AROUND THE SCHOOL ONLINE EDITION

a supplement to *Pitt Engineer*, the alumni magazine of the University of Pittsburgh Swanson School of Engineering

Mark Redfern

Mark Redfern, W.K. Whiteford Professor of Bioengineering, has been appointed associate dean for research in the Swanson School of Engineering, effective August 1, 2008. Redfern came to Pitt in 1988 after earning his PhD in bioengineering from the University of Michigan. His primary appointment is in the Department of Bioengineering, where he serves as vice chair, but he also holds appointments in otolaryngology in the School of Medicine and in rehabilitation sciences and technology in the School of Health and Rehabilitation Sciences.

Redfern's research in the Human Movement and Balance Laboratory, which is housed in the Swanson School, is focused in two areas: human postural control and ergonomics. The major goal of his postural control research is the prevention of falling injuries by investigating the factors that influence balance.

Redfern is an associate editor of several journals, including the *Journal of Applied Biomechanics* and *IEEE Transactions on Rehabilitation Engineering.*

In announcing the appointment, U.S. Steel Dean of Engineering Gerald D. Holder said, "In addition to being one of the most outstanding teachers in the school, Mark has a distinguished record of research with dozens of federal grants, particularly from [the National Institutes of Health], and a very strong record of publication in the top journals in his fields of ergonomics and biomechanics. I am confident that Mark will bring leadership, energy, and enthusiasm to the research initiatives in the school, helping us to achieve academic excellence in this domain."

Bioengineering

In conjunction with the McGowan Institute for Regenerative Medicine, the Department of Bioengineering will host the 8th Midwest Tissue Engineering Consortium (MTEC) conference April 3–4, 2009. The conference will showcase recent scientific advances in regenerative medicine and will cover the wide range of topics that define the interdisciplinary field of tissue engineering. The consortium will feature presentations from leading scientists; papers and posters by graduate students, postdoctoral fellows, and junior faculty; and networking opportunities. More information about the conference, including submission deadlines, is available online at www.mirm.pitt.edu/mtec/.

Steven Abramowitch, assistant professor, was an invited speaker in a roundtable titled "Pelvic Floor Modeling: Engineering Meets Medicine," held during the International Urogynecological Association 2008 annual meeting in Taipei in September. This was Abramowitch's third international invited lecture in a year on the topic of pelvic floor disorders.

Alan Russell, professor of bioengineering and chemical engineering and University Professor of Surgery, was named codirector of a new federally funded institution, the Armed Forces Institute of Regenerative Medicine (AFIRM). Codirecting with Russell, who also serves as director of the McGowan Institute for Regenerative Medicine, is Anthony Atala, director of the Wake Forest Institute for Regenerative Medicine. AFIRM will be dedicated to repairing battlefield injuries through the use of regenerative medicine, science that takes advantage of the body's natural healing powers to restore or replace damaged tissue and organs. Therapies developed by AFIRM also will benefit people in the civilian population with burns or severe trauma due to illness or injury. Other Swanson School faculty involved include **Prashant Kumta**, the Edward R. Weidlein Chair, and **William Wagner,** professor of bioengineering, chemical and petroleum engineering, and surgery. More information about AFIRM is available online at www.mirm.pitt.edu/news/article.asp?qEmpID=287.

Wagner has been named a fellow of biomaterials science and engineering by the International Union of Societies for Biomaterials Science and Engineering (IUS-BSE) in recognition of his work applying biomaterials science and engineering principles to address cardiovascular disease and for his leadership in the international biomaterials community. Wagner, who received his nomination from the Society for Biomaterials, is the first IUS-BSE fellow from the University of Pittsburgh. The recognition ceremony occurred at the Eighth World Biomaterials Congress in Amsterdam, the Netherlands. Fellows, accomplished scientists and role models in the field of biomaterials science and engineering, are announced and recognized every four years when a world biomaterials congress is held. IUS-BSE is an international body that brings together national and multinational groups dedicated to the advancement of biomaterials, surgical implants, prosthetics, artificial organs, tissue engineering, and regenerative medicine.

Michael Sacks, William Kepler Whiteford Professor, was named a 2008 fellow of the American Society of Mechanical Engineers (ASME), an organization with more than 127,000 members. Fellow status is the highest elected grade of membership in ASME. Sacks also received a 2008 University of Pittsburgh Chancellor's Distinguished Research Award and will give the Richard Skalak Bioengineering Colloquium at Columbia University. The Richard Skalak Biomedical Engineering Colloquium was established in 1996 to honor Skalak for his contributions to Columbia University and his accomplishment in the development of biomedical engineering at Columbia.

Savio L-Y. Woo (below left), University Professor of Bioengineering and director of Pitt's Musculoskeletal Research Center (MSRC), received an honorary professorship from Beijing University of Aeronautics and Astronautics (BUAA). BUAA President Li Wei, a member of the Chinese Academy of Engineering, conducted the ceremony, and Dean Fan of the School of Biological Science and Medical Engineering introduced Woo. The honor was bestowed upon Woo for his many contributions to biomedical engineering as well as his dedication to education. Woo also will serve as chair of the International Advisory Committee of the School of Biological Science and Medical Engineering at BUAA.

Woo delivered the keynote address at the 2008 Pre-Olympic Congress of the International Convention on Science, Education and Medicine in Sports (ICSEMIS) in Guangzhou, China, which was attended by more than 2,000 people.

Marina Kameneva, professor, has been elected a council member of the International Society of Biorheology.

Rakié Cham has been awarded tenure and promoted to the rank of associate professor of bioengineering at the Swanson School.

Tracy Cui, assistant professor, received funding for her National Institutes of Health (NIH) R01 application for "Improving the Chronic Neural Recording via Biomaterial Strategies."

Richard Debski, associate professor, received a Faculty Partner Award from Career Services for excellent work in helping to establish a network of companies offering employment and internship opportunities for bioengineering undergraduates.

Assistant Professor **Lance Davidson**'s Beginning Grant-in-Aid proposal to the American Heart Association, "Role of Fibronectin during Pre-cardiac Cell Migration and Establishment of the Heart Forming Region," has been awarded funding for two years.

Chemical and Petroleum Engineering

J. Karl Johnson has been named interim chair of the department. Johnson joined the University of Pittsburgh in 1995 after completing a National Research Council Research Associateship Program at the U.S. Naval Research Laboratory. During the past 13 years, he has conducted research on the molecular modeling of complex systems using the tools of statistical mechanics, quantum mechanics, and equations of state, with an overall goal of developing accurate engineering models that have a sound theoretical basis. Johnson is the leader of a multi-university grant through the U.S. Department of Energy (DOE) to study hydrogen storage in complex metal hydrides and a new National Science Foundation (NSF) grant to study separation and transport of gases using carbon nanotube-based membranes. He has been actively involved in promoting simulation and modeling across the University as codirector of the Center for Molecular and

Steven Little

Materials Simulations and the new University-wide Center for Simulation and Modeling. He also received a 2008 DOE Hydrogen Program R&D Award "in recognition of outstanding contributions to hydrogen storage technologies." Johnson holds a PhD in chemical engineering from Cornell University and is a W.K. Whiteford Professor and National Energy Technology Laboratory (NETL) Faculty Fellow.

Steven R. Little, assistant professor and Bicentennial Alumni Faculty Fellow, received a 2008 Beckman Young Investigators award from the Arnold and Mabel Beckman Foundation for his ongoing effort to create particles that would behave as natural cells do to carry out specific tasks. The foundation is named for renowned scientist Arnold Beckman, inventor of the pH meter and pioneer of Silicon Valley, and awards novel work with far-reaching potential. The award includes a three-year grant of $300,000.

As part of a $36 million commitment by DOE toward 15 projects aimed at furthering the development of new and cost-effective technologies for the capture of carbon dioxide (CO2) from the existing fleet of coal-fired power plants, **Eric Beckman**, George M. Bevier Professor of Engineering and codirector, Mascaro Center for Sustainable Innovation; **Bob Enick**, Bayer Professor; and Johnson will assist General Electric Co. in the development of new solvents for the efficient absorption of CO2 from gas mixtures. Johnson will provide molecular modeling that will guide the synthesis of new solvents with a strong affinity for CO2, Beckman will lead the efforts to synthesize these solvents, and Enick will assess the solubility of CO2 in the solvent and the viscosity of the solvents that are saturated with CO2. More information about these projects is available online at www.fossil.energy.gov/news/techlines/2008/08030-CO2_Capture_Projects_Selected.html.

Joseph McCarthy, associate professor and William Kepler Whiteford Faculty Fellow; **Robert Parker**, associate professor; and **Mary Besterfield-Sacre**, associate professor of industrial engineering, were awarded the 2008 Carnegie Science Center Award for Excellence in the university/postsecondary educator category for their innovative work in redeveloping the undergraduate chemical engineering curriculum. Called the Pillars Curriculum, the first-ever fully integrated chemical engineering curriculum, it follows the block scheduling model, a technique with a strong literature base and proven track record in K–12 education. The courses have considerably longer contact hours than a traditional university course so that (1) students may gain systems insight as early as the sophomore year through integration of their core knowledge across traditional course and discipline boundaries, (2) the instructors have the time to include truly multiscale—from molecular to continuum to macroscopic—descriptions of chemical engineering content, and (3) the instructors have the flexibility to accommodate diverse learning styles and incorporate active learning more effectively. In this way, McCarthy, Parker, and Besterfield-Sacre have built not only a better chemical engineering curriculum but also a better engineering model. The team was featured on Our Region's Business, produced by the Allegheny Conference on Community Development and WPXI-TV. Visit www.engr.pitt.edu/news/media to view the interview.

Di Gao, assistant professor and William Kepler Whiteford Faculty Fellow, received a Revolutionary Genome Sequencing Technologies grant from the National Human Genome Research Institute (NHGRI) for basic research on breakthrough technologies that will enable a human-sized genome to be sequenced for $1,000 or less. Gao's team will lay the groundwork to prove basic principles for a technology where DNA strands are pulled away from a solid surface when stretched by an electric field. When the stretching force exceeds a certain value, which is proportional to DNA length, the DNA strand would be released from the surface and detected by fluorescence. The order in which strands are released allows the instrument to identify the sequence of base pairs.

Di Gao

Civil and Environmental Engineering

Melissa Bilec, assistant professor; codirector, Center for Sustainable Transportation Infrastructure; and assistant director of education and outreach, Mascaro Center for Sustainable Innovation, and **Amy Landis**, assistant professor, received funding through the Green Building Alliance for their research project, "Investigating the Environmental Life-cycle Assessment, Performance, and Life-cycle Costing of Expanded Polystyrene for Construction Materials and Supplies: Focus on Insulating Concrete Forms (ICFs)." Using life-cycle assessment and life-cycle costing, Bilec and Landis will perform a comparative analysis of ICFs and traditional construction methods to assess the products' environmental and economic performance. Their models will provide suggestions for manufacturing improvements to ICFs' environmental and economic impacts. They are collaborating with Tegrant Corp. to generate independent third-party data of Tegrant's ICF product.

Landis and Bilec also are working together on the Biodiesel Fuel Feasibility Study, which is funded through the intergovernmental agreement (IGA) Pitt has with the Pennsylvania Department of Transportation (PennDOT). The objective of this project is to advise PennDOT during its District 8 pilot fleet transition to biodiesel. The University will provide information and recommendations on best practices for current biodiesel (B5) implementation and for other possibilities for biodiesel implementation, including additional biodiesel formulations (e.g., B20, B100) and the relationship between manufacturers' recommendations and warranties. The University also will offer recommendations with respect to measures to be taken to meet 2010 federal emissions requirements. The analysis will include information on economic and environmental impacts as well as a performance evaluation for the pilot study and statewide implications. Collaboration with other state agencies, such as the Department of Environmental Protection, is anticipated.

Landis; Bilec; and **Joe Marriott**, assistant professor, received funding from the National Collegiate Inventors and Innovators Alliance (NCIIA) to create a new class, Beyond Design for the Environment: Improving Products, Processes, and Actions. The course will examine the understanding of the social, economic, and environmental impacts between product and process design decisions and will contain a dynamic mix of authentic learning and hands-on Design for the Environment laboratory experiments that are infused with real-world interactions. The engineering teams will partner with local green industries and organizations to identify and engineer relevant

Melissa Bilec, Joe Marriott, and Amy Landis

product and process innovations and/or improvements. The aim of the course is to encourage students to gain an understanding of how their actions and designs can have a significant impact on global sustainability efforts.

Bilec and Marriott are working on the research project "Market Analysis of Construction Materials with Recommendations for the Future of the Industry," which is funded through the IGA Pitt has with PennDOT. The objective of this work is to perform a market analysis and forecast for key commodities used in the highway and bridge construction industries, including oil/asphalt, cement/concrete, steel, aggregates, and chemicals. This forecast will provide a basis for recommendations on future commodity use, new technologies, environmental issues, and construction practices and/or substitution commodities for PennDOT to consider for future development.

Kent Harries, assistant professor and William Kepler Whiteford Faculty Fellow, and **Jonathan Moses** (BSCE '04, MSCE '05) were awarded the Best Paper for FRP in New Construction at the December 2007 Asia-Pacific Conference on FRP in Structures held in Hong Kong. The paper was titled "Replacing a Composite RC Bridge Deck with an FRP Deck: The Effect on Superstructure Stresses."

Harries delivered an invited lecture, "FRP for Bridge Structures: U.S. Perspective," at a special workshop held in conjunction with the 4th International Conference on FRP Composites in Civil Engineering held in Zurich, Switzerland, in July 2008.

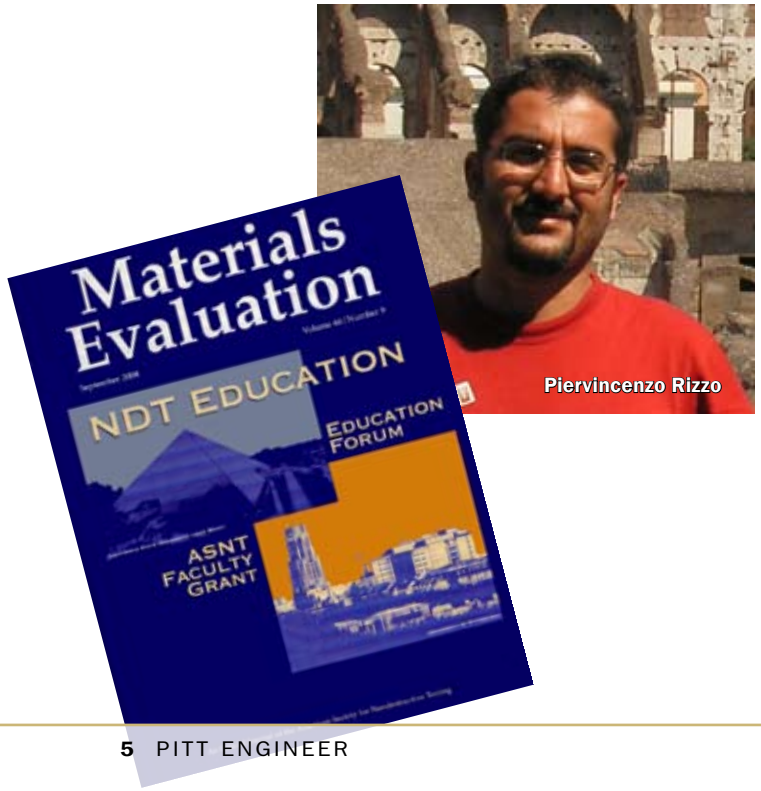
Harries also was elected to the council of the International Institute for FRP in Construction at its annual meeting in Zurich. He will serve a six-year term.

Xu Liang, associate professor, has been awarded a DOE grant for her research to study mega drought and its implications for climate change. Liang also has been

selected to serve on the Consortium of Universities for the Advancement of Hydrologic Science, Inc. 2008 Audit Committee. Additionally, Liang gave two keynote speeches, one at the QUEST Working Group in the Hydrological Cycle meeting in Totnes, Devon, United Kingdom, titled "What Determines the Partitioning of Precipitation between Runoff, ET, and Storage?: Hydrological Processes and Their Significance," and another at the first international Centre for Australian Weather and Climate Research Modelling Workshop on Physical Processes and Modelling of the Water and Carbon Cycle, held in Melbourne, Australia, on "Land Surface Modeling and Data Assimilation."

During the 37th IGIP (International Society for Engineering Education) Symposium in Moscow, Russia, **Dan Budny**, associate professor and academic director of the Freshman Engineering Program, received the International Engineering Educator Award. This award is given each year to the top engineering educators around the world, and Budny is only the second American to receive it. Budny also received the 2008 Outstanding Educator Award from the Swanson School of Engineering.

The September 2008 issue of *Materials Evaluation*, the journal of the American Society for Nondestructive Testing (ASNT), featured the University of Pittsburgh on its cover thanks to Assistant Professor **Piervincenzo Rizzo**, who received an ASNT faculty grant award to develop the course Introduction to Nondestructive Evaluation/ Structural Health Monitoring. The grant is for the development or innovation of a nondestructive testing/evaluation curriculum for undergraduates in an accredited engineering school.



Piervincenzo Rizzo

Rizzo has been awarded a 36-month NSF grant for "Collaborative Research: Novel NDE/SHM Approach Based on Highly Nonlinear Dynamics." The project is part of a collaborative effort between Rizzo and faculty at the California Institute of Technology. He also was awarded a 30-month grant from PennDOT for "Collaborative Research: Sensing Technology for Damage Assessment of Sign Supports and Cantilever Pole Structures." He coauthored two articles that appear in the *Encyclopedia of Structural Health Monitoring*. Additionally, Rizzo presented a paper at the Third International Conference "Smart Materials, Structures and Systems," CIMTEC 2008, held in Acireale, Sicily, Italy, and was invited to give a talk at the Department of Structural and Geotechnical Engineering at the University of Palermo, Italy.

Luis E. Vallejo, professor, and **J.S. Lin**, associate professor, are the principal investigators of a two-year project funded by PennDOT to study highway subsidence due to long wall mining.

Vallejo also was named to the editorial board of the international journal *Geomechanics and Geoengineering* and was invited by the Universidad de los Andes in Colombia to present a short course on pre-Columbian engineering.

Ronald D. Neufeld, professor, in collaboration with other engineering experts, published "Integrated Methodology of Design for Construction Site Sedimentation Basins" in the American Society of Civil Engineers (ASCE) *Journal of Environmental Engineering* (volume 134, number 8, pages 619–27). Neufeld also was appointed an associate editor of the *Journal of Energy Engineering*.

Radisav D. Vidic, professor and chair, was appointed to a William Kepler Whiteford Professorship effective September 1, 2008. This appointment is in recognition of Vidic's outstanding productivity as a senior member of the faculty and reflects his contributions to scholarship, graduate and undergraduate education, external research support, research quality, and diversity. Vidic was awarded a three-year research grant from DOE to study the use of treated municipal wastewater for cooling in thermoelectric power plants. This project is a collaborative effort with David Dzombak from Carnegie Mellon University and is a continuation of their current study that is evaluating the use of several impaired waters in cooling towers of thermoelectric power plants.

Associate Professor **Willie F. Harper, Jr.** made a significant breakthrough in understanding the biochemistry and microbial ecology of bacteria that remove ammonia from wastewater. Harper has been studying nitrification, the process of biologically removing ammonia from wastewater. Working closely with colleagues in microbiology and chemistry, he discovered that hydroxylamine, a key intermediate

formed during nitrification, can cause the microbial communities to become inhibited and disaggregated, ultimately interfering with the removal of ammonia. This exciting discovery may explain why nitrification suddenly fails. "The microbial communities that perform nitrification are widely regarded as being relatively weak and slow growing," Harper says. "These findings show that nitrifiers are sometimes inhibited—not because they are inherently fragile but because they produce an intermediate that can cause damage. The negative effects include disaggregation, a reduction in the number of functional genes, and a deleterious shift in the overall microbial ecology. These results may challenge our current thinking about nitrification and could have significant impact on the development of new and hybrid technologies being deployed for removal of ammonia from wastewater." This research was performed as part of an interdisciplinary collaboration of engineers, chemists, and microbial ecologists at the University of Pittsburgh, Auburn University, the Technical University of Denmark, and the Université de Lyon and is in press for publication in *Biotechnology & Bioengineering*.

Harper also recently received an NSF Faculty Early Career Development (CAREER) Award.

Larry Shuman, professor and senior associate dean for academic affairs, is principal investigator on a Fund for the Improvement of Postsecondary Education (FIPSE) grant, which is funded through the U.S. Department of Education and will be administered by Bilec, assistant professor of civil and environmental engineering, and **Kristine Lalley**, director of international engineering initiatives, with support from the Mascaro Center for Sustainable Innovation. FIPSE allows for an exchange program between two academic institutions and fosters international graduate and undergraduate academics. Currently, four students from Brazilian universities are studying at the Swanson School, and three Swanson School students will study in Brazil in spring 2009. The program is open to all engineering majors interested in sustainable and innovative design.

Electrical and Computer Engineering

Marlin H. Mickle, Nickolas A. DeCecco Professor and executive director of the RFID Center of Excellence; **Peter J. Hawrylak**, research associate; and students in the RFID Center of Excellence are developing a system to improve bridge safety and streamline the bridge inspection process. Specifically, the system will monitor for scouring in and around bridges. This project is funded by PennDOT and is being completed in conjunction with Bilec.

Allen C. Cheng, assistant professor, was awarded a research grant from Microsoft Research to support his interdisciplinary research project, titled "A Mobile Platform for Continuous Real-time Monitoring and Automatic Detection of Cardiovascular Disease." Cheng also received an NSF grant to develop self-adaptive threat detection techniques for bio-implantable system-on-a-chip.

Marlin Mickle

Kevin P. Chen has been awarded tenure and promoted to the rank of associate professor. Chen is an expert in fiber optic sensors, radio isotope-based micro power systems, and ultra-fast laser processing and is a recent recipient of an NSF CAREER Award, among other honors.

C.C. Li, professor, earned American Association for the Advancement of Science (AAAS) fellow status.

Gregory Reed (PhD '97) has been appointed director of the Power and Energy Initiative in the Swanson School and associate professor of electrical and computer engineering. As director, Reed will provide the vision and leadership for the school's multidisciplinary activities surrounding the initiative's educational, research, and outreach components, and he will teach courses on power and energy engineering. Prior to his appointment at Pitt, Reed served as senior vice president of the Power System Planning and Management Group at KEMA, Inc., an international company providing power and energy consulting, technology implementation, and market knowledge expertise. He is a recognized authority and worldwide industry leader in the development and application of advanced power electronics systems; power transmission; and distribution, generation, and industrial systems technologies. He has authored or coauthored more than 50 published papers and technical articles in the areas of electric power system analysis and the applications of power systems technologies. Reed is an active member of the IEEE Power Engineering Society, participating in various committees, task forces, and working groups and serving currently as the education working group chair for the IEEE Power and Energy Engineering Workforce Collaborative. He also is a member of the American Society for Engineering Education (ASEE).

Industrial Engineering

On October 3, 2008, more than 100 faculty, staff, alumni, and friends gathered on the 10th floor of Benedum Hall for a special dedication ceremony. The latest and most advanced instructional facility in the Swanson School officially was dedicated as the new Albert G. Holzman Learning Center, named in honor of the former professor and department chair who served for more than two decades in this role. Holzman also was the first industrial engineer to be elected to the National Academy of Engineering.

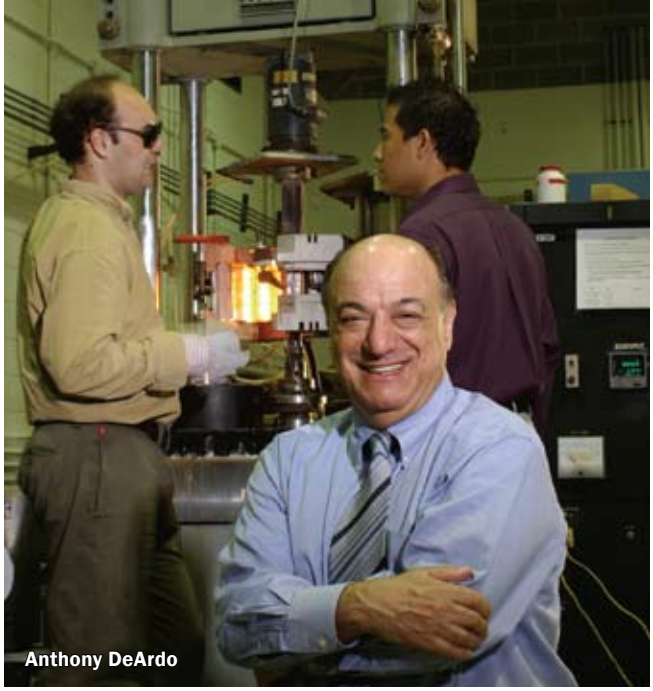
The facility consists of a smaller executive classroom with movable tables and laptops and a larger teaching facility with team-based workstations, two LCD projectors, and a digital tablet that allows the instructor to draw directly over illustrations or notes projected on the screen or on the students' computers. IE department chair and Ernest Roth Professor **Bopaya Bidanda** says the Holzman Learning Center creates a distinct advantage for Pitt's IE program. "We are truly fortunate to have such a remarkable teaching space. Our students and faculty now have one of the best facilities anywhere, and we are especially grateful to those alumni and friends who helped make this possible. Not only is it a great resource to us, but it has given us the opportunity to honor the memory of Al Holzman in a way that honors all he accomplished."

Mary Besterfield-Sacre, associate professor, received a new grant from NSF for "Assessing Technical Entrepreneurship Learning in Engineering Education." Besterfield-Sacre will collaborate with NCIIA on this Phase II Course, Curriculum, and Laboratory Improvement project, which will contain three steps. First, the team will conduct a nationwide study to determine the status of entrepreneurship education in 330 engineering schools across the United States and, using this information, identify similar types of approaches and contexts using a clustering algorithm. Specifically, Besterfield-Sacre's team will collect information on programs and courses in entrepreneurship that are offered to engineering students, where these programs and courses are located within each university, other extracurricular learning opportunities and resources for entrepreneurship, and the individuals catalyzing entrepreneurship education in each context. Next, the group will select a representative sample of 30–35 schools and perform an in-depth cross-institutional analysis of students' learning in upper-level engineering courses that address entrepreneurship and related topics. It will do this by administering two assessment instruments that have been developed under separate funding: a knowledge inventory that measures self-reported familiarity with entrepreneurial concepts and terms and an entrepreneurial "mind-set" rubric that appraises students' written responses to engineering-based entrepreneurship cases. Through statistical and modeling efforts, student outcomes will be mapped directly to teaching practices and institutional characteristics. The results will be used to develop guidelines for best practices in teaching, program development, and assessment and will be disseminated through influential faculty and entrepreneurial leaders in engineering. Dissemination will include workshops and training materials for faculty, tools for evaluation of learning outcomes, and detailed information on the status of entrepreneurship education programs across the country.

Besterfield-Sacre and 16 engineering students from the University of Pittsburgh; Penn State University; Carnegie Mellon University; University of Texas, Austin; University of California, Davis; and Humboldt State University traveled to Brazil for 10 days in August 2008. Besterfield-Sacre taught a course through the International Association for the Exchange of Students for Technical Experience (IAESTE) program that investigated renewable energy sources such as hydroelectric, wind, and alternative fuels by exploring Brazil's use of sustainable and clean power. Students engaged in dialogue with Brazilian sustainable energy industry leaders and experienced Brazil through a variety of cultural and educational activities. The group is pictured below at the Itaipu Dam.

Jeffrey Kharoufeh, associate professor, has received a three-year NSF grant for "A Mathematical Framework for the Performance Evaluation of Large-scale Sensor Networks." Before joining the department in fall 2008, Kharoufeh was an associate professor of operations research with tenure at the Air Force Institute of Technology Graduate School of Engineering and Management and was on the faculty at Northeastern University.

Mary Besterfield-Sacre (second from left) with students at the Itaipu Dam in Brazil


Anthony DeArdo

Mechanical Engineering and Materials Science

Jörg Wiezorek, associate professor and William Kepler Whiteford Faculty Fellow, was awarded funding from the DOE Office of Basic Energy Sciences to conduct a research project titled "Electron Density Determination, Bonding and Properties of Tetragonal Ferromagnetic Intermetallics." This effort combines quantitative experimentation by transmission electron microscopy (TEM), X-ray diffraction (XRD), and magnetometry with materials theory to study relationships between the electronic structure and intrinsic properties of the tetragonal ferromagnetic intermetallics FePd and FePt. The isostructural tetragonal L10-phases of FePd and FePt are model systems for basic research of details of interactions of 3d (Fe) electrons with 4d (Pd) and 5d (Pt) electrons and their role for key materials properties. This research advances state-of-the-art quantitative electron beam and X-ray diffraction; provides new experimental data uniquely suited for the critically needed evaluation of competing computational models; and enables development of improved, robust materials theory tools for reliable and ideally predictive studies of L10-FePt and FePd. Application and extension of the experimental and theoretical tools resulting from this activity to other chemically ordered intermetallics and transition metal-based, solid-solution alloys involving d-electron atoms, especially those involving ferromagnetic species (Fe, Co, Ni), can impact advanced metals-based technologies of relevance for energy production and distribution, hydrogen production and storage, advanced catalysts, shape-memory devices, superconductors, and permanent magnets. This project involves a collaboration with Oleg Mryasov, currently at Seagate Technology LLC, and provides training and education of students and young researchers in areas of basic science and in technologies for the pursuit of research in design, synthesis, and discovery of novel materials, as well as to advance innovative electron beam methods.

Minking Chyu, chair; **Sung Kwon Cho**, assistant professor; **John Leonard**, assistant professor; **Jung Kun Lee**, assistant professor; **Ian Nettleship**, associate professor; and **Laura Schaefer**, associate professor, recently received multiple research grants from NETL to investigate nanofluid applications in heat exchangers, oil and gas deep drilling, and water recovery. Nanofluid is a fluid made of base liquid and nanoparticles. The nanoparticles improve the fluid's rheological, mechanical, and thermal properties because of unique particle-fluid interaction and suspension mechanism in micro and nano scales. The research group also is exploring the feasibility of using nanofluids to cool nuclear reactors and enhance thermal hydraulic stability.

Peyman Givi, William Kepler Whiteford Professor, was elected Pitt's representative to the Council of Institutions of the Universities Space Research Association (USRA). Additionally, he was an invited keynote lecturer at the Seventh International Symposium on Hazards, Prevention, and Mitigation of Industrial Explosions, held in St. Petersburg, Russia. His lecture was titled "Structure of Nonpremixed Turbulent Flames." Givi was a member of the program committee for Computational and Informational Technologies in Science, Engineering and Education (CTMM-2008) held in Almaty, Kazakhstan, and he offered a short course in the Department of Mechanics and Mathematics at El-Farabi Kazakh National University.

Givi also received two new grants, one from NASA Headquarters to research "Large Eddy Simulation of High-speed Turbulent Combustion via the Filtered Density Function" and another from NETL to complete the project "Assessment of Turbo-chemistry Models for Prediction of Fuel Composition Effects on GTC Emission."

Anthony J. DeArdo, William Kepler Whiteford Professor, and **C. Isaac Garcia**, research professor, have received a grant from the North American steel industry (AK Steel Corp., ArcelorMittal Foundation, Ellwood Group Inc., Nucor Corp., and United States Steel Foundation) to establish an undergraduate area of concentration in ferrous physical metallurgy within the materials science and engineering, mechanical engineering, and engineering physics majors. This initiative was created to educate and prepare future engineers to meet the demand of the workforce of the North American steel industry.

DeArdo and Garcia additionally received a grant from Nucor (USA) and Ternium (Mexico) to study the development of cost-effective, high-strength ERW steel line pipes for the oil and gas industry and have created a partnership with the University of Veracruz (Mexico) and Tenaris to educate five graduate students from Mexico.

DeArdo received a three-year appointment as a Distinguished Professor to the University of Oulu in Finland. He was one of the four professors from around the world selected by the Finland Distinguished Professor Programme (FiDiPro) to lead and advise a research project at a Finnish university.

Anne M. Robertson, associate professor, was coorganizer of the NSF-funded workshop Optimal Transport in the Human Body: Lungs and Blood. This workshop was part of a 14-week program on optimal transport hosted by the NSF Institute for Pure and Applied Mathematics (IPAM) at the University of California, Los Angeles.

Howard A. Kuhn, adjunct professor, received the 2008 Gold Medal from ASM International for "creative innovations in understanding and controlling deformation and fracture during metalworking, and for leadership in ensuring that these technologies become widely used in industry." The medal was established in 1943 to recognize outstanding knowledge and great versatility in the application of science to the field of materials science and engineering as well as exceptional ability in the diagnosis and solution of diversified materials problems.

A new assistantship in the Department of Mechanical Engineering and Materials Science (MEMS) has added to the number of MEMS students working in orthopaedic biomechanics. **Mark Carl Miller**, associate research professor, will advise David Weir (BSME '08), a MEMS graduate student who will be a research assistant to Christopher Schmidt at Allegheny General Hospital. Miller directs the orthopaedic research laboratory at Allegheny General, and Schmidt is a graduate of the residency program in the University of Pittsburgh School of Medicine. Weir will study biceps tendon repair and assist in the development of new techniques to simplify the surgery, speed healing, and improve the use of orthopaedic hardware. Other faculty collaborators on this new resident assistant program include **Patrick Smolinski**, associate professor, who works in anterior cruciate ligament repair, and **Xudong Zhang**, who is teaching Orthopaedic Engineering in MEMS.

As part of a federal effort to expand the nuclear energy workforce of the United States, the University of Pittsburgh received three government grants totaling $750,000 to bolster the nuclear engineering undergraduate and graduate certificate programs based in MEMS. The grants will be led by **Larry Foulke**, adjunct professor; **Larry Shuman**, professor and senior associate dean for academic affairs; **Mark Redfern**, associate dean for research; and **Don Shields**, director of corporate relations.

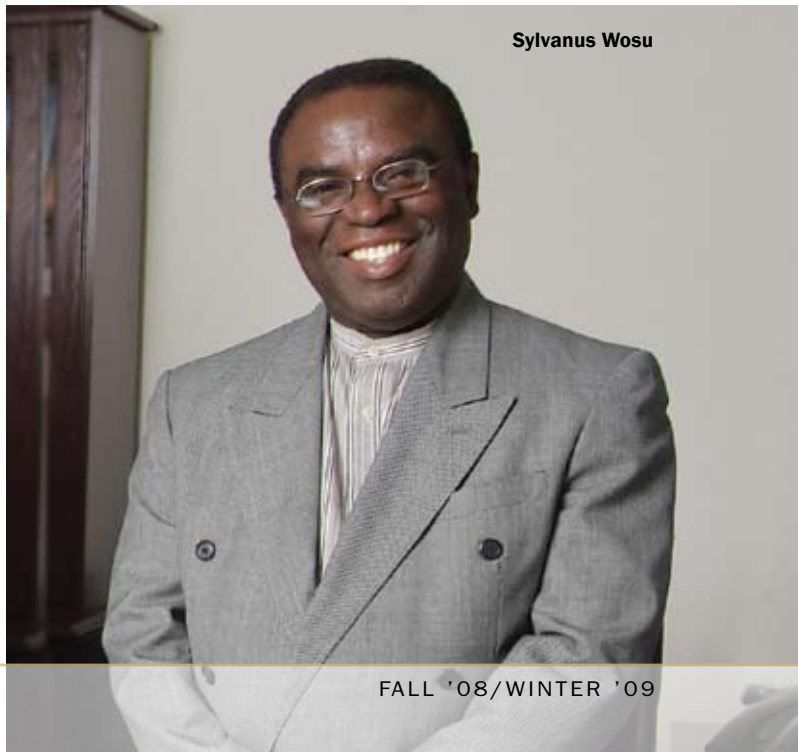
Research Centers and Initiatives

Marlin H. Mickle, Nickolas A. DeCecco Professor and executive director of the RFID Center of Excellence, and **Peter J. Hawrylak**, research associate, hosted a weeklong meeting of the International Organization for Standardization (ISO) working groups covering the radio frequency identification (RFID) field. The Pitt RFID Center of Excellence is an active member of ISO and is continuing to lead innovation in the RFID field by participating in the development and improvement of numerous ISO RFID standards.

Pitt, through the RFID Center of Excellence, is one of three universities worldwide participating with the industry association AIM Global in an initiative headed by AIM Global's RFID Experts Group. This effort is intended to create an environment that will permit radio frequency emitters to be certified as benign in a health care setting. When used properly, RFID has the potential to increase throughput and reduce errors—such as patients being given the wrong medication—in medical environments.

Engineering Office of Diversity

Sylvanus Wosu, associate dean for diversity and associate professor in mechanical engineering and materials science, recently developed and delivered a new diversity workshop aimed at developing competence in leading, working, and succeeding in an increasingly global marketplace and workplace. The workshop, attended by about 135 people, centered on the Intercultural Development Inventory (IDI). Designed by Milton Bennett and Mitchell Hammer, IDI measures how a person or a group of people tend to think and feel about cultural differences. Wosu is certified as an administrator for IDI.



Sylvanus Wosu