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Microprocessors & Embedded Systems: a Giant Step in Environmental Monitoring

When Jack Kilby and Robert Noyce first introduced the microchip in the early 1960s, they drastically changed the course of the computer industry by transforming room-sized machines into an array of mainframes, mini, and personal computers.

But their chip touched many other industries as well. Today, microprocessors are literally everywhere. And, the number of chips being manufactured to meet the ever-growing consumer demand is enormous. More than a quarter of a billion microprocessors are built and sold every month.

These chips are not being used exclusively for traditional computer applications but are also embedded in products such as washing machines, dryers, dishwashers, refrigerators, televisions, stereos, cell phones, pacemakers, toys, and cars. In fact, it's difficult to name an electronic or electro-mechanical device that does not feature one or more embedded processors.

There are approximately 50 microprocessors in an average American household today. Add a personal computer and that number jumps to 60. Add a car, depending on the model, and the number of microprocessors in a typical household doubles. These embedded or "smart" microprocessors, originally used to analyze data or respond to a desktop user who has employed a series of commands, now use real-time processing and assessment to prompt appropriate actions when no "user" is present. They interact with the environment to make the products in which they are embedded more functional or more efficient.

Equally as positive as the benefits of embedded microprocessors in consumer products are the benefits derived when embedded systems technology is applied to research initiatives in disciplines not previously employing this type of sophisticated technology. One of the most exciting of these efforts in the College of Engineering is the Naiades project.

Named for the nymphs of rivers, lakes, and streams of Greek mythology, Naiades represents a collaborative effort between researchers in the Department of Electrical Engineering and the University's Center for Environmental Science and Technology (CEST). Researchers believe the use of embedded system technology will enable observation of a natural habitat at the scale and in the amount of detail that has never before been possible.

Team leaders Patricia A. Maurice, professor of civil engineering and geological sciences and director of CEST, and Michael D. Lemmon, associate professor of electrical engineering, are excited about using embedded systems in natural environments. "The Naiades project," says Maurice, "has the potential of greatly enhancing our knowledge of the hydrologic

continued on page 3

Patricia A. Maurice, professor of civil engineering and geological sciences and director of the Center for Environmental Sciences and Technology, standing, and graduate student Leilani Arthurs sample the water from St. Mary's Lake on the Notre Dame campus in the traditional manner. When the Naiades project is up and running, the monitoring of temperature, conductivity, algae biomarkers and by-products, and light in the lakes on campus will take place automatically, 24 hours a day, via a networked array of sensors placed in and around the lakes. Using the information available from the real-time data collection offered via the Naiades embedded system, researchers hope to be able to identify the trigger mechanisms for algal blooms.

inside

from the dean

In a recent assessment of the nation's academic enterprise, it was stated that Stanford University is the first truly great American university, not one rooted in European traditions but one that embodies a uniquely American ethos in its pursuit of excellence. Today, the University of Notre Dame stands at the threshold of becoming the first truly great non-secular university of the world, one that seeks to integrate faith with reason, knowledge, and the pursuit of social justice.

But increasingly, the course of human lives and events is being shaped by technology, and if Notre Dame is to become a great non-secular university, it must have engineering programs that are strong by any measure and linked to other disciplines through teaching, research, and service. The college recently completed a strategic planning process for achieving this goal.

There are four over-arching objectives of our strategic plan:

- *To provide **preeminent educational experiences** that are stimulating, responsive to needs of the 21st century, and prepare our students for leadership in their profession and society;*
- *To conduct **world-class research** that addresses **critical needs** of society;*
- *To gain **national recognition** as a first-tier College of Engineering; and*
- *To contribute to the **Catholic character** of the University.*

The first three objectives comprise lofty goals that some might say are audacious, if not unattainable, for a non-secular College of Engineering. Nevertheless, the majority of our faculty aspire to achieve recognition for excellence in education and research, for themselves, their departments, the college, and the University. Moreover, many of the faculty, including non-Catholics, wish to do so in harmony with the most fundamental of Catholic commitments to humanity. In what follows, I will focus on the first and fourth bullets, with treatment of the equally important second and third bullets deferred to the next installment of this newsletter.

If we are to be a world-class College of Engineering and true to our Notre Dame heritage, we must be a leader in undergraduate education. Our approach to achieving this goal is two-fold:

- *To become recognized as an innovative leader in undergraduate engineering education and among the best programs in the nation, and*
- *To provide a distinctive undergraduate education that is unique to Notre Dame, one that engages students in the broader dimensions of the profession, including its linkages to society, ethical issues, and service.*

As with many institutions, we want to be proactive and innovative in shaping the technical component of our curricula in ways that best prepare our students for successful careers. In previous issues of this newsletter, we have described several of the initiatives taken to achieve these objectives. Examples include the new first-year engineering curriculum, the upper division engineering/business option, and the comprehensive Bit-to-Chips curriculum for electrical and computer engineering majors.

In future issues we will share details of more recent initiatives, such as the revised first-year chemistry sequence. The second course in this sequence, which is required of all engineering intents, introduces students to the intersection of chemistry with cellular and molecular biology, and hence to issues that will be of paramount importance in the 21st century. Other initiatives relate to the integration of significant life science content in the chemical engineering curriculum and a concomitant departmental name change to Chemical and Biomolecular Engineering, as well as integration of information technologies in the form of system intelligence throughout the aerospace and mechanical engineering curriculum.

Our strategic plan calls for continuation of the foregoing efforts through enrichment of the technical component of undergraduate education. But, if we are to provide a distinctive undergraduate education that is unique to Notre Dame and prepares our students for leadership, we must engage them in the broader dimensions of the profession, including the role of technology in society and service to humankind. To achieve this objective, we plan to:

- *Develop courses that integrate technology with social, economic, and geopolitical issues;*
- *Meld consideration of values and ethics with existing courses; and*
- *Strengthen the content of projects that involve service to local and global communities.*

The continuous and seemingly relentless advancement of technology profoundly influences the lives of people throughout the world, in less developed as well as industrialized nations, and for impoverished as well as wealthy populations. The effects are ubiquitous. Technology affects political, economic, and social conditions on local, national, and global levels. It also exerts a strong influence on sustainability of the Earth's resources and ecosystems and on the accumulation and distribution of wealth throughout the world.

Despite the multifaceted linkages of technology to the well-being of society, the degree to which these linkages are understood by Notre Dame students, much less by decision makers at the highest levels of business and government, is low. The college can provide a distinctive undergraduate education by explicitly linking key technology sectors to related social, economic, and political issues. It will therefore endeavor to develop a suite of courses in important topical areas such as energy and water resources, environmental effects including global climate change, and telecommunications. In addition to exposing engineering students to relevant non-technical issues, the courses would encourage co-enrollment of non-engineering students by maintaining the engineering/science content at an appropriate level.

We should not need recent developments to remind us of the enormous damage that is done when individuals in a position to influence the lives of others decouple ethical considerations from their decisions and actions. Issues of ethics and morality are too important to be left to a few courses on the subject. The college will therefore seek ways to systemically integrate ethical considerations throughout its curriculum.

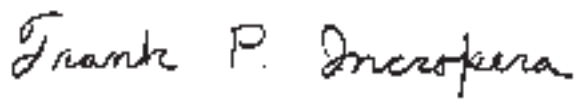
The college currently offers service opportunities for its students, principally through its Engineering Projects in Community Services program. However, faculty and student participation is low, the projects are detached from the core curriculum, and the engineering content is, at times, marginal. To strengthen the program, we will therefore endeavor to meld, where appropriate, service opportunities with existing courses, and to focus on projects that enhance the technical component of a student's education, while addressing an important social need.

If we are able to make substantive progress on the foregoing objectives, we will be able to walk the talk and say that a Notre Dame engineering education is, indeed, distinctive.

In the next issue of this newsletter, I will highlight the progress we are making on our research endeavors and how we are addressing the factors that contribute to reputation.

In the meantime, should you wish to access our strategic plan, you can do so at **www.nd.edu/~engineer/plan.pdf.**

Best wishes to all,



Frank P. Incropera
Matthew H. McCloskey Dean of Engineering
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Microprocessors & Embedded Systems: a Giant Step in Environmental Monitoring

continued from page 1

cycle, water quality, pollution, the effects of microorganisms, and even biological warfare." Current technology dictates that a researcher seeking to understand the physicochemical reactions that occur in a lake or stream has to either collect samples — physically go to the lake or stream, gather water, and take it back to a lab for testing — or set up commercial sensors in the water to record the status of variables such as pH or conductivity. The trouble has been that the real world involves a variety of spatial and temporal scales not addressed by these testing methods. Although researchers gather samples under a variety of conditions, they do not normally collect data during thunderstorms or sub-zero temperatures. In addition, even the most accurate commercial sensors have been limited in the number of samples or amount of information they could record or process.

Naiades will differ from current technologies in two distinct ways. First, the entire Naiades net will wirelessly link a variety of simple sensors — designed to measure temperature, conductivity, turbidity, flow, and ambient light — to bacterial sensors and bulk water samplers, which will measure major cations, anions, metals, and pesticides. The system will also feature submerged nodes, each with an embedded computer and each connected to an above-ground base station. The wireless ad hoc network formed by these base stations will be able to automatically reconfigure routing pathways based on the analysis performed by the Naiades sensors, individually and collectively. So, the system will function even if several nodes are incapacitated.

Information gathered by the system could be used for immediate needs, such as issuing alerts to the appropriate agencies of increased E. coli levels in beach areas or for long-term research projects. Field tests, scheduled to begin in the third year of the project, will focus on detecting, forecasting, and monitoring storm events and diel (day/night) fluctuations.

The project also offers a variety of educational opportunities. A learning module is being developed for EG111/112, the first-year engineering course sequence. Information from the project will be incorporated into undergraduate and graduate curricula in the Department of Civil Engineering and Geological Sciences. Graduate students will also participate in a one-credit-hour special topics course to be taught by Naiades faculty.

One of the most attractive elements of the Naiades project is that researchers will be able to test the system in the two lakes on campus, St. Mary's and St. Joseph's. Through the tests faculty and students will be working to develop accurate predictive models of algal blooms, an important environmental issue that would benefit from the high-resolution, real-time data collection Naiades offers.

If successful in developing these "smart" sensors and flexible embedded systems, the Naiades team will have taken a quantum step in environmental monitoring. "We're pleased with the progress of the project to date," says Maurice. "This is an innovative solution to building more comprehensive environmental models so we can better understand our world and what impacts it. The next step, actually placing Naiades in the lakes, will be a very exciting one not just for our team here at Notre Dame but for the field of environmental sciences."

Other faculty involved in the Naiades project are Martin Haenggi, assistant professor of electrical engineering; J. Nicholas Laneman, assistant professor of electrical engineering; Agnes E. Ostafin, assistant professor of chemical and biomolecular engineering; Jeffrey W. Talley, assistant professor of civil engineering and geological sciences; and George Hornberger, the Ernest H. Ern Professor of Environmental Sciences at the University of Virginia.

The Networked Embedded Systems test bed was developed under a Defense Advanced Research Projects Agency contract awarded to the Department of Electrical Engineering. It is one of a handful of such facilities in the nation and allows researchers and students, such as Qiang Ling, shown here, the opportunity to build and validate their networks in order to help determine the best ways to develop hardware and software, as well as ways to improve network communication and node performance while operating on limited power. Protocols developed as a result of this research may be used for long-term autonomous monitoring of the environment, such as the Naiades project.

Team Chicago Studies the Performance of Tall Buildings

Tracy Kijewski-Correa, monitors the static and dynamic performance of several buildings in Chicago from Notre Dame's NatHaz Modeling Laboratory. Using state-of-the-art equipment and a Global Positioning System, Notre Dame researchers are able to track the movement of individual buildings down to five millimeters with data acquired at one-tenth-of-a-second intervals. The project is funded by the National Science Foundation.

For several years **Ahsan Kareem,** the Robert Moran Professor of Civil Engineering and Geological Sciences, and Rooney Family Assistant Professor **Tracy Kijewski-Correa** have been interested in how wind affects the performance of tall buildings. The National Science Foundation study they are now leading focuses on these issues by modeling several tall buildings in Chicago which were designed and built at a time when scale-model testing and computer modeling were not as advanced as they are today.

As the leaders of Team Chicago, which also includes members of Skidmore, Owings & Merrill LLP (SOM) and the Boundary Layer Wind Tunnel Laboratory of the University of Western Ontario, Kareem and Kijewski-Correa are trying to determine if the structures they are studying are behaving in the manner for which they were designed.

Questions the team is asking include: Were the procedures used at the time of the structures' design representative of realistic loadings and responses? Are the structures performing as expected? And, if they are not, how does that impact the design criteria for the next generation of urban structures?

Kareem and Kijewski-Correa are using traditional monitoring devices, such as anemometers and accelerometers, in conjunction with cutting-edge technology, such as the Leica MC500 Global Positioning System with Real-Time Kinematic potential. In addition to monitoring the movements of the tall structures, they are using a low-rise building in the city as a base station. This "control" or differential monitoring reduces errors in the GPS to as little as five millimeters. And, with this measurement protocol, the Notre Dame team can monitor a building's displacement every one-tenth of a second. More traditional methods only provide data points every 60 seconds.

Information from the sensors is transmitted to a communications hub in the SOM building in Chicago and then relayed, via the Ethernet, to Notre Dame, where it is archived in a Web-assisted database and analyzed. Scale models of the structures and the surrounding built environment are then developed in order to compare the predicted response to actual data.

"What's important to remember," says Kijewski-Correa, "is Notre Dame's role in the integrated monitoring of tall structures. We are not designing the individual sensors, but we have adapted and prototyped a networked configuration of these devices in order to capture signals peculiar to long-period civil structures. Our findings could directly impact the architectural and structural communities for years to come."

For more information on the tall building study, visit the project Web site at **http://windycity.ce.nd.edu.** An article written by Kijewski-Correa and Kareem, "The Height of Precision," was also featured in the September issue of *GPS World.* To view it, visit **http://www.gpsworld.com/gpsworld/.**

Editor's note: SOM is one of the world's premier architecture and engineering firms and the company responsible for the design of structures such as the Sears Tower, the Lever House in New York City, and the Bank of America World Headquarters in San Francisco. The Boundary Layer Wind Tunnel Laboratory of the University of Western Ontario is a world leader in commercial wind tunnel testing.

Undergraduates Design and Build Microcontrollers

While students in the Department of Aerospace and Mechanical Engineering are learning how to design aircraft, they are also learning how to design and build microcontrollers — tiny embedded systems which may feature global positioning systems, accelerometers, pressure transducers, thermocouples, analog-to-digital converters, and transmitters. The purpose of designing these microprocessors is two-fold: to introduce students to the interdisciplinary nature of engineering via the building block of all mechatronic systems and to address real-world applications. This is particularly important, says graduate student Thomas R. Szarek, "because digital processors are finding their way into more and more, and smaller and smaller technologies."

The undergraduates Szarek is working with are developing the microcontrollers as a means of data acquisition. According to **Thomas C. Corke,** the Clark Equipment Professor of Aerospace and Mechanical Engineering, there is an increasing need for remote controlled aircraft able to collect data. "The obvious need," says Corke, "is a military one. For example, remote piloted aircraft flew many reconnaissance and tracking flights over Iraq, so fewer lives were put at risk in this type of activity. But there is also a lot of interest in using autonomous aircraft for environmental monitoring." In fact, one of Corke's students is conversing with the forestry service in Florida about the possibility of using a remote piloted plane to follow migratory animals. The embedded system in the vehicle could track animals tagged with radio transmitters, but the vehicle could also track a flock visually using an embedded pattern recognition program.

This type of aircraft could also measure air and water quality, including thermal pollution. "The idea is that information would be gathered by the embedded system and then transmitted to a receiver on the ground," says Corke. "It's less expensive than deploying manned flights, and, because of that, it would be possible to operate more aircraft, cover larger areas, and collect more data."

Thomas R. Szarek, a graduate student in the Department of Aerospace and Mechanical Engineering, loads a student designed microcontroller-based system into a model rocket for testing. The function of the tiny embedded system, which measures the acceleration and velocity of the rocket, is data acquisition.

Students from the Department of Electrical Engineering are working with city engineers, community leaders, and transportation companies across Indiana to analyze the benefits of switching from traditional incandescent traffic lights to light-emitting diode (LED) signals. Team members, shown here from left to right, are Tom Silio, Michael Kramer, Michael Bien, David Schwartz, and Associate Professor Douglas Hall. Also shown is Frank Thomas, far right, project manager for TransTech Electric Inc., the South Bend company assisting the students in their efforts. Although LED signals use 90 percent less energy than traditional lights, currently only 15-20 percent of the 11 million traffic signals nationwide use LED technology.

Engineering Projects in Community Service: Making the Switch from Incandescent to LED

Founded in 1995 at Purdue University, the Engineering Projects in Community Service (EPICS) program was designed to partner engineering undergraduates with local service agencies. The Notre Dame program, which has teamed students with local organizations since 1997, is one of six such initiatives in the country.

The benefits of EPICS are two-fold. First, engineering students are able to experience the design process from start to finish, develop management and leadership skills, and learn to work on a multidisciplinary team which includes local community leaders, city engineers, and professionals from a variety of organizations. As important, the students are able to assist community organizations in reaching their goals in a timely and economic manner.

One of the several EPICS projects within the College of Engineering involves a team of students from the Department of Electrical Engineering who are working to assess the benefits to the state of Indiana of replacing traditional incandescent traffic lights with light-emitting diode (LED) signals. In addition to the analysis, the team will be making suggestions on how best to make the switch to LEDs.

The students also hope to develop an educational outreach program for elementary and secondary school students that will encompass information on LED lights and other energy-saving technologies, the role of engineering in society, and the importance of energy conservation to the environment.

Women's Engineering Program Receives Honors

The Chicago Regional Section (CRS) of the Society of Women Engineers (SWE) has named the Notre Dame student section "Best Student Section" for 2002-03. The section award includes a stipend from Northrop Grumman Corporation, to assist the group in its future community outreach efforts. In addition **Cathy Pieronek** ('84, AME; '95, J.D.), director of the Notre Dame Women's Engineering Program (WEP), was named adviser of the year in the academic division.

The CRS also provides scholarships to first-year engineering students. Two of this year's recipients are attending Notre Dame. They are Lydia Szeligowski of Newark, Ill., and Lisa Horstman of Glen Ellyn, Ill.

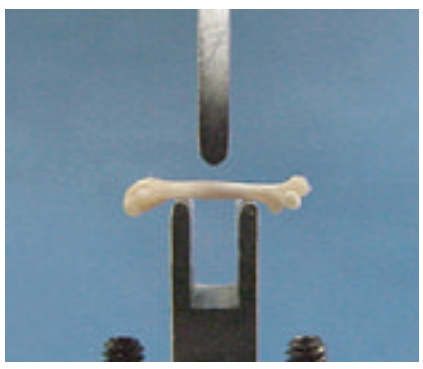
Three Notre Dame students received national scholarships. Pamela Jefson, a sophomore in the Department of Chemical and Biomolecular Engineering, received the 2003 Chevron Texaco Corporation Scholarship. It is presented for outstanding academic achievement with strong engineering potential. Jefson is from Kalamazoo, Mich. Plymouth, Minn., native Rachel Kemp received the Dorothy Lemke Howarth Scholarship. Kemp is a junior in the Department of Aerospace and Mechanical Engineering. Amanda Lehmann, a senior in the Department of Chemical and Biomolecular Engineering, received the Northrop Grumman Corporation Scholarship. Lehmann is from Portland, Ore.

Established by the College of Engineering in July 2002, the WEP works with students, industry, and alumni to develop activities that encourage young women in the study of engineering. Elements of the program include career information seminars, leadership training, alumnae and special guest lectures, peer group development, community-building activities, and community outreach efforts. *(See page 13.)*

For more than 20 years the Notre Dame section of the Society of Women Engineers (SWE) has encouraged women in the College of Engineering to reach out to one another and to the community. SWE officers for the 2002-03 academic year, left to right, were Nicole Wykoff, president; Allyson Swanson, SWE representative to the student-led Joint Engineering Council; Cathy Pieronek, director of the Women's Engineering Program; Carolyn Lauer, treasurer; Meghan Roe, secretary; and Jenna Spanbauer, vice president.

Recent Graduate Receives Bioengineering Award

Within a month of receiving her degree in mechanical engineering, **Casey L. Korecki** was receiving a second-place award for undergraduate research at the Summer Bioengineering Conference sponsored by the American Society of Mechanical Engineers in Key Biscayne, Fla. Her entry, which highlighted research conducted in the Tissue Mechanics Laboratory at Notre Dame in conjunction with Glen L. Niebur, assistant professor of aerospace and mechanical engineering, and JoEllen J. Welsh, professor of biological sciences, focused on her investigations of the effect of Vitamin D on bone growth and strength during gestation and lactation. Mice without a specific gene, the Vitamin D receptor (VDR), provided the experimental means to study the process.



Casey L. Korecki received second place at the 2003 Summer Bioengineering Conference in Key Biscayne, Fla., earlier this year. Working with Assistant Professor Glen L. Niebur, Professor JoEllen Welsh, and a team of researchers in the Tissue Mechanics Laboratory, Korecki measured the geometric and mechanical properties of mouse bones at various stages of gestation and lactation to better assess the role of Vitamin D in skeletal changes during the reproductive cycle.

Vitamin D has long been known to play a role in bone growth and maintenance, affecting cells through the VDR. The role of Vitamin D in calcium metabolism during pregnancy and lactation is not fully understood because even though bone material properties weaken during pregnancy, there appears to be no significant change in overall skeletal strength. Korecki found that the demands placed on calcium regulating channels during the reproductive cycle resulted in decreased bone strength and stiffness in the mother as the calcium demands of a developing fetus or nursing infant increased. In fact, all of the mice in her study experienced bone loss and decreased bone stiffness, even though they received excess dietary calcium. However, in the early and middle stages of gestation, the VDR deficient mice exhibited more adverse effects compared to the normal mice in the study. Changes in the mineral structure and the bone microstructure of the mice were also studied.

Silio Receives Dixon Award

Thomas J. Silio, a senior in the Department of Electrical Engineering, received the Patrick Dixon Award during the 2003 Commencement ceremonies. The Dixon Award is given annually to an outstanding Army ROTC cadet at Notre Dame. A native of Beltsville, Md., Silio is also involved in the Engineering Projects in Community Service program. **(See page 4.)**

Myers Receives Graduate Fellowship

Meghan Myers, a senior in civil engineering and geological sciences from Plano, Texas, received a graduate fellowship from the highly competitive Graduate Research Fellowship Program of the National Science Foundation (NSF). According to the NSF, fellowship recipients are chosen based on their "intellectual merit and the broader impacts of supporting an applicant's graduate study. ... Evaluation of applicants is based on all available evidence of ability, including academic records, recommendations regarding each applicant's qualifications, and Graduate Record Examinations scores."

Meghan Myers

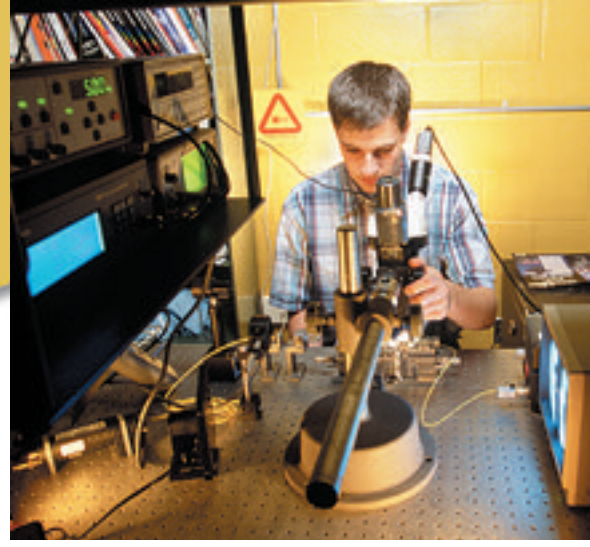
In addition to her academic accomplishments and work in departmental laboratories, Myers spent the summer between her sophomore and junior years in Japan as part of the Research Experiences for Undergraduates (REU) program at Notre Dame. As an REU Myers worked in the Earthquake Engineering Laboratory developing "Shakes and Quakes," an educational outreach program for elementary and middle school students.

Senior Wins Intel Research Contest

Dane Wheeler, a graduate of the Class of 2003, won the prestigious national Intel Research Award Contest for Undergraduate Students. Wheeler, who graduated from the Department of Electrical Engineering, was one of only 17 students nationwide who were invited to participate in the contest. Each student was selected on the basis of proposals submitted to Intel describing his or her individual research project. Participants were awarded $2,000 each for research to be conducted between June 2002 and March 2003. At the end of the research period, Intel flew the students to Santa Clara, Calif., to present their results before a panel of Intel researchers.

The goal of Wheeler's project was to create a transparent, all-optical communications technology that would enable switchers and routers to operate at the speed of the incoming optical information, thus eliminating bottlenecks created by current electronic switches. Douglas C. Hall, associate professor of electrical engineering, directed Wheeler's research.

Wheeler also recently received a Best Undergraduate Plan award from the University's Gigot Center for Entrepreneurial Studies and the Pace Global People's Choice award for a Granger, Ind., company he and a friend from high school started. The company, www.MightyBrain.com, developed a computer program that connects parents with their child's school, allowing them to check on grades, homework assignments, course descriptions, and other activities at any time.



Electrical engineering major Dane Wheeler received the $5,000 first prize at the Intel Research Award Contest, held in May 2003 in Santa Clara, Calif. Sponsored by Intel's Microprocessor Research Labs, the goal of the contest is to stimulate inventiveness in undergraduates enrolled in engineering or other technical programs by challenging them to explore the frontiers of computing. Wheeler is currently pursuing a doctorate in electrical engineering at the University under a Semiconductor Research Corporation Graduate Fellowship.

Xerox Scholars Honored

In 1997, the year the Xerox Scholarship Program began, two scholarships were awarded by the Xerox Corporation. The purpose of the scholarships was to encourage outstanding female students to complete their degrees in engineering. Since its inception, the program has continued to grow and now provides scholarships to nine engineering students.

This year seniors were Tracy Blichfeldt, a chemical engineering major from Trego, Wis.; Kelly Landers, a Woodstock, Ill., native studying electrical engineering; and Anne Mierendorf, a chemical engineering major from Ann Arbor, Mich. Juniors included Lauren Krietmeyer, a computer science major from Woodbury, Minn.; Erin Laird, who comes from Manassas, Va., and is studying electrical engineering; and Sara Sreniawski, a chemical engineering student from Hamburg, N.Y.. Sophomores were Karla Bell, a chemical engineering major from Poland, Ohio; Lindsay Miller, a native from Allentown, Pa., studying chemical engineering; and Rachel Turcotte, a mechanical engineering student from Wallace, Mich. The students were honored at the Xerox Scholars Dinner earlier this year.

On Wednesday, April 2, representatives from the Xerox Corporation awarded scholarships to nine engineering students. Presenting the 2003 Xerox Scholarships were representatives, left to right, Jerry Murray ('68, ME), vice president of the Production Solutions Business Group Unit; Todd Stout, manager of the company's North American Professional and College Recruiting Services; and Bruce Gadansky, solutions executive for the Higher Education Public Sector.

College Names Steiner Recipients

Four seniors have been selected as the 2003 recipients of the Rev. Thomas A. Steiner, C.S.C., Award for dedication to their fields of study in engineering, outstanding leadership abilities, and commitment to the values of the University. This year's honorees are: **Daniel Buonadonna,** civil engineering and geological sciences; **Daniel Connell,** chemical and biomolecular engineering; **Vanessa Pruzinsky,** chemical and biomolecular engineering, and **Jennifer Spanbauer,** aerospace and mechanical engineering.

Daniel Buonadonna

Vanessa Pruzinsky

Daniel Connell

Jennifer Spanbauer

Buonadonna, a resident of Renton, Wash., has been actively involved in University life. A Notre Dame scholar, member of Tau Beta Pi — the national engineering honor society — and recipient of several scholarships, he plans to enter the Peace Corps after graduation to work in West Africa. Faculty indicate that this level of commitment is typical of the service projects with which Buonadonna involved himself as an undergraduate, including the Haiti Seminar, the Appalachian Seminar, the American Red Cross, and Toys for Tots. He was also active in student government and is a member of the American Society of Civil Engineers.

A native of Bethel Park, Pa., Connell has a 4.0 grade-point average. He is the recipient of the James P. Kohn Scholarship, the CONSOL Energy Inc. Scholarship, and the National Starch and Chemical Company Scholarship. He is also a member of Tau Beta Pi and the American Institute of Chemical Engineers (AIChE). In addition to his course activities, Connell served as a tutor for the Boys and Girls Club of South Bend, academic commissioner for Carroll Hall, and member of the college's outstanding teacher award selection committee for 2003. He was also a percussionist for the Carroll Hall Liturgical Ensemble.

Pruzinsky is a member of the AIChE and of the American Chemical Society. With a 4.0 grade-point average, she ranks in the top of her class. She is also a starter on the varsity women's soccer team and has received numerous national-level honors for her athletic accomplishments. According to her professors, "she embodies the very best qualities that we seek to develop in our students and has, undoubtedly, a very bright future ahead of her." Pruzinsky is from Trumbull, Conn.

Spanbauer has excelled academically while at the University but has also been very active outside the classroom. She has served as president of Pi Tau Sigma, the mechanical engineering honor society; vice president of the Notre Dame section of the Society of Women Engineers; secretary of the Joint Engineering Council, and a member of Delta Phi Alpha, the national German honor society. In addition to serving as resident assistant for Howard Hall, she volunteered at a local hospital, served on the student advisory board of *Notre Dame* Magazine, and was a member of the women's rowing team. Spanbauer is a native of McKeesport, Pa.

The Steiner award dates back to 1948 when former students of "Pops" Steiner established the prize. Students are nominated by their individual departments and selected on the basis of their cumulative grade-point averages and activities in honor societies, councils, academic teams, clubs, and ministries.

2002-03 College Honors

American Institute of Chemists Award
To an outstanding senior in chemical engineering
Michael James Blanchard, Springfield, Va.

American Society of Civil Engineers Activity Award
For participating in the services and activities of the American Society of Civil Engineers
Russell Patrick Montgomery, Pendleton, Ore.
Meghan Kathleen Myers, Plano, Texas

Chemical Engineering Alumni Award
In recognition of high scholastic standing and involvement in extra-curricular activities
Nicole Makai Kohrt, Granger, Ind.

Chemical Engineering Faculty Award
To the senior having the highest scholastic average after seven semesters
Daniel Patrick Connell, Bethel Park, Pa.
Vanessa Marie Pruzinsky, Trumbull, Conn.

Chemical Engineering Research Award
In recognition of outstanding undergraduate research
Luis Bollmann Verastegui, La Paz, Bolivia
Carl Joshua Vess, Scottsdale, Ariz.

The Patrick J. Deviny Scholarship Award
To the senior in aerospace engineering displaying the most diligence and persistence in his or her studies
Melissa Ann Green, Basking Ridge, N.J.

The IEC William L. Everitt Award
For achievement in electrical engineering, computer engineering, or computer science, with an interest in the area of communications
Hans C. Kaesgen, Berea, Ohio
Keith Walter Rauenbuehler, Pacifica, Calif.
Brandon Jonathan Viloria, Wailuku, Hawaii

The Vincent P. Goddard Award for Aerospace Design
For the best design in the senior aerospace design course
Thomas Bradley Apker, Paradise Valley, Ariz.

The Raymond C. Gutschick Award
To the graduating senior who has demonstrated the most promise in geological research as evidenced by a successful undergraduate research project
Leslie Ann Hayden, Marlton, N.J.

More than 2,700 students participated in the University's 158th Commencement Exercises on Sunday, May 18. Among the 1,977 undergraduates receiving their degrees were, left to right, Atasha Potter, aerospace and mechanical engineering; Maria Perez, aerospace and mechanical engineering; and Kara Tholen, civil engineering and geological sciences. Potter is a resident of Kualapuu, Hawaii. Perez is a native of Austin, Texas, and Tholen is from Garnett, Kan.

Engineering Graduate Students Honored

Tracy Kijewski-Correa was honored in May 2003 as one of the four doctoral candidates at the University to receive the Eli J. and Helen Shaheen Graduate School Award. Named in honor of a Notre Dame alumnus and his wife, the award recognizes the top graduating doctoral degree recipients in engineering, science, the humanities, and social sciences. Shaheen winners are chosen for their superior ability as exhibited by grades, research and publications, fellowships and other awards, and teaching ability.

While a graduate student Kijewski-Correa received numerous awards from the University's John A. Kaneb Center for Teaching and Learning and the Department of Civil Engineering and Geological Sciences. She also led an outreach program called "Shakes and Quakes" at local schools to demonstrate the power of earthquakes and the importance of the understanding the motions of tall buildings in an urban environment.

Kijewski-Correa is currently the Rooney Family Assistant Professor in the Department of Civil Engineering and Geological Sciences at the University. Her research interests include time-frequency signal analysis, Global Positioning Systems for dynamic monitoring, full-scale monitoring, quantification and modeling of structural damping, structural dynamics and random vibrations, and stochastic analyses.

The Kaneb Center for Teaching and Learning presented 60 graduate students with its fourth annual Outstanding Graduate Student Teaching Awards. Among the honorees were: (from aerospace and mechanical engineering) **Muhammad Owais Iqbal, Xiangyi Liu, Paul S. Nebosky Jr.,** and **Thomas R. Szarek;** (from chemical and biomolecular engineering) **Adrienne R. Minerick** and **Christopher W. Norfolk;** (from civil engineering and geological sciences) **William S. Kinman** and **Tiphaine A. Williams;** (from computer science and engineering) **Richard C. Murphy;** and (from electrical engineering) **Fabien Feron, De Liang,** and **Ling Zhou.**

Marcin Sikora, a doctoral candidate in the Department of Electrical Engineering, received the 2003 Werner von Siemens Excellence Award. Sikora received the award for his master's thesis, "System Level Performance of High Speed Downlink Packet Access with Adaptive Antennas." Sikora received his master's degree from the Technical University of Munich earlier this year. The Werner von Siemens Excellence Award has been presented to students for excellence in master's examinations, dissertations, and innovative projects since 1996. The award is sponsored by the Siemens AG Youth and Knowledge program and has been presented to more than 1,000 students worldwide since its inception.

Other master's and doctoral candidates receiving awards included **Jennifer Anthony,** chemical and biomolecular engineering, who received the GE Fund Graduate Fellowship; **Charles Arvin,** chemical and biomolecular engineering, who received the Institute of Electrical and Electronics Engineers, Inc. student achievement award; **Hoi-Sze Lau,** chemical and biomolecular engineering, who received the Dr. Janice Lumpkin Future Faculty Travel Award from the American Institute of Chemical Engineers, and **Susan Olson,** aerospace and mechanical engineering, who received the Zonta International Amelia Earhart Fellowship.

Karinna Vernaza was one of the 229 graduate students receiving degrees from the University of Notre Dame Graduate School in May 2003. She was accompanied by her adviser James J. Mason, far right, associate professor of aerospace and mechanical engineering. Vernaza is currently an assistant professor at Gannon University in Erie, Pa. University President Rev. Edward A. Malloy, far left, presented the degrees to each graduate.

The Sydney Kelsey Outstanding Scholar Award
To a senior civil engineering student for excellence and creativity in academics
Timothy Paul Ruggaber, Wheaton, Ill.

Kenneth R. Lauer Award
To a senior civil engineering student for leadership, integrity, and service to fellow students and community as determined by his or her classmates
Daniel Buonadonna, Renton, Wash.

Manly Award for Excellence in Materials Science Research
In recognition of outstanding research in materials science
Dante Adam Simonetti, Massillon, Ohio

The James L. Massey Award
For achievement in electrical engineering, recalling communication theory, undergraduate teaching, and the Binary Examination
Erin Scott Turner, Crestwood, Ky.

The Basil R. Myers Award
For achievement in electrical engineering, recalling circuit theory, the English language, and St. George Day at Notre Dame
Kevin John McGirr, Dayton, Ohio
Mark Raymond Trandel, Cary, Ill.

The James A. McCarthy Scholarship
Presented to a senior civil engineering student for outstanding academic and professional excellence in their junior year
Meghan Kathleen Myers, Plano, Texas

Outstanding Computer Engineering Senior Award
For outstanding academic achievement in the computer engineering program
Charles Andrew Giefer, Stillwater, Minn.

Outstanding Computer Science Senior Award
For outstanding academic achievement in the computer science program
Daniel Timothy Brunner, Cincinnati, Ohio
Joseph Edward Lammersfeld, Mount Prospect, Ill.

The Arthur J. Quigley Award
For achievement in electrical engineering, recalling electronics, service to our neighbor, and the little man in the circuit
Michael Adelbert Rerko, Vincennes, Ind.

Rockwell Automation Power Systems Design Award
For the best design in the senior mechanical engineering capstone design course
Casey Lee Korecki, Brooksville, Fla.
Jason Michael Mayes, Longview, Texas

The Walter L. Shilts Award for Undergraduate Achievement
To a senior civil engineering student who has best fulfilled his or her potential through hard work and dedication to obtaining the best possible education
Daniel Buonadonna, Renton, Wash.
Meghan Kathleen Myers, Plano, Texas

Sigma Gamma Tau Honor Award
To the outstanding graduate in aerospace engineering
Melissa Ann Green, Basking Ridge, N.J.

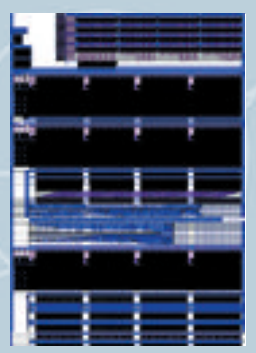
The Lawrence F. Stauder Award
For achievement in electrical engineering, recalling electrical power, the IEEE student branch, and the Notre Dame alumni
Scott Sheridan Howard Jr., Levittown, N.Y.

Zahm Prize for Aeronautical Engineering
To the senior who has achieved the most distinguished record in professional subjects
David Matthew Schatzman, Cincinnati, Ohio

College News

Department Develops PIM Chip

Researchers in the Department of Computer Science and Engineering are developing a new Processing-in-Memory (PIM) chip for use in a new generation of computers. **Jay B. Brockman,** associate professor of computer science and engineering, and graduate student Shyamkumar Thoziyoor, in collaboration with researchers from the California Institute of Technology and NASA's Jet Propulsion Laboratory, are finalizing the design of a chip which will be fabricated by the Metal Oxide Semiconductor Implementation System (MOSIS) using 0.18 micron technology. The fine lines and densities achieved using this silicon lithography process are necessary to support high-performance data processing and high-capacity storage.



The Processing-in-Memory chip being developed by College of Engineering researchers will be fabricated by the Metal Oxide Semiconductor Implementation System (MOSIS) using 0.18 micron technology. MOSIS was founded by the Defense Advanced Research Projects Agency in 1981 to provide low-cost, small-volume prototyping production for VLSI circuit development. It has fabricated more than 50,000 circuit designs for academic institutions, governmental agencies, and commercial firms since its inception.

The key feature of the design is that it places a custom microprocessor and main memory on the same chip, eliminating one of the major bottlenecks in conventional computer systems. Current technology dictates that logic and memory must exist on two separate silicon chips. PIM says that instead of two chips, memory and logic can co-exist on one chip. Computer processing time would be reduced because there would be no need to go from the processor to the memory and back again, and power levels would also be greatly reduced.

The impetus for projects like the development of a PIM chip stems from the realization that computers of the future will be expected to perform more and more complex operations faster and more efficiently. Although this chip will run at a clock speed slower than today's fastest commodity microprocessors, it will be capable of performing many operations in parallel, leading to higher performance for many engineering applications.

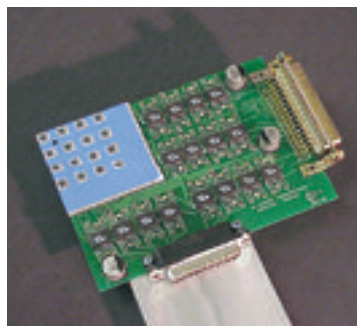
Restoring the Quality of Laser Beams through Aero-optics

Aero-optics is the study of the interplay of light with a turbulent flow. The light could emanate from distant space objects or other celestial bodies, but the research being conducted by **Eric J. Jumper,** professor of aerospace and mechanical engineering, and a team of engineering researchers examines the detailed interactions of a laser beam projected from an aircraft with the thin layer of turbulent air over the vehicle. The effects of these interactions can reduce the focus of the laser to less than 1 percent of its original intensity.

Using high-speed wavefront sensors developed at Notre Dame; multiple, dedicated, embedded processors; deformable mirror technology; and the Notre Dame Shear-Layer Facility, the aero-optics team is developing technology that will allow an aircraft flying at high Mach numbers to project correctly configured laser beams — whether for military or imaging purposes — onto a target. "This is a very dynamic process," says Jumper, "so a traditional approach to an adaptive-optic correction was not feasible. We have incorporated flow control, high-frequency non-real-time wavefront sensing, and a new approach to controlling adaptive optics into making this correction."

The team is currently preparing to measure the distortion of a laser beam, develop the conjugate of the distortion, adjust a deformable mirror — part of an embedded system on the aircraft — and restore the laser's quality by bending the mirror up to 15,000 times per second.

Jumper's research is funded through a contract with Oceanit, a Hawaii-based engineering, science, and research company under the sponsorship of the Air Force Office of Scientific Research. He is also working with the Air Force Research Laboratory, Boeing, and Northrop Grumman.



The circuit board, shown here, is part of an embedded system which will help aircraft flying at high Mach numbers to project correctly configured laser beams. Developed at Notre Dame by Professor Eric J. Jumper and designed by Joel Preston, electronic specialist in the Department of Aerospace and Mechanical Engineering, the board features 64 amplifiers, which support a 4 x 4 sensor array. Four of these arrays will be ganged to form an 8 x 8 array. UDT Corporation is making the sensors, which will line up with the actuators on a deformable mirror, built by Xenetics Corporation, which is also part of the embedded system.

University Computer Cluster Named One of Nation's Top 500

The Bunch-o-Boxes (B.O.B) laboratory at the University of Notre Dame has been named one of the 500 fastest computer clusters in the world and 42nd of all supercomputing systems at U.S. academic institutions. Designed and built by the colleges of engineering and science in order to provide high-end computing on campus for data- and time-intensive projects, the cluster was funded through a grant from the National Science Foundation's Major Research Initiative program.

B.O.B. is a 106-dual processor Beowulf cluster located in the Stepan Chemistry Hall. It processes information at a rate of 280 gigaflops — 280 billion floating operations — per second. The world's fastest processor, the Earth Simulator in Yokohama, Japan, performs at 35.61 teraflops — more than 35 trillion floating operations per second.

Simulation and modeling activities in B.O.B. span a broad range of disciplines and departments throughout the University. Research includes projects in nanomaterials and complex fluids, directed by Edward J. Maginn, associate professor of chemical and biomolecular engineering, and projects in global optimization, interval analysis, and environmentally conscious process design, led by Mark A. Stadtherr, professor of chemical and biomolecular engineering. Albert-László Barabási, the Emil T. Hofman Professor of Physics, directs studies in networks and granular media, while J. Daniel Gezelter, assistant professor of chemistry and biochemistry, focuses on diffusion through biological membranes, glass formation in metallic alloys, theories of diffusion in liquids, and the development of methods for molecular dynamics in biomembranes. Projects in theoretical astrophysics, relativistic hydrodynamics, and stellar evolution are being directed by Grant J. Matthews, professor of physics. Olaf G. Wiest's efforts in B.O.B. include the development of mechanisms and models of DNA photolyase, the structure and reactivity of hydrocarbon radical ions, and molecular implementations of Quantum Cellular Automata, a transistorless nanoscale approach to computing developed at Notre Dame.

University Team Receives Two Major Grants for Fuel Cell Research

A multidisciplinary team of researchers, led by **Paul J. McGinn,** professor of chemical and biomolecular engineering and newly appointed director of the Center for Molecularly Engineered Materials, has received a $1.6 million grant from the U.S. Army Communications and Electronics Command to develop novel materials and processes suitable for use in hydrogen fuel cells.

There are many uses for hydrogen fuel cells, ranging from powering a car or heating a home to providing the portable power soldiers and other military personnel need on the battlefield. The National Aeronautics and Space Administration has used fuel cells as portable power sources for spacecraft since the 1960s, and they are currently used in the space shuttle program. These fuel cells, however, are much larger and more expensive than those appropriate for a variety of land-based applications, where size, speed, and mobility are of utmost importance.

The Army, the funding agency for this grant, is seeking smaller and more powerful fuel cells to run the variety of portable devices necessary to the success of the 21st-century soldier, items such as squad radios, navigation aides, video capture devices, weapons subsystems, and micro-climate cooling capabilities for protective suits.

The University has also recently received a two-year grant from the Indiana 21st Century Research and Technology Fund totaling $1.8 million. The purpose of the fund, established by the state of Indiana in 1999, is to identify industries and/or technologies with significant potential for growth and to encourage academic-commercial partnerships which will eventually "transfer the technology" into commercial products, boosting economic development in Indiana.

Funding for fuel cell research has increased significantly following remarks made by President Bush in his 2003 State of the Union address, during which he announced a $1.2-billion hydrogen fuel cell initiative to help reduce the country's dependence on foreign oil by developing new and environmentally sound fuel technologies. The president has often remarked on the potential impact of hydrogen fuel cells, calling them "one of the most encouraging, innovative technologies of our era."

One area of focus for the University team is carbon nanotubes, which Notre Dame researchers have shown to have high potential for use in hydrogen storage. They are also designing new electrodes for fuel cells that would minimize the use of platinum.

The team is also working to reduce the size of fuel cells by better understanding the heat transfer, mass transfer, and fluid handling processes within fuel cell systems. Their work is being conducted under the auspices of Notre Dame's Center for Molecularly Engineered Materials.

In addition to McGinn, team members are Arvind Varma, the Arthur J. Schmitt Professor of Chemical and Biomolecular Engineering; Albert E. Miller, professor of chemical and biomolecular engineering; Mark J. McCready, professor and chair of the Department of Chemical and Biomolecular Engineering; Davide A. Hill, associate professor of chemical and biomolecular engineering; David T. Leighton Jr., professor of chemical and biomolecular engineering; Hsueh-Chia Chang, the Bayer Corporation Professor of Chemical and Biomolecular Engineering; Prashant V. Kamat, professional specialist in Notre Dame's Radiation Laboratory; Dan Meisel, professor of chemistry and biochemistry and director of the Radiation Laboratory; and Kizhanipuram Vinodgopal, professor of analytical and environmental chemistry at Indiana University Northwest.

While many companies and academic institutions are pursuing fuel cell stack and system developments, researchers at Notre Dame, like Scott Sherwin, above, a senior in the Department of Aerospace and Mechanical Engineering, and faculty and students in the Department of Chemical and Biomolecular Engineering are exploring new fundamental processes and materials which would work as alternatives to platinum and other non-corroding metals currently used in fuel cells. They are also working to create nano-materials for more efficient hydrogen storage and electrode structures. The fuel cell shown here, which is powering the fan in the background, generates one kilowatt of energy, more than enough to power a coffee maker (600 watts), laptop computer (40 watts), and a cell phone (20 watts). Five kilowatts of energy can power a typical household.

Engineering Team Receives Grant for Development of Nanoscale Biosensors

A multidisciplinary team of researchers, led by Wolfgang Porod, the Frank M. Freimann Professor of Electrical Engineering and director of the Center for Nano Science and Technology, was selected as one of the recipients of the Department of Defense's Multidisciplinary University Research Initiative (MURI) program. The team will receive a total of $5 million over a five-year period.

One of only 16 institutions to receive a MURI grant this year, the Notre Dame-led team is collaborating with faculty at the University of California-Berkeley and Harvard University. They are working to develop nanoscale sensors for biologically-inspired processor arrays, which could aid in target detection, navigation, tracking, and robotics applications. The goal of the project is to design several miniature prototype devices which could be used for image processing in autonomous vehicles.

Team members are: (from Notre Dame) Porod; Gary H. Bernstein, professor of electrical engineering; Patrick J. Fay, associate professor of electrical engineering; Yih-Fang Huang, professor and chair of electrical engineering; and Arpad Csurgay, visiting professor of electrical engineering; (from Harvard) Botond Roska; (from Berkeley) Leon O. Chua, Frank S. Werblin, and Tamas Roska.

ICP-MS Facility Receives Grant from National Science Foundation

The Department of Civil Engineering and Geological Sciences has received a grant of $520,000 for the purchase of an additional, more sensitive, Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) unit. According to Clive R. Neal, associate professor and director of the ICP-MS facility, "The resolution available via this new unit will allow us to employ more accurate analytical techniques, which are critical for a number of research projects." The grant was led by Neal and Jinesh Jain, assistant professional specialist and ICP-MS lab manager.

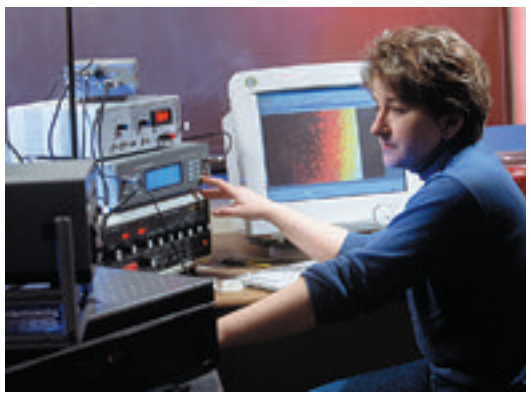
Other faculty participating in the grant are Peter C. Burns, Massman Chair of the Department of Civil Engineering and Geological Sciences; Jeremy B. Fein, professor and director of the Environmental Molecular Science Institute; Patricia A. Maurice, professor and director of the Center for Environmental Science and Technology; Jeffrey W. Talley, assistant professor; Stephen E. Silliman, professor and associate dean for educational programs; Charles F. Kulpa, professor and chair of the Department of Biological Sciences; and Kirsten Nicholson, assistant professor of geology at Ball State University.

Operating since 1992, the Inductively Coupled Plasma-Mass Spectrometry facility provides a precise analytical method for obtaining high-quality multi-element analyses at trace (parts per million to parts per billion) and ultra-trace (parts per trillion and lower) levels. Samples that have been studied in the lab include: Apollo 11, 12, 14, and 17 lunar basalts; Martian meteorites; trace metals in lake water; toxic elements in durum wheat; groundwater and mine wastewater; dust from the World Trade Center site; road dirt (for platinum); and herbal medicines. For more information, visit **http://www.nd.edu/~icpmslab.**

Chemical Engineering Department Adopts New Name

The Department of Chemical Engineering has changed its name to the Department of Chemical and Biomolecular Engineering. According to Mark J. McCready, professor and chair of the department, the change is "part of the 'directed evolution' of the field of chemical engineering. It also better reflects the growth of molecular biology as one of the fundamentals of our research program and undergraduate curriculum."

McCready stresses that the department has not abandoned its commitment to traditional chemical engineering. Instead, he credits the understanding and use of traditional chemical engineering principles with the department's ability to offer fundamental knowledge in biomolecular engineering. "Although we're starting activities in the biomolecular area later than some institutions," he says, "we have made significant strides in our research programs, particularly in the areas of drug delivery, biosensors, and nanotechnologies. We are one of the first engineering programs to develop undergraduate curricula that offers significant life science content integrated throughout the program."



In renaming the department from chemical engineering to chemical and biomolecular engineering, Notre Dame joins the ranks of institutions such as the University of Illinois and Cornell University. The change recognizes the unique perspective chemical engineers are bringing to "bio" fields such as tissue engineering, metabolic engineering, and drug delivery. Assistant Professor Agnes E. Ostafin, above, is one of several faculty members leading biomolecular efforts. One of the projects she is directing focuses on the development of medical biosensors to aid in the early detection of diseases such as cancer.

In addition to the newest undergraduate courses available in the department — Biomedical Engineering Transport Phenomena, Biomaterials Engineering, and Biomolecular Process Engineering — students have a variety of research activities from which to choose. For example, faculty and student researchers are working to create a universal blood substitute that needs no refrigeration. They are developing nanoscale biosensors to aid in the early detection of cancer and other diseases, and they are working with pharmaceutical companies to design miniature medical sensors and micro-syringes for use in home/office diagnostic kits.

Center for Micro-fluidics and Medical Diagnostics Established

Building on long-standing excellence in fluid mechanics, the University of Notre Dame has established the Center for Micro-fluidics and Medical Diagnostics (CMMD). The purpose of the center is to facilitate technology transfer — the development and fabrication of micro-fluidic devices and miniature diagnostic kits — from research to industry. For example, Ph.D. level research is typically fundamental in nature and not easily picked up by industry for commercialization. It is this developmental area between fundamental research and finished product, that the center seeks to address, taking the basic ideas the "extra mile" to the point where they will be more attractive and possibly more cost-efficient for industry to pursue. The ultimate goal is two-fold — to invigorate research activity in an important emerging field, micro-medical diagnostics, and to enrich graduate and undergraduate education through active research and development.

The center director is Hsueh-Chia Chang, the Bayer Professor of Chemical and Biomolecular Engineering. David T. Leighton Jr., professor of chemical and biomolecular engineering, is associate director. Serving on the center's advisory board are Gary H. Bernstein, professor of electrical engineering; Mark J. McCready, professor and chair of chemical and biomolecular engineering; Albert E. Miller, professor of chemical and biomolecular engineering; and Agnes E. Ostafin, assistant professor of chemical and biomolecular engineering.

One of the projects currently in development in the Center for Micro-fluidics and Medical Diagnostics is a "miniature" diabetes kit. Researchers in the center are attempting to reduce the amount of blood needed to activate each test strip. In traditional glucose monitoring kits, when the sample amount is too small, segregation effects become more pronounced and render the sample useless. Center faculty are using micro-fluidic devices to break this size limit while still maintaining an accurate reading. They are also working on a blood cell segregation device that will separate cells according to size, shape, and elasticity. The new device could rapidly count and identify a variety of cells, replacing the present labor-intensive method, where technicians visually count and categorize blood cells.

McGinn Appointed Director of CMEM

Paul J. McGinn

Paul J. McGinn, professor of chemical and biomolecular engineering, has been named director of the Center for Molecularly Engineered Materials. Established in October 2000, the multidisciplinary center builds upon a long history of faculty research and educational developments in materials science at the University. It is dedicated to the molecular-level design, synthesis, characterization, and development of advanced materials.

Most recently, McGinn served as associate director of the center. He replaces Arvind Varma, the Arthur J. Schmitt Professor of Chemical Engineering, who has accepted a position as department head of the school of chemical engineering at Purdue University. A faculty member since 1987, McGinn received his bachelor's, master's, and Ph.D. degrees in metallurgical engineering and materials science from Notre Dame.

Silliman Named Teacher of the Year

Stephen E. Silliman

The College of Engineering has awarded the Outstanding Teacher of the Year Award to Stephen E. Silliman, professor of civil engineering and geological sciences and associate dean for educational programs.

Since joining the University in 1986, Silliman, has successfully combined his professional expertise, teaching ability, and commitment to service. Students describe him as someone who will "go that extra mile, making classes informative and interesting." They say he "makes sure everyone understands the concepts and encourages critical and logical thinking." They also admire his enthusiasm for the ways in which he uses engineering to positively impact society.

For example, he is responsible for developing an educational experience that integrates engineering and the Notre Dame mission. Silliman and teams of students annually spend a week in Haiti repairing hand pump wells, which are the primary water supply in rural regions of the country. He has led this program, a joint venture between the department and the Center for Social Concerns, for several years. When the Haiti program began in 1999, it was one of the first credit-for-service programs in the college; today it is one of many. Silliman is also developing a similar effort in the Republic of Benin in western Africa.

Business Engineering Program Appoints Associate Director

John M. Brauer

John M. Brauer, associate professional specialist, has been named associate director for the Integrated Engineering and Business Practices Program. Brauer received bachelor's and master's degrees in chemical engineering from the University of Buffalo. He comes to Notre Dame with 34 years of experience in industry, most recently at the IBM Corporation. His management experience in process development, product development, manufacturing, quality, facilities management, and environmental health and safety will complement the industrial expertise already offered in the program.

The courses in the program, Integrated Engineering and Business Fundamentals and Advanced Topics in Integrated Engineering and Business, are two of the most popular electives in the College of Engineering. In fact, by December 2003, more than half of the college's graduates — Classes of 2002, 2003, and 2004 — will have taken the fundamentals course.

Faculty Promotions

To Dean Emeritus

Anthony N. Michel
Electrical Engineering

To Emeritus

William B. Berry, professor
Electrical Engineering

Robert L. Irvine, professor
Civil Engineering and Geological Sciences

James I. Taylor, professor
Civil Engineering and Geological Sciences

To Associate Professor

Patrick J. Fay
Electrical Engineering

Yahya C. Kurama
Civil Engineering and Geological Sciences

To Professor

Peter C. Burns, Massman Chair
Civil Engineering and Geological Sciences

Jeremy B. Fein
Civil Engineering and Geological Sciences

Patricia A. Maurice
Civil Engineering and Geological Sciences

To Department Chair

Peter C. Burns
Civil Engineering and Geological Sciences

To Endowed Professor

Joan F. Brennecke
Keating-Crawford Professor of Chemical and Biomolecular Engineering

Craig S. Lent
Frank M. Freimann Professor of Electrical Engineering

To Associate Dean

Stephen E. Silliman
Associate Dean of Educational Programs

To Director

Thomas C. Corke
Hessert Laboratory

Jeremy B. Fein
Environmental Molecular Science Institute

Patricia A. Maurice
Center for Environmental Science and Technology

25 Years of Service

Stephen M. Batill, professor and chair
Aerospace and Mechanical Engineering

Thomas H. Kosel, associate professor
Electrical Engineering

College Selects Kaneb Award Honorees

The Kaneb Teaching Awards were created in 1999 through a gift from University Trustee John A. Kaneb. They are bestowed annually by individual colleges on faculty who have been active in full-time undergraduate teaching for a minimum of five years. Nominees are chosen based upon the recommendations of current students, recent graduates, and fellow faculty. This year the College of Engineering is pleased to honor the following faculty members for their outstanding service as educators:

Peter M. Kogge

Ted H. McCourtney Professor **Peter M. Kogge,** associate dean for research, joined the University in 1994. Since that time he has consistently shown himself to be equally committed to outstanding research and quality teaching in the Department of Computer Science and Engineering. He has played essential roles in the design and implementation of undergraduate curricula both in the computer science and engineering and electrical engineering departments and has also taught a variety of undergraduate courses. However, what students praise most is the time he makes for them outside of the classroom.

Mark J. McCready

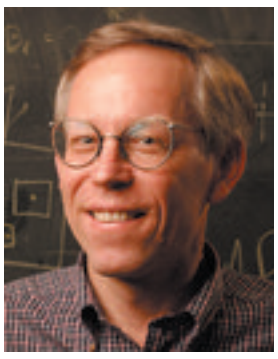
A faculty member since 1984, **Mark J. McCready,** has served as professor and chair of the Department of Chemical and Biomolecular Engineering for the last six years. During that time he has established new teaching and research directions in bioengineering, helped develop the Center for Molecularly Engineered Materials, and participated in numerous University-level committees. According to his students, he is an excellent teacher who shows a genuine concern for their learning and encourages them to ask questions and seek knowledge throughout their careers.

Thomas J. Mueller

Students describe **Thomas J. Mueller,** the Roth-Gibson Professor of Aerospace and Mechanical Engineering, as someone who can relate to and inspire them. As an instructor approaching his 40th year of teaching, Mueller has made many contributions to the undergraduate teaching mission of the College of Engineering and to the Department of Aerospace and Mechanical Engineering. He is a leading researcher in the aerodynamics of micro-air-vehicles and the first member of the Notre Dame faculty to be elected to the Royal Aeronautical Society of London.

Clive R. Neal

Since joining the Department of Civil Engineering and Geological Sciences in 1990, Associate Professor **Clive R. Neal** has exhibited a commitment to undergraduate education that is consistent and contagious. His development of environmental geosciences courses and the international study program in Australia have enabled students to explore and experience different cultures and environments while gaining practical experience. According to students, he teaches with incredible intensity, making classes challenging, yet understandable. Students also credit his enthusiasm with their own discovery of a passion for geosciences.



Ken D. Sauer

Associate Professor **Ken D. Sauer's** dedication to the enhancement of undergraduate engineering curriculum in the Department of Electrical Engineering has been exemplary. His development of the Electric Machinery and Power Systems course is representative of his active pursuit of a cutting-edge curriculum. He is excited about research yet committed to students. In fact, his students often remark that his care and concern for their education is apparent. They cite interesting in-class discussions and demonstrations, unique hands-on opportunities, and frequent field trips to local industries. Sauer joined the University in 1989.

Steven R. Schmid

A 2002-03 Kaneb faculty fellow and author of three books, Associate Professor **Steven R. Schmid** joined the Department of Aerospace and Mechanical Engineering in 1993. Students appreciate and enjoy his enthusiasm, wit, and dedication to helping them learn. They value the way in which he shares the progress of his research activities in the classroom, involving them in the process and teaching them how to apply lessons from their courses to real-world problems. They also comment on the amount of time he spends with them outside of the classroom.

Faculty Updates

Laneman Receives Oak Ridge Award

J. Nicholas Laneman

J. Nicholas Laneman, assistant professor of electrical engineering, has been named one of the 24 recipients of the Ralph E. Powe Junior Faculty Enhancement Award from Oak Ridge Associated Universities, a consortium of 88 academic institutions which includes the University of Notre Dame. Awards in five areas of technology — engineering and applied science, life sciences, mathematics and computer science, physical sciences, and policy management or education — are made annually to young faculty in the first two years of their careers to enhance their research. A faculty member since 2002, Laneman specializes in communications and signal processing, with particular focus on wireless communications and networking applications.

Kurama Receives T.Y. Lin Award

Yahya C. Kurama

Yahya C. Kurama, associate professor of civil engineering and geological sciences, and Michael G. Allen, former graduate student now a structural designer at Degenkolb Engineers in San Francisco, Calif., have received the 2003 T.Y. Lin Award from the American Society of Civil Engineers. The award, which is presented annually to the author(s) of a published paper in the area of prestressed concrete, recognizes the preparation of meaningful papers about prestressed concrete that push building technology beyond existing limits. It is given in honor of T.Y. Lin, an internationally renowned pioneer in the field of prestressed concrete. Kurama and Allen also received the Martin P. Korn Award from the Precast/Prestressed Concrete Institute (PCI) for this same paper, which was published in the March-April 2002 PCI Journal.

Maurice Named Kaneb Fellow

Patricia A. Maurice

Patricia A. Maurice, professor of civil engineering and geological sciences and director of the Center for Environmental Science and Technology, has been named a faculty fellow for the 2003-04 academic year by the University's Kaneb Center for Teaching and Learning. The faculty fellow program is designed to utilize the expertise of University faculty in their discipline-specific areas. Throughout the year faculty fellows share their teaching abilities and experiences via workshops, discussion groups, research, and individual consultation. Maurice joined the faculty in 2000. Her research interests include field and laboratory studies of mineral-water interface geochemistry; organic and microbial interactions with mineral surfaces; geochemistry of humic substances; hydrology and biogeochemistry of freshwater wetlands; and the remediation of metal contamination.

Porod Joins Nanoengineering Council

Wolfgang Porod

Wolfgang Porod, the Frank M. Freimann Professor of Electrical Engineering and director of the Center for Nano Science and Technology, has been appointed to the NanoEngineering Advisory Council of the International Engineering Consortium (IEC). A newly formed board of leading technologists, scientists, academics, and industry professionals, members of this council will guide the IEC's development of educational programs and infrastructure relating to nanotechnology and the successful translation of research into commercial applications.

Porod, who joined the University in 1986, was also recently invited to participate in the 1st Annual National Academies Keck Futures Initiative conference on "Signals, Decisions, and Meaning in Biology, Chemistry, Physics, and Engineering." Created by the National Academies and the W.M. Keck Foundation, the Futures Initiative represents an effort to "catalyze interdisciplinary inquiry and to enhance communication among researchers, funding agencies, universities, and the general public — with the object of stimulating research at the most exciting frontiers."

Article Named One of Most Cited

Joan F. Brennecke

An article titled "Recovery of Organic Products from Ionic Liquids Using Supercritical Carbon Dioxide," written by Joan F. Brennecke, the Keating-Crawford Professor of Chemical and Biomolecular Engineering, and Lynnette A. Blanchard, has been named one of the most cited papers in the field of engineering by the Institute for Scientific Information.

Brennecke, a faculty member since 1989, is a pioneer in environmentally conscious chemical process design, thermodynamics, solvent effects on reactions, and supercritical fluids. Most recently, she was named the 2003 winner of the University's James A. Burns, C.S.C., Graduate School Award, an honor given to a faculty member for "distinction in graduate teaching or other exemplary contributions to graduate education," such as outstanding research and mentoring.

A senior process engineer at Intel Corporation in Boston, Blanchard received her bachelor's degree from the University of Massachusetts-Amherst in 1995 and her doctorate in chemical engineering from Notre Dame in 2002.

Kareem Named ASCE Chair

Ahsan Kareem

Ahsan Kareem, the Robert Moran Professor of Civil Engineering and Geological Sciences, has been named chair of the Engineering Mechanics Division of the American Society of Civil Engineers, the division responsible for technical activities in applied mechanics. Specializing in probabilistic structural dynamics, fluid-structure interactions, structural safety, and mitigation of natural hazards, Kareem has been a member of the faculty since 1990. His research focuses on the environmental loads of wind, waves, and earthquakes on structures, the associated dynamic behavior of structures, and risk assessment.

Kareem participates on several panels of the National Research Council and the National Academy of Sciences, as well as the National Academy of Engineering. He is the past president of the American Association for Wind Engineering and has served as a senior consultant to major oil and insurance companies, engineering corporations, and the United Nations.

AIAA Honors Mueller

The American Institute of Aeronautics and Astronautics (AIAA) has named Roth-Gibson Professor Thomas J. Mueller the recipient of the 2003 AIAA Aerodynamics Award. Presented for meritorious achievement in the field of applied aerodynamics, the award recognizes contributions in the development, application, and evaluation of aerodynamic concepts and methods.

A leading researcher in the complex flow phenomena present at low Reynolds numbers, Mueller has been a member of the Notre Dame faculty since 1965. He served as director of engineering research and graduate studies from 1985 to 1989 and as chair of the Department of Aerospace and Mechanical Engineering from 1988 to 1996.

Jumper Named AIAA Fellow

Eric J. Jumper

"For contributions to our understanding of aero-optics, reacting flows, and unsteady aerodynamics and for dedicated service to the aerospace profession," the American Institute of Aeronautics and Astronautics (AIAA) named Professor Eric J. Jumper a Fellow in Aerospace Sciences. Only one out of every 1,000 members of the AIAA are selected each year as fellows, and of the 200 members nominated for the aerospace sciences category, only four were selected. Jumper is the third member of the Department of Aerospace and Mechanical Engineering to receive such an honor from the AIAA; Viola D. Hank Professor Hafiz M. Atassi and Professor Robert C. Nelson also hold the title of AIAA Fellow. Jumper joined the University in 1989. His research focuses on steady and unsteady aerodynamics, hypersonics, real gas phenomena, plasma dynamics and laser physics, and aero-optical phenomena.

t-rex cast launches "learn with us" series

On Tuesday, July 15, children from South Bend's Robinson Community Learning Center visited the Eck Center on the Notre Dame campus as part of the first installment of the **"Learn with Us"** series developed by the University's Community Relations office. The children, who ranged in age from kindergarten to sixth grade, viewed casts of the head and teeth of a fossilized skeleton of a Tyrannosaurus rex unearthed in northeast Montana near the Fort Peck Reservoir in 1997 by J. Keith Rigby Jr., associate professor in the Department of Civil Engineering and Geological Sciences. University students also led the children in a pseudo dinosaur dig, where they were able to discover dinosaur bones of their own.

The goal of the series is to introduce children from under-represented minorities to concepts and careers in fields such as archaeology, fine arts, music, history, and culture with the assistance of scholars in the various fields. A faculty member since 1982, Rigby specializes in Late Cretaceous and Early Tertiary continental stratigraphy; sedimentology of clay-pebble conglomerates; abrasion of clasts and vertebrate remains; paleobiology; biostratigraphy; extinction; evolution and biometrics of Cretaceous and Early Teritary vertebrate faunas; and Cretaceous-tertiary boundary biotic crisis and mass extinction. He has directed annual volunteer digs in conjunction with the Fort Peck Dam Interpretive Center since finding the T-rex in 1997.

For more information on the Fort Peck Dam Interpretive Center and the dinosaur remains, visit **http://garfieldweb.com/fortpeck.**

For more information on "Learn with Us," visit **http://www.nd.edu/~prinfo/news/2003/7-10b.html.**

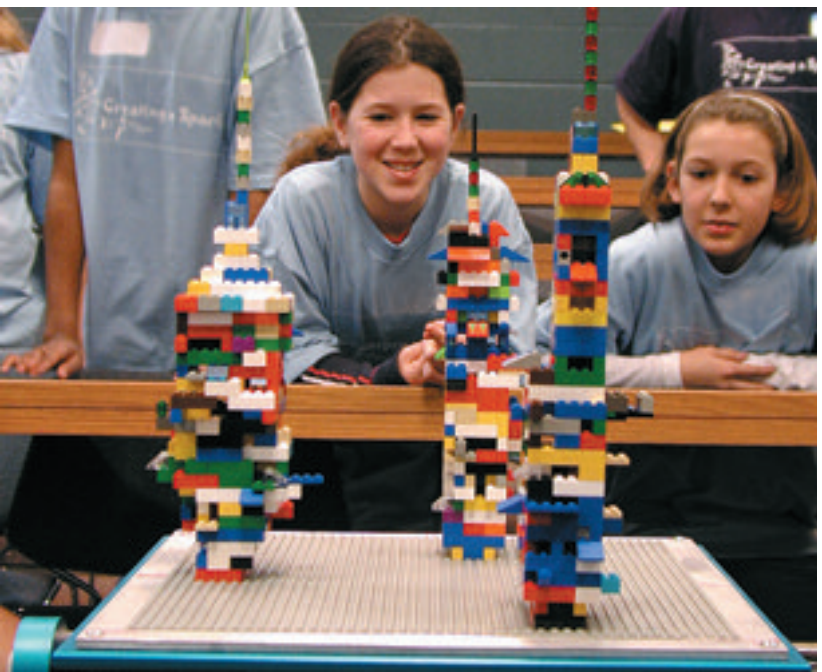
reaching out

ms. wizard day helps girls explore technical careers

On Saturday, February 1, the University welcomed area fourth-through-sixth-grade girls to the eighth annual **Ms. Wizard Day** program. Sponsored by the colleges of engineering and science, the Mendoza College of Business, the Club Coordination Council, and the McCormick Company, this year's program featured 150 students from seven local public schools and almost as many University volunteers.

Founded by Lauren Aimonette, a 1996 graduate of the University, Ms. Wizard Day helps young girls explore the fields of engineering, science, math, and business in a university setting. Through a series of lab experiments, scientific demonstrations, information sessions, and take-home materials — designed to build interest and self-esteem in technical programs, Ms. Wizard Day encourages elementary and middle school girls to pursue their academic interests. It introduces them to career possibilities and fosters a mentoring atmosphere between Notre Dame students and pre-adolescent girls.

One of the many student organizations that participated in the program was the Notre Dame chapter of the Earthquake Engineering Research Institute (EERIUND). Members of EERIUND developed a one-hour adaptation of the group's existing "Shakes and Quakes" program, where teams of students designed and built LEGO® structures using specific aesthetic, economic, and structural safety guidelines. The buildings were then tested in a shake-off competition using a portable earthquake table, and awards were presented to student teams for the most earthquake-proof building, the most beautiful building, and the most profitable building, based on the potential rental space. It was evident from their excitement that the students enjoyed themselves, but more important, according to Ms. Wizard Day sponsors, was the lasting impression the event makes on young girls as they begin to consider careers. According to one of the event's organizers, Tracy Blichfeldt, a senior in chemical and biomolecular engineering, "Ms. Wizard Day provides these girls with positive role models and encouragement to pursue higher education. It also gives them a chance to interact with other girls interested in traditionally male fields so that they do not feel isolated as a woman, or girl in this case, in pursuing these interests."



women engineers reach out to next generation

In March 2003 students in the Women's Engineering Program helped members of Junior Girl Scout Troop 22 from Prairie Vista Elementary School in Granger, Ind., earn their technical merit badges. Approximately 20 scouts and 12 engineering undergraduates participated. This is just one of the many community service projects sponsored by the Notre Dame section of the Society of Women Engineers (SWE). Other SWE outreach activities this year have included performing science demonstrations at the Robinson Community Learning Center in South Bend and participating in "Expanding Your Horizons," a University sponsored career conference for sixth-to eighth-grade girls.

Astronaut Harrison Schmitt Delivers Engineering Lectures

Harrison Hagan Schmitt, the last man to walk on the Moon, presented two lectures on the campus of the University of Notre Dame earlier this year. A native of Silver City, N.M., Schmitt has been a geologist, pilot, astronaut, administrator, writer, businessman, and senator.

On December 11, 1972, Harrison Hagan Schmitt landed in the Valley of Taurus-Littrow, the only scientist and the last of 12 men to step foot on the Moon. On March 3, 2003, the former astronaut and senator delivered a talk entitled "To the Moon and Beyond" to University students and faculty. It was the second installment of the 2002-03 Distinguished Engineering Lecture Series. Later that evening, he presented a public lecture titled "Exploring the Moon and Planets after Apollo." During both lectures, Schmitt shared stories of the Apollo 17 mission — the last manned mission to the Moon — explaining how the mission changed the understanding of the early history of Earth and discussing the role the Moon holds in future space exploration, utilization, and settlement.

Selected for NASA's Scientist Astronaut Program in 1965, Schmitt organized the lunar science training program for the Apollo astronauts, represented the crews during the development of hardware and procedures for lunar surface exploration, and oversaw final preparations of the Apollo Lunar Module Descent Stage.

Schmitt is chair emeritus of The Annapolis Center and an adjunct professor in the Department of Engineering at the University of Wisconsin-Madison. He serves on the corporate boards of Orbital Sciences Corporation and PhDx Systems, Inc., and is the founder and chairman of Interlune-Intermars Initiative, Inc., an organization that seeks to advance the private sector's acquisition of lunar resources, helium-3 fusion power, and the broad clinical use of medical isotopes produced by fusion-related processes.

The Fight Against Hunger

In Bangladesh the per capita income is roughly $285 a year, and a family of five often has to live for six months on the price of two Notre Dame football tickets. That's enough to make anybody fighting mad, especially the 145 undergraduates who signed up for the annual Bengal Mission Bouts. The University's yearly club boxing tournament, the Bouts have been run since 1931 with proceeds benefitting the Holy Cross Missions in Bangladesh. Participating students sell advertising, tickets, and even pay for their own equipment with all profits going to missions. To date the 2003 tournament has raised more than $45,000, although donations are received throughout the year.

Engineering students have been among those who annually give their time and literally fight against hunger and poverty. Nineteen students from the College of Engineering participated in the 73rd annual Bengal Bouts. Representing the Department of Aerospace and Mechanical Engineering were undergraduates Paul Robinson, Jose Ronchetta, Larry Rooney, Michael Ryan, Denis Sullivan, and Jon Valenzuela. Brian Murphy of the Department of Chemical and Biomolecular Engineering and Brandon Gasser and Joseph Schmidlin of the Department of Civil Engineering and Geological Sciences also participated. Stepping into the ring for the Department of Computer Science and Engineering were John Caver, Colin Kerrigan, Christopher Koegel, Mark Pfizenmayer, and James Ward. Patrick Flaherty, Brian Michalek, Rian Sweeney, Steve Tschanz, and Mark Yost represented the Department of Electrical Engineering.

The sportsmanship, competitive spirit, and dedication to safety in amateur sports exhibited by Bengal Bouts participants is evident every year during training sessions and throughout the five-day tournament. As important is the reason for the Bouts, to raise funds for the Holy Cross Missions in Bangladesh or as Dominic "Nappy" Napolitano, director and coach emeritus of the Bengal Bouts has said, "Strong bodies fight, that weak bodies may be nourished."

Brandon Gasser, shown in the gold trunks, is a student in the Department of Civil Engineering and Geological Sciences. Gasser was the No. 3 seed in the 150-pound semifinal of the 2003 Bengal Mission Bouts. He won the semifinal round but lost in the finals. The tournament, in its 73rd year, raised more than $45,000 for Holy Cross Missions in Bangladesh.

College Remembers Kohn

A faculty member since 1955, James P. Kohn, professor emeritus of the Department of Chemical and Biomolecular Engineering, died on May 26 at the age of 78. Kohn's research specialty was thermodynamics and equilibrium, but his influence extended beyond his precise measurement of phase equilibria and his 85 archival publications.

In addition to the numerous awards and honors received during his professional career for exceptional teaching, research, and service, Kohn played a key role in establishing the doctoral program in chemical engineering at Notre Dame. He directed 21 doctoral dissertations, and he established the James P. Kohn Scholarship Fund, which has a direct impact on current students. Through his efforts scholarships have been given annually since 1995. His care and concern for students was evident. It was common for him to remember names and details of students who returned to campus even 30 or 40 years after graduation.

According to Mark J. McCready, professor and chair of the department, "James Kohn embodied the qualities we as faculty strive to achieve. He will be dearly missed by his family, friends, students, and fellow faculty."

Professor Emeritus James P. Kohn, far left, poses with the 2002-03 recipients of the James P. Kohn Scholarships, from left to right, Tracy Blichfeldt, Andrew Downard, Daniel Connell, and Dante Simonetti.

Alumni News

Engineering Alum Honored

William J. Walsh, a 1958 chemical engineering graduate, was selected to receive the 2003 Rev. Louis J. Putz, C.S.C., Award from the Notre Dame Alumni Association. Walsh is the co-founder and senior scientist at the Health Research Institute-Pfeiffer Treatment Center near Chicago. Established in 2002, the Putz Award is given annually by the Alumni Association to an alumni club or individual in recognition of "the development and implementation of programs that have contributed to improving the lives of others."

College Names New Advisory Council Members

The College of Engineering has appointed the following alumni to its advisory council: James P. Bradley ('67, EE), partner in Sidley Austin Brown & Wood, LLP, in Dallas, Texas; George Robert Dunn Jr. ('67, FIN), president of Heffron Company Inc., in Kensington, Md.; Suzanne Hull ('83, EE); and John D. Remick ('59, AME), president and owner of Rochester Athletic Club in Rochester, Minn.

A Leap of Faith

ALUMNI REUNION 2003

Upon graduation many engineering students enter the workplace. Instead of continuing to "climb the corporate ladder," some choose a different path — they start their own technology companies or join start-up ventures. It's exciting, frightening, and, according to many of them, incredibly fulfilling.

Earlier this summer during Reunion 2003, several of these entrepreneurial spirits, and others who were interested in learning more about financing a start-up company, participated in a panel session led by Notre Dame engineering alumni. The session, titled "Financing Your Start-up Company: Why, When, and How to Raise Venture Capital," was led by Kevin G. Connors, managing general partner of Spray Venture Partners in Boston, Mass., and Daniel W. Wrappe, chief executive officer and founder of Triad Semiconductor in Raleigh, N.C. Both Connors and Wrappe graduated in 1983 from the Department of Electrical Engineering. William T. Colleran, chief executive officer of Impinj, Inc., in Seattle, Wa., and Dr. James. F. McGuckin, founder of REX Medical in Radnor, Pa., were also scheduled as panelists but were unable to attend. Colleran and McGuckin graduated in 1983 as well, Colleran from electrical engineering and McGuckin with a degree in mechanical engineering.

"The level of entrepreneurial activity among Notre Dame engineering alumni is significant," says Connors. "This was a good forum for members of the Notre Dame family to share perspectives and ideas on how to start, finance, and grow new technology companies." Alumni interested in obtaining a copy of the video of the panel discussion may contact Engineering Graphics at welding.2@nd.edu for information. The video costs $12, which includes shipping. All proceeds will go toward the new Multidisciplinary Engineering Education and Research Building.

Alumni Updates

Dennis Doughty ('78, EE) has been named president of Booz Allen Hamilton, a management consulting firm. Doughty is based in the firm's McLean, Va., headquarters. Prior to being elected president, he headed major business units in information technology and telecommunications. He has also led commercial sector initiatives in e-business and telecommunications for the company.

Kathleen Hubscher ('97, CE), who is stationed at Kadena Air Force Base in Okinawa, Japan, is currently assigned to the Pacific Airborne Warning and Control System unit patrolling Korea. She is also pursuing graduate studies in space science through Embry Riddle University.

Kathleen [Cannon] Laurini ('82, EE), visited the Notre Dame campus in September as an invited speaker in the Women's Engineering Program (WEP) Career Highlights Lecture Series. Laurini, who most recently served as manager of NASA's office in the Netherlands where she was responsible for the integration of the Automated Transfer Vehicle that will travel to the International Space Station (ISS), was featured in the last issue of *INSIGHTS* as part of a story about the WEP. Since that time she and her family have moved to Houston, Texas, where she is continuing her work on the ISS at Johnson Space Center.

Vincent S. Przybylinski Jr. ('90, ME) was named principal at Waldwick High School in Waldwick, N.J. He had most recently served as assistant principal at Parsippany High School. In addition to his degree from Notre Dame, Przybylinski holds a master's degree in teaching from Montclair State University as well as a master's in business administration in quantitative analysis from Seton Hall University.

Ryan Roberts ('94, ME) has been named vice president and general manager of services for Invensys business unit where he will work with global service organization and regional business units to develop and market an expanded portfolio of automation service products. Most recently, he was employed by GE Medical Systems. Roberts will work out of the Invensys divisional headquarters in Foxboro, Mass.

Jennifer Spanbauer ('03, ME), *summa cum laude* graduate and Steiner Prize recipient *(See page 6.)*, presented "An Informal Discussion on the Nuclear Power Industry" as part of the Women's Engineering Program Career Highlights Lecture Series. She is currently in the Project Manager Development Program at Westinghouse Electric Company in Pittsburgh, Pa.

In Memoriam

Clyde C. Batchellor ('35, EE) passed away in March. Batchellor served as an Army engineer during World War II and the Korean War. For more than 35 years, he worked as a civil engineer for the Coast Guard, designing and maintaining radio installations throughout the Caribbean. He returned to Florida in 1998 to be closer to family.

Donald K. Dorini ('53, COM) passed away in April. A member of the College of Engineering Advisory Council, he was also a member of the National Fire Protection Association and the American Society of Heating, Refrigerating, and Air Conditioning Engineers. He had been living in Fort Lauderdale, Fla.

William R. Kelly, a member of the College of Engineering Advisory Council, died in February in Pinehurst, N.C. He was a retired president of the Bituminous Material Company, Inc., and had been honored three times by two Indiana governors with the Sagamore of the Wabash, the highest award bestowed by the governor. He also served on the Board of Directors of the United Way of Moore County.

Hugh F. Saracino ('67, EE) died in April in San Diego, Calif. He received his master's degree in business administration from the University of Michigan and served in the Navy for five years before moving to San Diego, where he was a well-respected member of the community and worked in the commercial real estate market.

Chad S. Sharon had been a freshman studying engineering when he was pronounced dead on February 12, 2003, a victim of accidental drowning. He was a member of the Math League and served as a D.A.R.E. role model. He served as his high school's senior class president and was also student council president. Sharon was a native of Pelican Lake, Wis.

A Soldier's Welcome

On Thursday, July 3, at 5:30 p.m. in the South Bend Regional Airport, a group of students and colleagues from the College of Engineering surprised Assistant Professor **Jeffrey W. Talley** as he disembarked. Talley, a lieutenant colonel in the United States Army Corps of Engineers, was deployed to the Middle East in February 2003. He returned just in time to help his family and friends celebrate July 4.

As chief of operations for the 416th Engineer Command, Talley was responsible for all engineering missions within the southwest Asia theater. His job during the Iraqi conflict was to organize and control all of the Army engineering missions throughout Kuwait and Iraq. Typical design-and-build assignments for his troops included roads, airfields, base camps, buildings, bridges, enemy prisoner of war camps, water and wastewater treatment plants, and environmental baseline surveys of areas impacted by the war. He and his troops were also instrumental in supporting humanitarian assistance to the Iraqi citizens by returning water and electrical service to numerous Iraqi cities.

Because he specializes in the treatment of contaminated groundwater, soils, and sediments, Talley was also called on to assist in environmental assessment and remediation efforts for different environmental sites in Kuwait and Iraq, specifically assisting Task Force Restore Iraqi Oil at those oil fields destroyed by the former regime.

"Although he was unable to give us details while in Iraq," says Peter C. Burns, Massman Chair of the Department of Civil Engineering and Geological Sciences, "he checked in with us periodically, so we knew he was okay. We're grateful for his safe return, and we are very proud of his efforts and his sacrifice."

Family, friends, and colleagues greeted Assistant Professor Jeffrey W. Talley at the South Bend Regional Airport as he returned home from assignment in Kuwait.

Like soldiers who have returned home from previous wars, Jeffrey W. Talley, assistant professor of civil engineering and geological sciences, brought with him mementos of his time in Iraq and Kuwait. Although these Iraqi dinars hold no monetary value, because they were issued by the former regime, to Talley the money represents the hope and expectations he, the soldiers he served with, and millions of Iraqi people share ... "that Iraq will continue its progression toward a free society and that this particular currency will never again return to circulation." The dinars were presented to Talley by Task Force Restore Iraqi Oil in recognition of his environmental remediation efforts at the oil fields destroyed by the former regime.

insights
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University of Notre Dame

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