, students construct and assemble their designs based on the drawings each student group creates.

One such project challenged students to produce a device that would automatically maintain optimal automobile tire pressure using the tire's own rotation as a power source.

Studies indicate that properly inflated tires could collectively save American drivers four million gallons of gas per day, while also extending the life of their vehicles' tires by as much as 25 percent.

On a \$375 budget, students built a prototype device that protruded no more than six inches from the tire surface, and designed a system easy to mount and dismount – in less than 15 minutes – using standard household tools. The goal was to maintain a minimum inflation rate of one pound per square inch (psi) for every three miles driven.

The project “showed both how important and difficult it is to design for manufacturing and cost, as well as performance,” student Jim Cunningham says. “This experience will make us all more prepared for the real engineering world.”



Engineering freshmen attend E² summer camp in August 2009.

Freshman camp experience supported by alumni generosity

In the summer of 2008, the Ira A. Fulton Schools of Engineering launched E² (Engineering Experience) Camp to help acclimate our new students to ASU and create a sense of community before they even set foot in the classroom.

The inaugural E² Camp welcomed more than 700 engineering freshmen to the Ira A. Fulton Schools of Engineering. Students were introduced to the global mission of the Ira A. Fulton Schools of Engineering. They participated in team projects, physical challenges, competitions and workshops, and interacted with faculty members and student mentors.

"Students arrived at the camp as strangers," said engineering dean Deirdre Meldrum, "and left energized and engaged."

Based on the overwhelming first year E² Camp success, the engineering school decided to make it a permanent component of the undergraduate experience.

Alumni were encouraged to sponsor an incoming student to attend E² Camp in an effort to generate the financial support

needed to sustain this unique experience. Engineering alumnus Tom Prescott did just that – many times over – with a generous \$1,500 gift.

"Several keys to America's global competitiveness are found in education and our entrepreneurial culture," Prescott says. "We were happy to support the E² Camps this year as they address both."

Graduating in 1980 with a bachelor's degree in civil engineering, Mr. Prescott is currently president and C.E.O. for Align Technology Inc., a global medical-device company that pioneered the invisible-orthodontics market with the introduction of the Invisalign® system, a clear, removable orthodontic-treatment option for straightening teeth.

"These new ASU Engineering students were able to get a fast start as future technology leaders as well as grounding in ASU's commitment to creating an entrepreneurial culture," says Prescott.

If you are interested in supporting the 2010 E² camp, please call 480-965-9646 or visit engineering.asu.edu/development.

Support our vision

Investments to the Ira A. Fulton Schools of Engineering provide the backbone of support that enables our academic units to remain a guiding force in the engineering community. With your help, our faculty and students have even better opportunities to think big and set high goals. They can work on bold ideas and complex problems, collaborate with industry leaders and participate in real-world projects that strengthen our communities and the world we live in today.

To learn more about how you can support our efforts, please contact:
Charles Silver
charles.silver@asu.edu
480-965-9449.



2010

DEAN'S SPRING LECTURE SERIES



The 2010 Dean's Spring Lecture Series is brought to you by the Ira A. Fulton Schools of Engineering at Arizona State University. All lectures are held on the Tempe campus and are free and open to the public. Space is limited so reservations are required. All lectures begin at 5 p.m., and will be held at the University Club, Tempe, AZ. Light refreshments are served prior to the lecture to allow you to meet our guest lecturer.

Register online at engineering.asu.edu/lectureseries or by calling 480.727.8871.

Lecture 1

Thursday, January 28, 2010

Commercializing University Research - It's Not as Easy as it Looks

Michael N. Kozicki, Ph.D.

Professor, Director of The Center for Applied Nanoionics
School of Electrical, Computer, and Energy Engineering

The university, by its very nature, is perhaps the most ideal environment for the generation of ideas. It may seem incongruous that most of the world's great inventions do not have their genesis in academia but originate instead from industry.

Hear from Michael Kozicki as he discusses how the tide is slowly turning as use-inspired research takes its place among the traditional academic pillars on campuses across the globe. This talk – part technology, part Greek tragedy, part feel good movie of the year – will describe his journey from the classroom to the boardroom.

Lecture 2

Thursday, February 18, 2010

Innovations in Addressing Our Nation's Aging Underground Infrastructure Systems

Samuel T. Ariaratnam, Ph.D., P.E.

Professor, Del E. Webb School of Construction, School of Sustainable Engineering and the Built Environment

Deterioration of our nation's aging underground infrastructure network is a critical societal issue. Unfortunately, maintenance and rehabilitation of these buried utilities is often neglected.

Join Sam Ariaratnam as he discusses innovative technologies that provide minimally-intrusive "greener" solutions to installing and repairing our underground infrastructure systems.

Lecture 3

Thursday, March 11, 2010

Exploiting the Beautiful Complexity of Nature to Revolutionize Health Care

William Ditto, Ph.D.

Interim Director
School of Biological and Health Systems Engineering

The intricate and complex nature of biological systems can be harnessed to better the human condition. We are only just now realizing the true potential of biomedical research.

Dr. Ditto will be presenting a glimpse of the present and near future of the coming revolution in medicine and how ASU and the new School of Biological & Health Systems Engineering is quickly becoming a leader in redefining medicine, engineering and health care.

FIRST LEGO League

FIRST LEGO League (FLL) is a global program that introduces 9-14 year old students to real-world engineering challenges by building LEGO-based robots. Arizona FLL kicked off the 2009 season in September. In 2008, nearly 1,200 Arizona youth participated in the program.

The Ira A. Fulton Schools of Engineering are coordinating and hosting all 2009 events, including the State Championship Tournament, December 12th on ASU's Tempe campus.

engineering.asu.edu/k12outreach/fll

Ira A. Fulton Schools of Engineering Alumni Chapter

The Engineering Alumni Chapter serves as a means for you to stay in touch with classmates and graduates from the Ira A. Fulton Schools of Engineering at ASU. Joining the Engineering Alumni Chapter also lets you build a network of valuable contacts in your industry. Our goal is to keep you informed and connected.

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Join Us!

If you are interested in attending or would like to volunteer to help at any of our upcoming events, please contact Cassius.McChesney@aps.com or visit engineering.asu.edu/alumni.

In memoriam

Warren Rice, an emeritus professor of mechanical and aerospace engineering who was on the faculty of Arizona State University for more than 30 years, lost his battle with cancer on June 5, 2009.

Rice was at ASU from 1958 until 1990, and was one of the early leaders of engineering research at the university. He had numerous significant research publications, and was recipient of several top teaching awards including the Faculty Research Award for the then-College of Engineering and Applied Science, the ASU Graduate College Distinguished Research Award, and the ASU Alumni Association Faculty Achievement Award.

A member of the American Society of Mechanical Engineers, Rice also was honored as the ASU Pi Tau Sigma Professor of the Year and the ASU Golden Key Honor Society Distinguished Teacher Award.

Acknowledgement of Rice's accomplishments in engineering was reflected by high demand for his expertise, which included some of the early efforts in environmental engineering. He was a consultant to numerous companies, universities and research programs from 1948 to 2000.

Viewpoint

As he addressed a record crowd during ASU's Spring 2009 commencement ceremony, President Barack Obama praised the efforts of Engineering faculty and students working to provide medical devices to villagers in Malawi, Africa (see article, p.4).

In this photo, the president congratulates students who are part of the President Barack Obama Scholars program at ASU. Nearly 160 engineering students currently participate in the program, which provides financial support for eligible, high achieving students from Arizona high schools.

<http://promise.asu.edu/obamascholars>



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What's news?

We want to know – and your fellow alumni do too!

E-mail us at full.circle@asu.edu to share news about a new job, new home, new addition to your family or other updates you would like to have included in a future edition of Full Circle magazine. Be sure to include the year you graduated, as well as your degree and major. We look forward to hearing from you! (submissions may be edited for length or content)

Full Circle is online

Be sure to visit fullcircle.asu.edu and bookmark the site for future visits. If you'd like to be notified when each new edition is available online, e-mail full.circle@asu.edu and provide your name, e-mail and/or physical mailing address.

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