



signatures

ENGINEERING ADVANCES AT THE UNIVERSITY OF NOTRE DAME

Winter 2008 • Volume 8, Number 2

Engineering Alumnae

Past, Present, and Future

Undergraduate Honors Program

A Look at Tomorrow's Leaders

Climate Change

Fighting the Good Fight





20 YEARS of MEP

The Minority Engineering Program (MEP) is gearing up to celebrate 20 years in the College of Engineering. According to *Ivan Favila*, program director, MEP is visible evidence of the college's commitment to establish and maintain an environment where every student is welcome and able to pursue his or her career aspirations. As Favila says, "Creative solutions arise from people who think differently, and students from varied ethnicities encourage a diverse collection of ideas and solutions." Collaborative efforts in MEP and throughout the college make the program successful for the students and program sponsors.

Participation is key. MEP students and alumni work as a community of learners, through mentoring programs, group study sessions, retreats, and professional and

personal development seminars. They also participate in national student organizations, such as the National Society of Black Engineers, the Society of Mexican American Engineers and Scientists, and the Society of Hispanic Professional Engineers.

MEP students understand the importance of their experiences in engineering at Notre Dame, but they are equally concerned about future generations of engineers. They play a major role in planning and implementing annual pre-college programs for local middle and high school students, such as the "Is Engineering for Me?" program, shown here.

For more information about how to become involved with MEP at Notre Dame, visit www.nd.edu/~mepnd.



On the cover:

Taken in the Hessert Laboratory for Aerospace Research, the photo on the cover shows a project that employs plasma actuators to study a specific flow control application, reducing airplane landing gear noise. This type of noise manifests itself when the air does not follow the shape of the landing gear (represented by the cylinder). In the wind tunnel, the plasma actuators placed "around the cylinder" force the air to be on the cylinder surface, thus reducing the noise level. Among many other applications, plasma actuators are also used to reduce air resistance (drag) on the back side of a truck, which results in a substantial fuel savings.

For more information about plasma actuators and the University's long history in aerospace research, visit ame.nd.edu.

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Features

- 6 35 Years ... and Counting**
Celebrating Notre Dame
Women Engineers

signatures

Departments

- 2 Seeing the Big Picture**
The rest of the story

- 4 Talking Points**
A letter from the dean

- 14 Taking Note**
News in and around the college

- 28 Sharing Perspectives**
Notes from a faculty member

- 30 Making the Grade**
Student achievements and events

- 36 Reaching Out**
Engineers serving others

- 42 Staying in Touch**
Alumni highlights



- 34 Serious Fun**
The Engineering Honors Program

Exploring Engineering

Although summer programs introducing high school students to engineering have existed at Notre Dame since 1976 (see the related story on the back cover), the current Introduction to Engineering Program (IEP) has been around only since 1998. The idea that started as a way to attract more women to engineering by inviting them to a three-week program in the summer between their junior and senior years in high school has blossomed ... more like exploded ... into a summer experience where high school students apply online and may end up on a waiting list 100 persons long.

Ramzi Bualuan, director of the IEP, says that the overall goal of the program is the same: to make students of this age (rising seniors in high school who excel in math and the sciences) aware of what engineering is and the multitude of career options available as an engineer. IEP also gives the students a taste of college life ... what it is like to be away from home, manage their own time and money, and meet people from around the country. "I've seen teens really get excited about the ways in which they can impact humanity through engineering," says Bualuan. "They actually make the decision to pursue engineering because of this program. But even if they find out engineering is not for them, the program is a success."

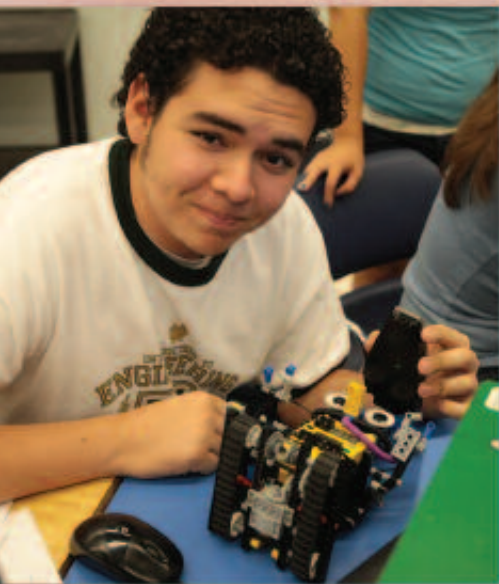
According to Bualuan, approximately 75 percent of the IEP students who attend the program apply to Notre Dame. A third of those students are admitted, and almost half of those who accept and enter the University in the fall continue in engineering. In fact, 18 IEP alumni (the 2002 summer program) graduated from the University in May 2007.

Among the many unique aspects of the program is the online scrapbook that students can share with their parents and friends. It's available at www.nd.edu/~iep/scrapbook. Students wishing to apply for the 2008 program may do so online at www.nd.edu/~iep.

THE REST OF THE STORY



A typical day in the Introduction to Engineering Program includes morning classes and lectures by engineering professors, hands-on sessions in the Engineering Learning Center during the afternoons, and sometimes a field trip to a local industry.



Introduction to Engineering students have homework, too. They are usually assigned two projects during the three-week program, which are based on very specific parameters. The teams must meet the project specifications, while employing their creativity to solve the problem. Among the most popular projects are the robot and bridge competitions. Each robot must interact with its environment to complete a task. Bridges must be sturdy (able to withstand a force of 30N), but still cost-effective.



Irish fans may have noticed that three of the newest TV spots during the Notre Dame football games this season have highlighted research within the College of Engineering. Featured during the Nov. 3, 10, and 17 games, respectively, were **Thomas C. Corke**, the Clark Equipment Professor of Aerospace and Mechanical Engineering; **Joan F. Brennecke**, the Keating-Crawford Professor of Chemical and Biomolecular Engineering; and **Kevin W. Bowyer**, the Schubmehl-Prein Chair of Computer Science and Engineering.

The spots are part of a seven-piece series themed "What would you fight for?" In the first spot, Corke and graduate student **Julia Stephens** discuss the impact of aircraft on consumable resources and fuel usage and how Notre Dame is addressing the challenge. Brennecke and **Jessica Anderson**, also a graduate student, speak about some of the ways in which Notre Dame is working to capture harmful CO₂ emissions from the burning of fossil fuels. Biometrics (vision recognition technologies) are the focus of the final engineering video. In it Bowyer and junior **Sarah Ring** share how Notre Dame is making an impact in iris recognition technologies.

All seven videos can be viewed at www.nd.edu/video. They run approximately two minutes each.



While they may have seen the Notre Dame spots, television viewers missed this: During the Nov. 3 Notre Dame-Navy game, Provost **Thomas G. Burish**, left, presented a game ball to **Peter C. Burns**, the Henry Massman Chair of Civil Engineering and Geological Sciences. Burns was one of several faculty who have been honored by the University at each home football game this season.



©Michael and Susan Bennett, Lighthouse Imaging

The fences are up!

You know they are serious about building you a building when the fences go up. And they are indeed up, extending south from the new Law School building, which is already under construction, to well past the site of our new Stinson-Remick Hall of Engineering. The fences occupy much of the DeBartolo Quad; in fact, to get to most of the buildings lining Notre Dame Avenue, one first has to go north from Cushing and Fitzpatrick halls.

Along with the rising of the fences, our plans and our hopes are also going up, with strategies for building the college of the future through thoughtfully articulated plans to exploit the new opportunities that come with expansion. In my last “Signatures” letter, I described the facilities planned for Stinson-Remick: the expanded, centrally located McCourtney Learning Center, the Center for Nano Science and Technology with a state-of-the-art clean room for device fabrication, our newly emerging Energy Center, an extensive high-tech materials center, and a 50 kW solar panel system on the roof with monitors in the learning center describing its use. Another gain derived from a new building is the opportunity to expand and modernize those labs that remain in Fitzpatrick and Cushing. When Stinson-Remick Hall is complete, we will have six (count them—six) engineering buildings, including the Multidisciplinary Engineering Research Building on the north end of the campus, focusing on orthopaedics research, the world-class Hessert Laboratories for aerospace engineering, and the newest “White Field” building with expanded aerospace facilities.

I believe that there is no better time to be an engineer. For engineers do more than simply study the world as it is given to them; they solve the problems associated with that world, with far more sophisticated tools than have ever been available. Engineers work at all dimensions (from the mega to the macro to the micro



to the nano) and apply the knowledge of physics, chemistry, and biology to the many problems that beset mankind. They not only build bridges, but they also study the materials from which bridges are made at the microscopic level, to design ways to keep them structurally sound. Engineers build skyscrapers, and they simulate their behavior under catastrophic conditions, such as earthquakes or terrorist acts.

I believe that there is also no better place at this time to study engineering than at Notre Dame. We are carrying out forefront research that singularly benefits mankind, and we are performing highly sophisticated computational modeling of killer storms to avert the destruction of future “Katrinas.” At Notre Dame we are learning how to rid the earth, sky, and water of the contaminants that are killing millions of people throughout the world, and we are developing unique ways to sequester carbon dioxide to reduce global warming. We are also developing

nanoelectronic devices and circuits that are smaller, faster, smarter, and consume less energy, along with the systems, architectures, and wireless capabilities that can provide information nearly instantaneously worldwide at a scale never before imagined. At Notre Dame we are developing “smart” sensors and materials for clinical diagnostics, drug delivery, surgery, and implants, and we are providing unprecedented computational power to the biologists who are working to eradicate disease such as cancer and malaria. All of these activities are central to the mission of Notre Dame as a Catholic university.

For the past 18 months, I have been privileged to preside over this college. During this time, we have added several energetic young faculty members with excellent research accomplishments and incredible enthusiasm for the teaching mission of the University. In addition, **Robert J. Bernhard** has joined the University as the vice president for research and professor of aerospace and mechanical engineering, and **Peter K. Kilpatrick** will soon be joining us as the new McCloskey Dean of Engineering and professor of chemical and biomolecular engineering (see related story on page 14). We have been awarded more than \$32 million in external research awards and gifts, which does not include a \$20 million Gates Foundation grant for the eradication of malaria — a project representing true interdisciplinary research between computer scientists and vector biologists. I have also been privileged to work with an extraordinary team of faculty and staff, who share a great love for Notre Dame and its wonderful student body.

We welcome, with enthusiasm, our new dean, who is fully prepared and uniquely capable to elevate the college to become one of the outstanding engineering programs in the United States. I have no doubt that when the fences

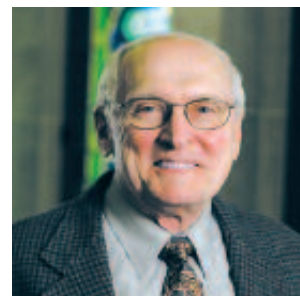


On Saturday, Nov. 3, donors **Kenneth and Ann Stinson**, **Jack and Mary Ann Remick**, and **Ted and Tracy McCourtney**; University President **Rev. John I. Jenkins, C.S.C.**; Executive Vice President **John Affleck-Graves**; Provost **Thomas G. Burish**; former dean **Frank P. Incropera**; interim dean **James L. Merz**; dean elect **Peter K. Kilpatrick**; and friends and faculty of the college gathered for a groundbreaking ceremony on the site of the future Stinson-Remick Hall of Engineering.

come down just two years from now, Notre Dame's College of Engineering will be poised to unleash the next level of intellectual firepower, teaching, and scholarly activity that is essential for Our Lady's University to move forward as the “great, Catholic university” which remains, as always, our goal.

James L. Merz

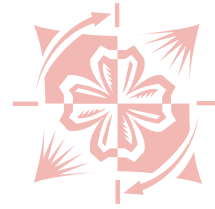
James L. Merz
Interim Dean, College of Engineering
Frank M. Freimann Professor of
Electrical Engineering





35 Years ... and Counting

Celebrating Notre Dame Women Engineers



An all-male school for 130 years, Notre Dame first admitted women in fall 1972. What was it like then, to not only be part of the first class of women at the University, but to also be among the first women engineering students? Was it harder to be a woman in the engineering program? In industry? What is it like today?

Let's face it, there are still plenty of myths about boys and girls and how they learn, especially regarding math and science. One of the biggest is "Boys are better at math and science than girls are." Is it true? Is it biological, or do other factors play a role?

Some of the other myths are just as frightening: "Girls don't like technology," or "A woman can't succeed in a male-dominated profession." Are these myths, or is it really harder, almost impossible, to be a successful woman engineer?

Those are some of the questions we asked Notre Dame engineering alumnae, several of them from the first class of women engineers. Here's what they had to say about being a woman engineer and about Notre Dame engineering.

WHY DID YOU CHOOSE TO PURSUE ENGINEERING?

At age five, **Francesca O'Connor** knew she wanted to be an engineer. "My earliest memory of wanting to be an engineer is when the Challenger space shuttle exploded," she says. "I told my mother if I had worked on the shuttle, the accident never would have happened." By age seven, she had decided she wanted to be an electrical engineer at Notre Dame. Ten years later, she was a first-year student at the University.

O'Connor (B.S., EE '02) is currently a systems engineer with Raytheon in San Diego, Calif. She is responsible for naval ship integration on multiple platforms, encompassing a range of systems from architecture to life cycle support.

DO YOU THINK BEING A WOMAN HINDERED OR HELPED YOUR ACCLIMATION TO THE ENGINEERING PROGRAM?

Some of our alumnae felt the college and classes were skewed toward the men. Not **Kathleen (Fochler) Piwko** (B.S., EE '90), one of seven women in the electrical engineering class of 1990. "I don't think that being a woman affected how I acclimated to the engineering program. Every night, my friend, Tina, and I studied at the same table on the second floor of the library. Since we usually had the homework done ahead of time, a lot of guys would come find us if they had questions."

Piwko does believe, however, that women have a disadvantage in that they don't generally gravitate toward engineering or technical hobbies. "I remember my brother, who was 12 at the time, understanding how a toaster worked when as a second or third-year engineering student, I had never given it a thought. I think that girls don't think about life from an 'engineering' viewpoint, and if they do, they usually don't have many girlfriends with whom to share that interest," she says. A resident of Sparta, N.J., Piwko is a stay-at-home mom. She "retired" as director of the Information Systems Department for Travelers Insurance Company to raise her four children.

Kristin Carey (B.S., CE '02) was working for Turner Construction Company in Chicago when this picture was taken. In addition to working on estimates for the Art Institute of Chicago's museum wing project, high-rise condominiums, and a local hospital renovation, she served as a field engineer on the Soldier Field renovation. Today, she is a project manager in the Department of Operations for construction and planning at Harvard Business School.

WHAT IS ONE OF YOUR FAVORITE MEMORIES ABOUT ENGINEERING AT NOTRE DAME?

Sally (Naxera) Benson (B.S., CE '76), who now lives in Naperville, Ill., had no trouble coming up with two of her favorite memories. She actually started her college career at Saint Mary's College in 1972 (math and chemistry), but transferred to Notre Dame in 1974 to pursue a degree in civil engineering. There were fewer than six women enrolled in the college at the time. "I remember the first class I had with the mechanical engineering guys. They knew I was coming to class, so they got there early and filled all the chairs in the room, except one. It was in the front row on the far side of the room," she says. "There were mumbles, comments, and a few whistles as I sat down. So I politely stood up, turned to the class with my most genuine smile and then said something like 'Hi, guys. Thanks so much for that warm welcome.' We were all good friends from then on."

She also remembered that Professor Jerry J. Marley, now professor emeritus of civil engineering and geological sciences, asked her to start a student group for women engineers. "He told me about an organization called 'SWE.' I just wanted to be one of the guys, so I actually argued against bringing a section on campus. I now understand how wrong I was, and what the value of such an organization can be. I've even spoken to the Notre Dame section since that time."

WHAT, IF ANYTHING, DO YOU BELIEVE IS THE DIFFERENCE BETWEEN HOW MEN AND WOMEN APPROACH ENGINEERING?

Lezlie (Potter) Roosa (B.S., EE '99) had always been told that she was good in math and science. That's why she chose engineering as an undergraduate at Notre Dame and pursued a master's degree in electrical engineering at Stanford. After graduation, she worked in semiconductor fabrication for Intel Corporation for two years. Today, she teaches sixth-grade math in Centennial, Colo. "To broadly generalize, yes, I do see a difference. I think men tend to be quicker and more intuitive in their approach to concepts and problems, but women ask more questions and come up with more thought-out reasoning to back up their results."

Roosa also coaches the middle school math teams, as they compete against other middle schools in solving logic problems. Last season the teams placed second and third in the Cherry Creek School District. "Part of my motivation to teach was a desire to give back to the community every day. I want to eventually teach at the high school level, where my background can more directly benefit students interested in engineering, but I hope that even now I'm preparing my students with a mindset [toward engineering] for the future."

WHAT WAS YOUR FIRST JOB AFTER GRADUATION?

It's been interesting that while many of our alumnae have continued in engineering, a few have pursued other careers. Every one of them has stressed that they were able to do that because the engineering degree taught them how to think and logically solve problems. **Anne Clarke (Weber) Kane** (B.S., CBE '75) was one of the first women to graduate with a degree in chemical engineering. Her first job after graduation was with Amoco Oil Company. She was a design engineer. But her career continued to evolve. "At 27, I got an M.B.A. and pursued positions as a financial analyst for corporations," she says. "When I was 40, I obtained my teaching credentials (physics and chemistry at the high school level). And, I recently completed my master's in educational administration and now serve as a middle school vice principal." Kane lives in Lihue, Hawaii.

OUT OF THIS WORLD

Some of **Dava Newman's** (B.S., AME '86) fondest memories of her life as a Notre Dame engineering student are similar to those of any other college student. She remembers the dorms, her fellow students, discussions about life and death, and contemplating if there ever could be a "just war."

She remembers sports. Newman was a member of the women's varsity basketball team and coached high school girls' basketball at a local school her last two years at Notre Dame.

She also remembers two of the faculty — **Rev. John Dunne, C.S.C.**, The Rev. John A. O'Brien Professor of Catholic Theology, and Professor **A. Murty Kanury**, who was at that time in the Department of Aerospace and Mechanical Engineering, and how they inspired her career.

Today, Newman is a professor of aeronautics and astronautics and engineering systems at the Massachusetts Institute of Technology, where she also serves as director of the Technology and Policy Program. When she came to the University, she thought engineering would be a challenging major and teach her how to be a problem solver. And, she was looking forward to the combination of liberal arts with technical courses that Notre Dame offered.

Newman arrived on campus 10 years after the University first admitted women. "It was great to be a woman in engineering," she says. "My best friend was the only other woman aerospace engineer in our class of 40. We had wonderful male colleagues and benefitted from close teamwork and academic support from a group of about six students."



The new spandex and nylon BioSuit designed by MIT's Professor **Dava Newman**, a Notre Dame alumna, is much less bulky than the standard, gas-pressurized space suit that was designed 40 years ago and currently weighs in at about 300 lbs. Newman's sleeker suit, which fits like a second skin, offers much greater mobility and better protection from punctures and decompression.

Engineering became a way of life for her: thinking, learning, designing, analyzing, and building, which are all things she strives to pass along to her undergraduate and graduate students. According to Newman, the most important thing is that everyone needs to contribute to solving the world's challenges, which are technical, cultural, and political in nature. "Engineers are essential to the solutions," she says.

In addition to her classroom duties and research activities, Newman is deeply committed to outreach and education for

K-12 students. In fact, she is a NASA Solar System Ambassador, an honor she received as part of an international outreach educational effort, the Galatea Odyssey Mission.

Most recently, her research has taken another "giant leap." Newman has designed a skintight space suit that exerts a force on the wearer's body to protect it from the vacuum in space rather than using gas pressurization. She believes it could be ready to fly in about 10 years, in time for a manned mission to Mars.



In 2002, **Dava Newman** served as educational director for the Galatea Odyssey Mission, as she and other leading educators (National Solar System Ambassadors) sailed around the world to promote educational ideas on science and technology. The crew interacted with school-age children around the world in person and via an educational Web site, where students were able to circumnavigate the globe and follow the path of the ship.

As a graduate student in the Department of Chemical and Biomolecular Engineering, **Jessica Anderson** studied ionic liquids and their potential use in carbon dioxide capture and sequestration. Recently, she accepted a position as visiting assistant professor of chemical engineering at Rose-Hulman Institute of Technology in Terre Haute, Ind., where she is teaching courses on conservation principles, material, and energy balances and also energy and the environment.



WHAT ARE YOU DOING NOW?

Marianne (O'Connor) Price (B.S., MET '74) from Indianapolis, Ind., is actually on her second career. Coming from an all-girl high school made for an interesting time as the only girl among 400 men in Professor Emil Hofman's freshman chemistry course. After graduation, she worked in research and development at Union Carbide Corporation for 15 years (3 years full time and 12 part time). After she had her fourth child, Price took some time off, but missed engineering and science, so she pursued and obtained a Ph.D. in medical and molecular genetics from Indiana University School of Medicine. "I am now director of research and education at the Cornea Research Foundation of America, where I manage between 12 and 15 clinical research studies each year, and publish and present the outcomes worldwide," she says. "I think one of the most exciting areas of engineering is biotechnology, developing an understanding of how nature's systems work and applying that knowledge to benefit people. The recent studies we have been involved with have dramatically changed how cornea transplants are performed."



A senior studying aerospace engineering, **Camille Legault** works with local middle school students in the annual "Is Engineering for Me?" program. Legault is also a research assistant, working with Associate Professor **Scott C. Morris** in the Hessert Laboratory for Aerospace Research.

WHAT IS THE MOST EXCITING PROJECT ON WHICH YOU'VE WORKED?

Suzanne Hardie (B.S., CBE '75), director of new growth platforms for Procter and Gamble (P&G), found it difficult to pick a single project. She loves creating new products for consumers. She's been with P&G for more than 30 years, but still gets a thrill about making things new and better. "The breakthroughs in consumer goods that push the boundaries of what is possible to enhance the lives of the world's consumers, especially in developing nations, are tremendously exciting. Our science and approaches can make a huge difference in the way people live," she says. "Because women tend to approach engineering more holistically, with the total experience in mind, I think they better appreciate and empathize with the human factor in engineering." Hardie is from Battle Creek, Mich.



Some of the members of the 2007-08 Society of Women Engineers at Notre Dame board took time from their busy schedules to pose for a photo. Left to right, are **Julie Matteo**, secretary; **Allison Cudworth**, dorm activities co-chair; **Laura Eads**, treasurer; **Emily Toates**, dog book committee co-chair; **Courtney Darlington**, mentoring committee co-chair; **Jen Vogle**, president; **Lindsay Lechner**, vice president; **Anne Brodfuehrer**, speakers and career guidance committee co-chair; **Charlotte Low**, committee coordinator and scrapbook; and **Catherine Crawford**, Joint Engineering Council liaison.

How SWEet It Is

Members of the Notre Dame section of the Society for Women Engineers (SWE) have a couple of reasons to celebrate. For the second year in a row, the section (SWE-ND) received the Outstanding Collegiate Section Award for a medium-sized section (36 to 100 members). The award was presented at the SWE national conference in October in Nashville, Tenn. This is not the first award the section has received. SWE-ND has also been honored by the University, as club of the year (2003) and for program of the year (2005).

Chartered in 1977, SWE-ND is also celebrating 30 years on campus. Adviser **Cathy Pieronek**, director of academic affairs and the Women's Engineering Program, says that the section is one of the most active engineering organizations in the college. In fact, membership in SWE-ND has increased from a handful of women in 2002 to more than 75 active members.

The section's on-campus activities include participation and sponsorship of Engineering Industry Day, numerous leadership luncheons and professional development events, study sessions, monthly meetings, and football concession stand duty.

SWE-ND is also very visible in the community. SWE members participate in programs such as Relay for Life and Ms. Wizard Day and Expanding Your Horizons (annual workshops that introduce young girls to careers in engineering and science). The students also sponsor toiletry drives for the local women's shelter, assist Girl Scout troops with technology badges, and volunteer at middle school science fairs.



SWE-ND sponsors several activities throughout the year. On Halloween night, it sponsored the first Trick-or-SWEet run, a 5K around St. Joseph and St. Mary lakes on campus. The event was a fund-raiser for the Ms. Wizard Day program. Founded by **Lauren A. Liang** (B.A., AMST '96) during her junior year at the University, Ms. Wizard Day exposes fourth-through six-grade girls to engineering, math, and science. Liang is now an assistant professor in the Cross-departmental Reading Program (College of Education) at the University of Utah.

WHAT DOES BEING AN ENGINEER MEAN TO YOU?

Recent graduate Elizabeth Rollins (B.S., AME '07) grew up wanting to invent a process to get rid of nuclear waste. As an eighth-grade student, this was enough to motivate her to pursue engineering, and eventually space science. "Being an engineer means that I have the opportunity to come up with creative solutions to real-world issues," she says. "I can make contributions to projects in new and exciting fields that can help people and make a difference in the world. Being an engineer allows me to make a positive impact on the lives of others."

Rollins is well on her way to achieving her goals. She is a Ph.D. student at the Massachusetts Institute of Technology (MIT), where she works in the Draper Laboratory as a Draper fellow. She also received a National Science Foundation Graduate Research Fellowship. A native of Houston, Texas, she is studying dynamics and controls in the aeronautics and astronautics department of MIT.

IN WHAT TYPE(S) OF ENGINEERING EDUCATIONAL OR SERVICE ACTIVITIES DO YOU PARTICIPATE?

Notre Dame engineering alumnae are active in service and educational outreach programs. For example, Margaret (Peg) Curtin (B.S., AME '76; M.S., AME '78) gives workshops at the annual Expanding Your Horizons conferences in the Seattle area. "There are four different conferences for middle and high school girls," she says. Like some of the other alumnae, Curtin transferred to the University in the early 1970s. Her first job as an engineer was in the aerodynamics group at Boeing Commercial Airplanes. "I worked on the 777, starting with the preliminary studies until about the time the first airplane was delivered, and I was able to watch its first flight," she says. "After more than 28 years, I'm still in the aerodynamics group, and I'm still having fun."

IF THERE WERE ONLY ONE THING YOU COULD TELL YOUNG WOMEN (AND YOUNG MEN) WHO ARE CONSIDERING ENGINEERING AS A CAREER, WHAT WOULD IT BE?

The chief executive officer and founder of Stellar Solutions, Inc., Celeste Volz Ford (B.S., AME '78) chose aerospace engineering because she was good in math and science. But it takes a little more than good grades to launch and grow a successful company. "It's been exciting to build an engineering company that aligns the dream jobs of employees with our customers' critical needs," she says. "The best advice I could give anyone is to find an engineering job that you can be passionate about. For women, in particular, engineering can be a family-friendly field, because you are judged by results, not necessarily the hours charged (such as in law or accounting)."

According to Volz Ford, engineering is also "fun" because of its high impact. "At Stellar Solutions, we work with a variety of space projects that positively impact people's lives. We've also been able to establish a foundation that contributes to the community service interests of our employees, and we give our employees bonuses for their participation in engineering outreach programs—such as speaking in schools about space and coaching robotics teams." In addition to her other duties, Volz Ford serves on the College of Engineering's Advisory Council.

The bottom line for all of these women is that they love what they do. They chose engineering because of its scope and the career options available ... the ability to chart their own paths. While many of them had stories about "being the only woman in the room," none of them allowed a male bias, real or perceived, to alter their course. And, after 35 years, the women in and from the College of Engineering are still charting their own paths and making a difference in the lives of others.

Editor's Note: We'd like to thank each of the alumnae who responded to our questions. They are truly amazing women with stories to match. To learn more about them, visit www.nd.edu/~engineer/publications.htm after January 30, 2008. We will be publishing more of the information they provided on our Engineering News Gateway, when we upload a Web-friendly copy of *Signatures*.

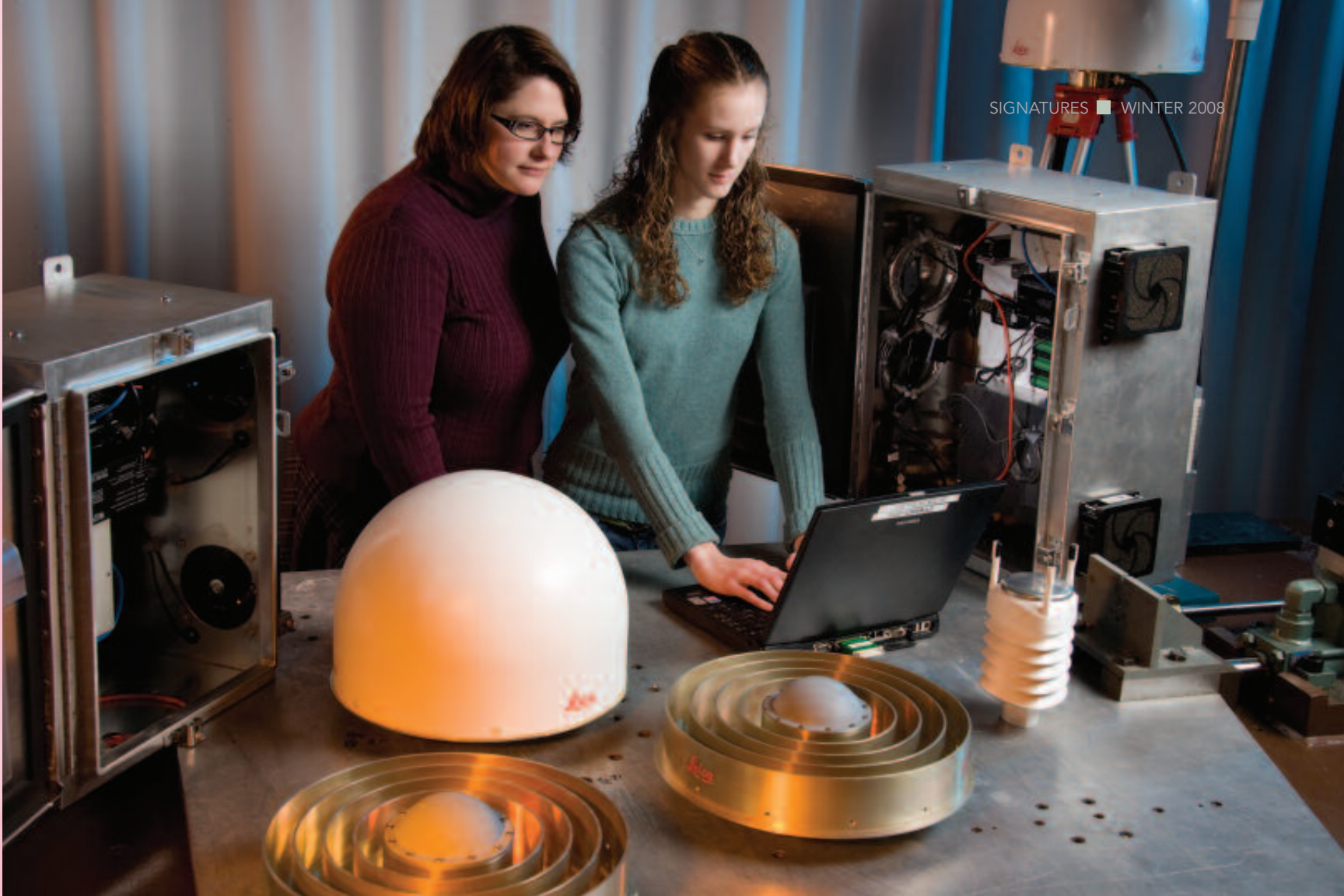
Go for Three

If a category on ESPN's "Stump the Schwab" game show were words or phrases associated with "3" or "triple," then Tracy Kijewski-Correa, the Rooney Family Assistant Professor of Civil Engineering and Geological Sciences, could be an answer ... along with "hat trick," "triple play," and "three ball." With her three degrees from the University in civil engineering (B.S. '97, M.S. '00, and Ph.D. '03), Kijewski-Correa is uniquely qualified not only to teach undergraduate and graduate students, but she also knows the University very well. She knows what it takes to be successful as a woman in engineering, and she knows the impact that engineers have in the world. But the path she's currently on could have been vastly different.

"I knew I wanted to study engineering before I came to Notre Dame," she says. "And, I was definitely interested in structural engineering. My mom worked in downtown Chicago, so as a child, I went and looked at the skyscrapers and wondered 'How'd they do that?'" But Kijewski-Correa had always envisioned getting her degree and going to Chicago as a designer. She never thought about doing the kind of research that lays the foundation for designers ... until one day on her way to the pizza counter.

In her junior year, Kijewski-Correa was serving pizzas in the South Dining Hall (her student job). After one of her classes as she was heading to her job, Ahsan Kareem, the Robert M. Moran Professor of Civil Engineering and Geological Sciences (and her future mentor), told her, "That's a waste of your talent. Would you like to do research for me instead?"

The rest, as they say, is history. Kijewski-Correa believes had it not



Under the direction of **Tracy Kijewski-Correa**, left, the DYNAMO Laboratory serves as home base for the Chicago full-scale monitoring program and other interdisciplinary studies involving graduate students, like **Jennifer Cycon**, and undergraduates. For more information on the facility, visit www.nd.edu/~dynamo.

been for Kareem she definitely would not be teaching and conducting research at Notre Dame today. She probably would not even have earned her doctorate.

As far as being a woman engineer, she says, “The only time I really noticed a difference was in my *Introduction to Civil Engineering* course. The professor gave us a problem to solve, individually at first, then we were to get back into groups. I was done and looked at the guy next to me, who was having problems. He saw I was done, but instead of asking me, a girl, for help, he looked around for another guy. It was subtle, and it didn’t last long.” Kijewski-Correa’s love of sports broke down some of the barriers very quickly. “It got a lot easier when I could talk football with the guys on Monday mornings.”

According to Kijewski-Correa, things are a lot different now in the first-year courses. But she believes girls in engineering can still feel intimidated and start to cluster to themselves. That’s a mistake. Integration

with the guys, not segregation, is the key. “There are natural differences between men and women, but I see a much better, more collaborative environment now among first-year students than when I was a student.”

Much more important than the male-female thing, she believes, is the impact engineers can have. “Engineering is a noble profession, on par with doctors,” she says. “Advancements in engineering give people cleaner water, cleaner air, and safer roadways and bridges. Engineers design tools that detect illnesses and pathogens, and so much more. It really is a life-saving profession that affects people every day. And, it is consistent with the Catholic mission of the University. You can’t ask for a greater calling in life.”



An Irish sports fan, Assistant Professor **Tracy Kijewski-Correa** fulfilled a dream as guest coach of the men’s varsity basketball team in their 2005 upset win over Boston College, No. 4 at the time.

Engineering Welcomes New Dean

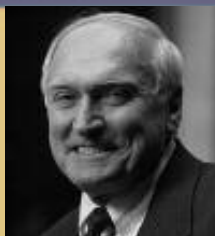
An accomplished teacher and researcher who has served as chair of the Department of Chemical and Biomolecular Engineering at North Carolina State University since 1999, **Peter K. Kilpatrick** has been appointed the dean of the College of Engineering. He will join the University in January 2008.

Kilpatrick earned his doctorate in chemical engineering from the University of Minnesota and his bachelor's degree in chemistry from Occidental College in Los Angeles. He has been a member of the North Carolina State faculty for 25 years. His research focuses on colloidal and interfacial science, with particular emphasis on the colloidal and molecular properties of crude oil and on biological membranes. His work, which promotes more energy-efficient and environmentally responsible oil production and refining, led to the development of the Biomanufacturing Training and Education Center at North Carolina State, a unique facility that focuses on protein manufacturing.



He succeeds **Frank P. Incropera**, the Brosey Professor of Aerospace and Mechanical Engineering, who had served as dean since 1998, and **James L. Merz**, the Frank M. Freimann Professor of Electrical Engineering, who will continue his tenure as interim dean until Kilpatrick begins in January. "Notre Dame has a tremendous and well-deserved reputation for excellence in undergraduate education that I am committed to maintaining and enhancing," says Kilpatrick. "I am also excited about building upon the graduate research component of the college and continuing to create distinctive engineers who are morally grounded in a mission such as the University's. Such engineers can truly make an impact on our world."

Historically speaking, Kilpatrick will be the 16th dean of the college, which was officially established as a college with its own dean in 1920. Each dean has served the University and the college well, often during exciting times. For example, the original Engineering Hall was destroyed and a new hall (the current Cushing Hall of Engineering) constructed during the tenure of **Rev. Thomas A. Steiner, C.S.C.** Under **Donald C. Jackson**, the fourth dean of engineering, Notre Dame received its first accreditations for its engineering programs. The first supersonic smoke tunnel in the United States was constructed on campus in 1959. Fitzpatrick Hall of Engineering was dedicated in 1979 and the Hessert Laboratory for Aerospace Research in 1991. There have also been numerous innovations over the years, such as the development of Quantum-dot Cellular Automata, the design of novel technologies to address the nationwide problem of combined sewer overflow, the demonstration of magnetic logic, the discovery of a new class of materials (actinyl peroxide compounds), and the design of a number of ionic liquids that dissolve carbon dioxide (applications for clean coal technologies). All testify to a forward-thinking administration and dedicated faculty in the College of Engineering. All point to a future as exciting as the past.



James L. Merz
2006-present



Frank P. Incropera
1998-2006



Anthony N. Michel
1988-98



James I. Taylor
1987-88



Roger A. Schmitz
1981-87



Joseph C. Hogan
1967-81



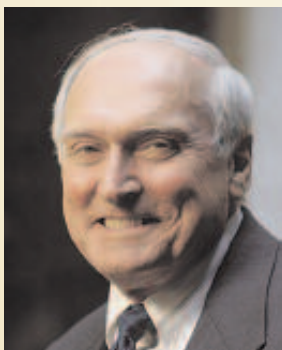
Norman R. Gay
1961-66



Bernhard to Lead Office of Research

In August 2007, **Robert J. Bernhard** joined the University, filling the newly created position of vice president for research in charge of the University's Office of Research. He also serves as a professor in the Department of Aerospace and Mechanical Engineering. According to Provost **Thomas G. Burish**, Bernhard brings his gifts as researcher and teacher, not to mention those of a skilled administrator and facilitator of large-scale research programs, to Notre Dame. "He has the background, commitment, talent, integrity, and work ethic to help propel Notre Dame's research efforts," Burish said.

One of the leading experts on noise control, Bernhard previously served as the associate vice president for research and professor of mechanical engineering at Purdue University. "I've been at Purdue for 25 years and had a wonderful career there," says Bernhard. "It was difficult to leave." At the same time, he has expressed his excitement for the bold vision of the University as it takes its commitment to research to the next level.



Merz Named AAAS Fellow

James L. Merz, the Frank M. Freimann Professor of Electrical Engineering, has been named a fellow of the American Association for the Advancement of Science (AAAS). A 1959 graduate of the University, he was cited for "distinguished contributions to the field of photonic devices and particularly to optical spectroscopy of semiconductor nanostructures."

An internationally recognized scholar in the field of optoelectronic materials and devices, Merz returned to Notre Dame in 1994 to direct a team of researchers investigating Quantum-dot Cellular Automata, a transistorless technology also known as "Notre Dame logic." Since that time, he has served the University in various capacities, including vice president for graduate studies and research and, most recently, as interim dean of the College of Engineering.



Harry C. Saxe
1960-61 and
1966-67

Mario Goglia
1957-59

Karl E. Schoenherr
1945-57

Raymond Schubmehl
1941-45

Donald C. Jackson
1939-41

Walter L. Shilts
1938-39

Rev. Thomas A.
Steiner, C.S.C.
1928-38

Martin McCue
1920-28

NSF CAREER Awards

The National Science Foundation (NSF) has awarded Early Career (CAREER) Awards to two Notre Dame faculty members: **Debdeep Jena** and **Douglas Thain**. Established in 1995, the CAREER program honors young faculty who exhibit a commitment to conducting research and providing stimulating educational opportunities for students. It is one of the highest honors given by the U.S. government to junior faculty in engineering and science. Competition for CAREER awards is fierce, with a



typical success rate between 15 and 20 percent.

An assistant professor in the Department of Electrical Engineering, Jena's research focuses on the growth and properties of III-V semiconductors and their application in high-speed devices and photovoltaics (solar cells) and on the investigation and development of nanoscale, quantum-wire devices. His winning proposal, "Dielectric Engineering of Quantum-wire Solids: Fundamentals to Applications" addresses the fundamental properties of semiconductor nanowires and includes research activities and curricula for undergraduates and graduate students, as well as a high school outreach program. Jena joined the faculty in 2003.



Thain, who joined the University in 2004, is an assistant professor in the Department of Computer Science and Engineering. His project, titled "Data Intensive Grid Computing on Active Storage Clusters," explores ways to efficiently execute data-intensive scientific workloads by using an array of servers with embedded computational ability. The project will develop new languages, data structures, and algorithms in order to better harness active storage clusters. His proposal also offers hands-on opportunities for student participation.



Laneman Honored in White House Ceremony

Among the 58 recipients of the Presidential Early Career Award for Scientists and Engineers (PECASE) honored during a Nov. 1 ceremony at the White House was **J. Nicholas Laneman**, assistant professor of electrical engineering.

The PECASE program represents the highest award that a beginning engineer or scientist can receive from the U.S. government. Nine government agencies, including the National Science Foundation (NSF), nominate the candidates, and selection is extremely competitive.

Already acknowledged as a pioneer in cooperative diversity, Laneman was one of the 20 honorees nominated by the NSF from among the grantees of its Faculty Early Career Development Program. His CAREER (and subsequently PECASE) project, "Toward a Renaissance in Finite Blocklength Information Theory," focuses on fundamental performance trade-offs of communication systems and networks for applications, such as wireless, in which transmission intervals are limited relative to the randomness of the communications medium. His goal is to provide a mathematical and computational framework for characterizing the trade-offs and designing more efficient systems.

Kareem Receives International Appointment

Past president of the American Association for Wind Engineering and frequent consultant to major oil and insurance companies, engineering corporations, and the United Nations, **Ahsan Kareem**, the Robert M. Moran Professor of Civil Engineering and Geological Sciences, has been appointed advisory professor to Tongji University of Shanghai. This is one of only four such appointments in the history of the civil engineering program at Tongji, which is rated number one in China.

Kareem is the director of the NatHaz Modeling Laboratory at Notre Dame. He specializes in probabilistic structural dynamics, fluid-structure interactions, structural safety and mitigation of natural hazards. His work relates to the research efforts at Tongji that focus on wind effects on civil infrastructure — specifically the mitigation of natural hazards and the development of tall buildings and long-span bridges — and supports China's commitment to advance the nation by encouraging international collaborations, exchange programs, and technological growth.

Additionally, the International Association of Wind Engineering has named Kareem the recipient of the Alan G. Davenport Medal. The award was presented in July 2007 at the 12th International Conference on Wind Engineering in Cairns, Australia.

He has also been appointed chair of the Advisory Board of the Engineering Mechanics Division of the American Society of Civil Engineers. The board oversees the technical activities and financial business of the division. Kareem has been a member of the Notre Dame faculty since 1990.



Those having torches will pass them
on to others. — *Plato, The Republic*

2007 Teaching Awards

Teacher of the Year

The first faculty award for outstanding teaching was presented in 1977 in celebration of 100 years of engineering at Notre Dame. According to students and



University colleagues, on a daily basis this year's recipient, **David T. Leighton Jr.**, professor of

chemical and biomolecular engineering, goes above and beyond what is "required." Students say he enlivens the classroom by incorporating unique demonstrations and enriches their University experience by showing genuine concern for their education. As one student said, "It is almost impossible to go into his office, which is always open, and leave without having learned something." Leighton joined the University in 1986.

University Teaching Awards

Formerly known as the Kaneb Teaching Award, the Rev. Edmund P. Joyce, C.S.C., Award for Excellence in Undergraduate Teaching was presented to a total of 17



Michael M. Stanisic, assistant professor of aerospace and mechanical engineering, and

University faculty this year. Among the honorees are two instructors from the College of Engineering:

Jeffrey W. Talley, professor of civil engineering and geological sciences. The newly established award recognizes faculty who have had a profound impact upon their students through teaching and mentoring. It is funded by an endowment provided by the Class of 1937, of which Father Joyce was a member, in honor of the 70th anniversary of his graduation.

Since joining the University in 1998, Stanisic has consistently demonstrated a passion and aptitude for the creation of environments and experiences that encourage young engineers. Students say he makes classes challenging, but not unattainable.



They also credit his enthusiasm for their continued interest in the field of mechanical engineering.

According to his students, Talley organizes and presents difficult material in a clear and concise manner. They say he encourages them in their exploration of environmental bioengineering by involving them in hands-on research. Since joining the University in 2001, he has proved himself to be as dedicated to finding solutions to real-world problems as he is to developing cutting-edge curriculum.

Spira Awards

Also presented annually, the Ruth and Joel Spira Award for Excellence in Teaching honors faculty members in the departments of electrical engineering and aerospace and mechanical engineering. The award was established in May 2000 by Joel Spira,

the founder, chairman, and director of research of Lutron Electronics and his wife, **Ruth**. They have funded similar awards at Carnegie Mellon University, Cornell University, Lehigh University, Massachusetts Institute of Technology, Pennsylvania State University, Purdue University, and the University of Michigan.

This year's recipients are **Thomas E. Fuja**, professor and chair of the Department of Electrical Engineering, and **Robert C. Nelson**, professor of aerospace and mechanical engineering. Fuja, whose research encompasses digital communications, error control coding, joint source-channel coding, and information theory, joined the University in 1998. Nelson, who received a bachelor's (1964) and master's (1966) degree in aerospace engineering from Notre Dame, returned to the University as a faculty member in 1975. His research interests include aircraft stability and control, fluid mechanics, and aerodynamics.



ND Storm Tracker Honored

Since before he joined the University in 1990, **Joannes J. Westerink**, professor of civil engineering and geological sciences has been studying coastal oceanography — modeling circulation and transport in coastal seas and oceans, recording tidal hydrodynamics, and working to accurately predict hurricane storm surge. In February 2007, Louisiana Gov. **Kathleen Blanco** appointed him to the Southeast Louisiana Flood Protection Authority (West Bank).

The seven-member board and its counter part, the 11-member East Bank board, serve as the local sponsors for the construction, operation, and maintenance of hurricane, storm damage reduction, and flood control projects in greater New Orleans and Southeastern Louisiana.

Westerink, the co-developer of the Advanced Circulation Model (ADCIRC), which is the

authoritative computer model for storm surge, had already been leading the development of more detailed storm surge models of the area to better understand the physics of storm surge development. He has also been involved in studies focusing on levee development for the Louisiana Coastal Protection and Restoration project, the Army's Interagency Performance and Evaluation Task Force (IPET), and the Federal Emergency Management Agency's Insurance Program.

His service as co-leader of the IPET team, which evaluated the Hurricane Katrina failures and hurricane protection risk, garnered a special citation from the Army. In April, he received the U.S. Department of the Army Outstanding Civilian Service Award. The award, which recognized his efforts on behalf of the IPET, cited Westerink for "his superior level of performance and tireless devotion which positively impacted IPET project success and contributed greatly to the reconstruction efforts of the New Orleans Hurricane Protection system."

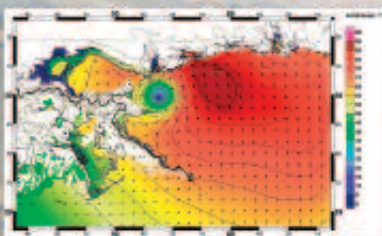
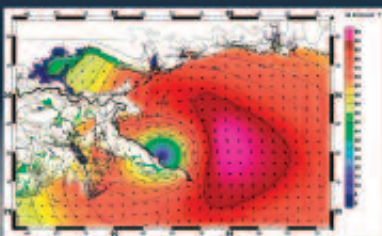
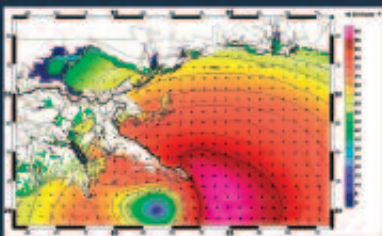
For more information about ADCIRC or storm surge research at Notre Dame, visit www.nd.edu/~coast.

WHAT'S IN A NAME?

The 2007 Atlantic Hurricane season, which began June 1, spawned two storms almost immediately. While a "normal" season produces 6 to 14 storms, the pre-season forecast issued by the National Oceanic and Atmospheric Administration projected a very active season with 13 to 17 named storms, including 7 to 10 hurricanes with 3 to 5 of those being intense hurricanes. As it turns out, only 6 hurricanes developed during the season, which ended November 30.



Professor **Joannes J. Westerink** and researchers in the Computational Hydraulics Laboratory track hurricanes and calculate storm surge using the Advanced Circulation Model (ADCIRC), the computer model for storm surge used by the Army Corps of Engineers, the Federal Emergency Management Agency, and the state of Louisiana. ADCIRC was developed by Westerink and **Richard A. Luetich Jr.**, director of the Institute of Marine Sciences at the University of North Carolina.



Another Patent

A United States utility patent, No. 7,185,150, for "Self-contained Mobile, Memory Programming" was issued to **Peter M. Kogge**, the Ted H. McCartney Professor of Computer Science and Engineering and Associate Dean for Research. (He holds more than 35.) It covers a new class of computer architectures where computation occurs in the memory rather than in the micro-processor.

Kogge graduated from the University in 1968 with a bachelor's degree in electrical engineering. Prior to returning to Notre Dame in 1994, he worked in the Federal Systems Division of IBM, served as an IBM Fellow, and was also an adjunct professor at the State University of New York at Binghamton.



Huang Receives Fulbright Award



Yih-Fang Huang, professor of electrical engineering, was awarded a Fulbright-Nokia Scholarship for a project titled "MIMO-OFDM for Emerging Wireless Communication Technology." Huang's research, which was conducted at the

Helsinki University of Technology during fall 2007, focused on signal processing techniques for systems with multiple antennas, specifically a form of wireless communications in which a single data stream is transmitted via multiple radio frequencies in such a way that they do not interfere with one another.

Huang, who earned his master's degree in electrical engineering from Notre Dame in 1980, returned to campus as a faculty member in 1982.

Corke Receives ND Research Award



On May 22, during the annual President's Dinner, the University presented **Thomas C. Corke**, the Clark Equipment Professor of Aerospace and Mechanical Engineering, with the 2007 Research Achievement Award. Corke, the founding director of the Center for Flow Physics and Control,

was recognized for his significant contributions to the study and understanding of fluid mechanics, which have resulted in more than \$8 million in research funding and significant collaborations with industrial partners.

Corke joined the University in 1999. He

holds two patents and has been twice honored with the NASA Achievement Award. A fellow of the American Society of Mechanical Engineers, his most recent book, *Design of Aircraft*, is the capstone design text for 12 aerospace departments across the country.



Jesus A. Izaguirre, associate professor of computer science and engineering, has been invited to serve as a member of the Biodata Management and Analysis (BDMA) study section of the Center for Scientific Review (CSR). The CSR is the portal for all research and training grant applications submitted to the National Institutes of Health.

Center for Scientific Review Taps Izaguirre

According to Dr. **Antonio Scarpa**, the director of the CSR, the BDMA section reviews grant applications targeting the development of technologies for the management and analysis of biological data. Specific areas covered by the section include, but are not limited to, methods for data management, theoretical approaches to the design and interpretation of large-scale studies and computational methods for organizing datasets, and visualization techniques.

Izaguirre's research interests encompass the

development of scalable algorithms and software for computational biology and chemistry, particularly in the areas of developmental and cellular molecular biology. In addition to expertise in the field, Scarpa says, "Service on a study section requires mature judgment and objectivity, as well as the ability to work effectively in a group ... qualities we believe Dr. Izaguirre will bring to this important task." Izaguirre has served as a member of the Notre Dame faculty since 1999.

Pieronek Receives Outstanding Adviser Award

The Society of Women Engineers (SWE) has named **Cathy Pieronek**, director of academic affairs and the Women's Engineering Program in the College of Engineering, their 2007



Outstanding Faculty Adviser. The inaugural award, honoring a SWE leader who has made outstanding contributions to a collegiate section as an adviser,

was presented during the society's national conference in October.

Pieronek was cited for her "dedication to female undergraduates through support of the Notre Dame Collegiate Section, developing it into a premier organization in the College of Engineering, and for implementing programs that have dramatically improved the retention of female engineering students."

A Notre Dame alumna (B.S., AME '84, and a J.D. '95), Pieronek returned to the College of Engineering in 2002 in order to establish the women's engineering program and thus address the low retention rate of women from the first through sophomore years. Her work has led to a 25 percent improvement in the retention rate of female students and a 20 percent increase in the number of admitted engineering women choosing to attend Notre Dame.

Notre Dame Hosts Electronics Conferences

From June 18 through 22, Notre Dame hosted the 65th Device Research Conference (DRC) and the 49th TMS Electronics Materials Conference (EMC). The premier forums for electronic materials and devices research, these paired conferences promote the open discussion of recent breakthroughs and advances, while fostering collaboration and the exchange of information. Approximately 500 attendees participated in invited lectures, plenary sessions, group discussions, poster sessions, and a special joint session highlighting nanobiological devices and materials.

In addition to addressing existing technologies, the DRC and EMC invigorate

discussions concerning emerging technologies. This is particularly important because of the escalating challenges to continued progress in electronics. Attendees discussed the work they have been conducting in a number of areas, including advanced semiconductors (developing and using materials other than silicon), nano and biological materials and devices (including organic transistors and carbon nanotubes) and fuel and solar cell materials.

Several members of the Department of Electrical Engineering — faculty, postdoctoral researchers, and graduate students — presented their work at the conferences.



IEEE Honors Liu

Rueywen Liu, the Frank M. Freimann Professor Emeritus of Electrical Engineering, has been named the 2007 recipient of the Institute of Electrical and Electronics (IEEE) Circuits and Systems Society's Mac Van Valkenburg Award. The award honors Liu for outstanding technical contributions and continuity of leadership.

An IEEE fellow, Liu joined the University in 1960. In addition to this most recent award, he has received the IEEE Society Technical Achievement Award, the IEEE Third Millennium Medal, the IEEE Society Golden Jubilee Medal, Alexander von Humboldt Senior Research Award, and the IEEE Society Meritorious Service Award.



“Straight on ’til Morning”

Since before Neil Armstrong’s “one small step,” mankind has had a storybook fascination with the Moon ... landing on it, living on it, using it as a base for deeper space expeditions. In 2004, President Bush renewed that sense of wonder when he announced the Vision for Space Exploration initiative and committed the country to long-term exploration of the solar system, starting with a return to the Moon. Even now, researchers are trying to determine if and how astronauts could safely work and live there.

A member of the College of Engineering faculty, Clive R. Neal, professor of civil engineering and geological sciences, will play a big part in addressing those issues. He has been named the chair of NASA’s Lunar Exploration Analysis Group (LEAG). He will also sit on the Planetary Science Subcommittee of NASA’s advisory council.

LEAG has been charged with analyzing the technical, operational, and commercial issues associated with lunar exploration. As its chair, Neal’s expertise will prove very beneficial. His research interests include the evolution of the Moon and Mars, and the origin of the solar system. Prior to joining the University in 1990, he served as a postdoctoral researcher at the University of Tennessee, where he first had the opportunity to work with Moon rocks.

Neal is also the chair of the Lunar Sample Allocation Subcommittee of NASA’s Curation and Analysis Planning Team for Extraterrestrial Materials, a position he has held since 2005.

For more information on LEAG, visit www.lpi.usra.edu/leag.





Jacqueline Garrison, who is studying the role of bone quality in osteoporotic fractures, is part of a National Institutes of Health study being conducted at Notre Dame in collaboration with the Small Ruminant Comparative Orthopaedic Laboratory at Colorado State University.

Bioengineering Ph.D. Now Offered at ND

“Bioengineering” is one of those buzzwords, like “nano,” that people seem to throw around indiscriminately. But there are reasons that industries and academia get excited about emerging technologies. It’s because of the possibilities, the “bold new frontiers” that are opening to exploration. From

orthopaedics and medical diagnostics to environmental engineering, and modeling and simulation techniques, bioengineering offers an incredibly diverse range of fields for students considering their future. In addition to undergraduate tracks, graduate students may now obtain a doctoral degree from the University in bioengineering through the College of Engineering.

What is especially intriguing about the program is its interdisciplinary nature. The college provides training in a wide range of engineering and biological fields (including physical, chemical, and mathematical sciences, as well as engineering principles). As important, the program encompasses each department within the college, with faculty from the colleges of engineering and science participating.

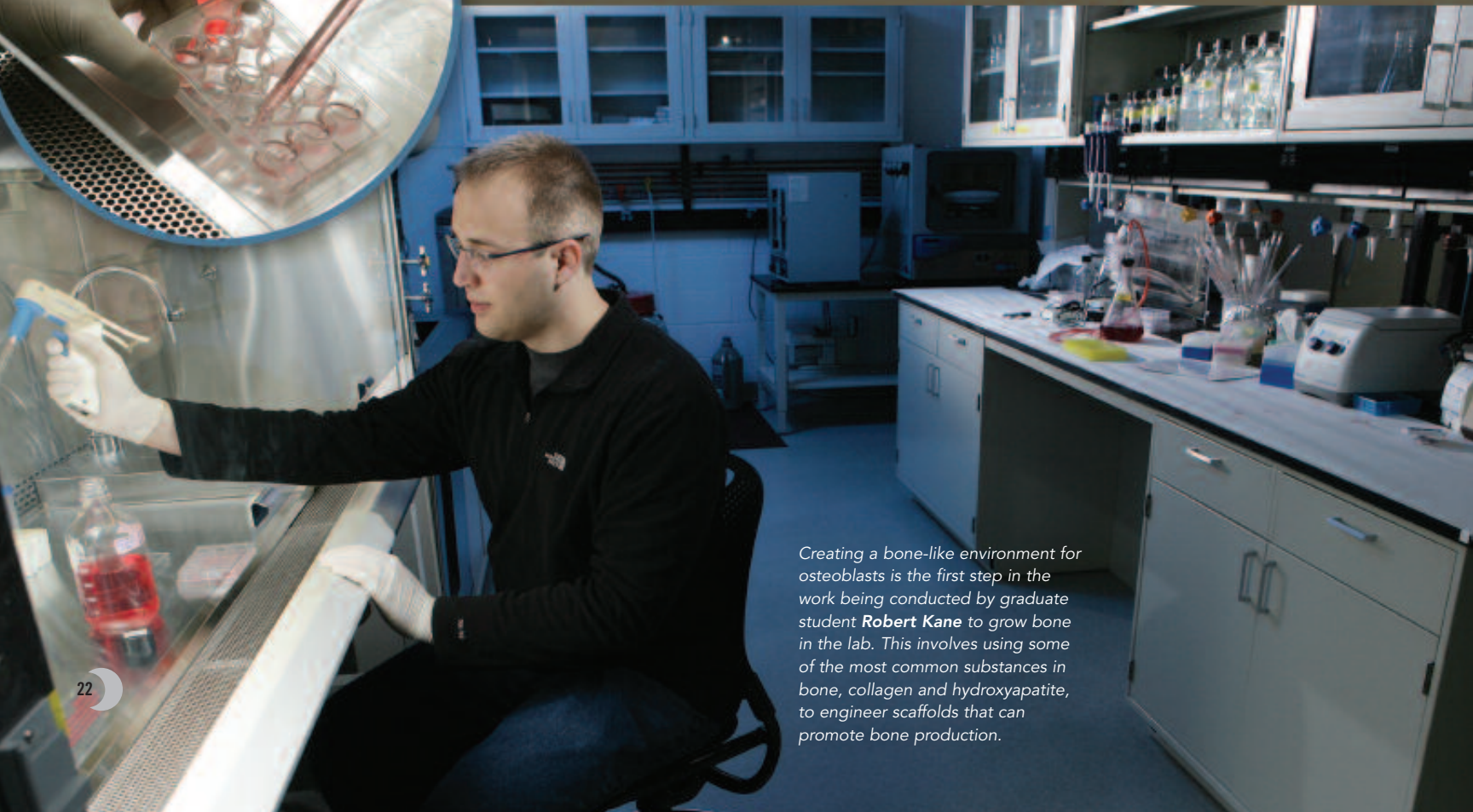
An entering Ph.D. student is admitted to the Graduate School and bioengineering graduate program with simultaneous admission into one of the traditional departments within the college, which serves as a student’s home department. Coursework emphasizes depth in that particular engineering discipline, while incorporating additional studies in areas of specific interest to each student.

Students work in state-of-the-art facilities, such as cell and tissue culture laboratories; biomechanical testing areas; imaging facilities that include computed tomography, electron microscopy, and light microscopy; microfluidics laboratories; high-performance computing clusters; and micro- and nanofabrication rooms.

The program is new, but it is growing, and students, who work closely with faculty and industry collaborators, are already making an impact through their work.



Also pursuing a Ph.D. in bioengineering, **Ryan Ross** is working on a U.S. Army-supported research project aimed at developing an X-ray contrast agent for quantifying microdamage in bone.



Creating a bone-like environment for osteoblasts is the first step in the work being conducted by graduate student **Robert Kane** to grow bone in the lab. This involves using some of the most common substances in bone, collagen and hydroxyapatite, to engineer scaffolds that can promote bone production.

Brennecke Wins Prausnitz Award

The Conference on Properties and Phase Equilibria for Product and Process Design has awarded the 2007 John M. Prausnitz Award for outstanding achievement in applied chemical thermodynamics to **Joan F. Brennecke**, the Keating-Crawford Professor of Chemical and Biomolecular Engineering and director of the Notre Dame Energy Center.

Brennecke was cited for her pioneering work in molecular thermodynamics of separations with ionic liquids (ILs) and local composition effects on reactions in supercritical fluids during the award presentation at the 11th international conference earlier this year. The Prausnitz award is the most recent in a long line of honors she has received for her research, which focuses on the experimental aspects of thermodynamics and separations.

A faculty member since 1989, Brennecke is a member of the American Chemical Society, American Institute of Chemical Engineers, and American Society for Engineering Education. She also serves on the editorial board of *Green Chemistry* and is chair of the Council for Chemical Research.



Learning from the Best

Kwang-Tzu Yang, the Viola D. Hank Professor Emeritus of Aerospace and Mechanical Engineering,

received the Max Jakob Memorial Award in July 2007 during the American Society of Mechanical Engineers (ASME)-Japan Society of Mechanical Engineers Thermal Engineering and Summer Heat Transfer Conference in Vancouver, British Columbia. of achievement and distinguished service in heat transfer. His research has focused on heat exchanger dynamics, hydronic systems, application of artificial intelligence, oscillating flows, modeling of large fires, tribology, food and materials processing, and technology transfer. He also holds patents for flexible coupling and the wet oxidation of coal for the generation of heat energy. The award is a special honor for Yang as Jakob was his Ph.D. adviser.

A fellow of the ASME and a member of numerous professional societies, Yang is listed in "Who's Who in America," "Who's Who in Engineering" and "American Men and Women of Science." He has served as a faculty member since 1955.



Named in honor of **Max Jakob**, a pioneer in the science of heat transmission, the award has been presented annually since 1961. Yang was recognized for a long career

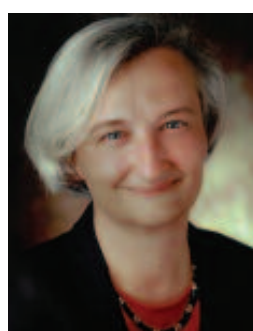
received the Max Jakob Memorial Award in July 2007 during the American Society of Mechanical Engineers (ASME)-Japan Society of Mechanical Engineers Thermal Engineering and Summer Heat Transfer Conference in Vancouver, British Columbia.

Maziar Named Senior Associate Provost

Christine Maziar, professor of electrical engineering and former vice president and associate provost at the University, has been promoted to vice president and senior associate provost. Prior to joining the University in 2002, she served as provost at the University of Minnesota. As such, she was responsible for academic units, but also oversaw the libraries, information technology, admissions, student affairs, and enrolled student services.

In addition to her most recent responsibilities at Notre Dame, which included administration of budgets, academic

space management, and implementation of the University's academic strategic plan, Maziar is now responsible for overseeing the provost's office when **Thomas G. Burish**, the University's provost, is traveling.



Nanotechnology on the Emerald Isle

An endowment created by 1953 graduate **John B. Clark Sr.**, former president and chief executive officer of Brown Plastics Engineering Company, and his wife, **Fidelma**, will support a research and educational exchange program between Notre Dame's College of Engineering and Ireland's University College in Cork and Trinity College in Dublin. Both of the Irish institutions have thriving nanotechnology programs that complement the work being conducted in the University's Center for Nano Science and Technology.

Through a summer research program, participating students will work in Ireland on a variety of collaborative projects designed to give them a deeper insight into one of today's most promising technologies. The research opportunities offered to undergraduates through this program will also give them an advantage when they graduate and compete for positions in industry or graduate school.

James L. Merz, the Frank M. Freimann Professor of Electrical Engineering, and **Wolfgang Porod**, the Frank M. Freimann Professor of Electrical Engineering and Director of the Center for Nano Science and Technology are the principal contacts for Notre Dame. Students wishing to find out more about the new program should contact Merz at jmerz@nd.edu.

an update on Engineering Structures



The 10,000-sq.-ft. engineering facility north of campus complements the University's long history of excellence in aerospace research and design.

CONSTRUCTION NEARLY COMPLETE ON WHITE FIELD

Construction began earlier this year on the 10,000-sq.-ft., \$1.9 million facility that will be part of the Center for Flow Physics and Control (FlowPAC). Located north of campus in an area previously used for football weekend parking, the building will house a new wind tunnel, and compressor and turbine facilities.

The \$3 million wind tunnel, which was designed by **Thomas C. Corke**, the Clark Equipment Professor of Aerospace and Mechanical Engineering and Director of FlowPAC, and six undergraduates in the Department of Aerospace and Mechanical Engineering, features an 8-ft. diameter fan, weighs 8.5 tons, and requires a 1,750-horsepower motor to operate it. Winds in the 3-sq.-ft. experimental cross-section of the tunnel can reach up to Mach 0.6, all of which make this a unique facility for any university. The tunnel, which is funded by the Air Force Office of Scientific Research (AFOSR), allows Notre Dame researchers to run their experiments at higher speeds, much closer to actual flight conditions. Some of the initial experiments that will be conducted in the new tunnel will focus on the next generation of ultra-efficient airplanes and pilotless aircraft.

In addition to the new wind tunnel, an existing \$.5 million compressor, formerly housed in the Hessert Laboratory for Aerospace Research, and a new \$1.8 million turbine will be housed in the new facility. The compressor and turbine were also funded through the AFOSR. Construction is expected to be complete in January 2008.



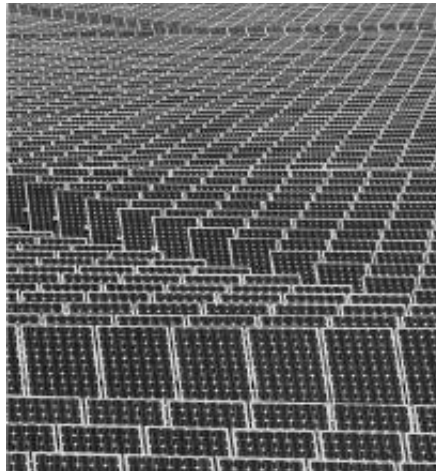
CAMPUS-WIDE NETWORK UPGRADE HITS ENGINEERING

Several years ago, the Office of Information Technologies (OIT) began recabling the University as part of a campus-wide network upgrade. The College of Engineering had been working with OIT's Integrated Communications Services (ICS) to custom build the engineering portion of the network to not only meet current needs, but also to take the college well into the future. The same type of networking now being installed in Cushing Hall, dedicated in 1932, and Fitzpatrick Hall, dedicated in 1979, will be installed in Stinson-Remick Hall, the new engineering facility currently under construction on Notre Dame Avenue. When the networking upgrade is complete in early 2008, all of the rooms in Cushing and Fitzpatrick will be re-wired with three Category 6 (Cat 6) copper cables and three pairs of 9-micron single-mode fiber. The Cat 6 cables will provide higher bandwidth connections to the campus network infrastructure for all engineering users. The single-mode fiber will allow researchers to build custom interconnections between the research facilities within the college. These connections may be used in many ways: to transport sensitive data between research centers without exposing it to the public campus infrastructure, to quickly transport large volumes of data

between research data-collection instruments, and compute/storage locations, to build high-speed connections between research centers on campus where such connections are currently not available, and to facilitate research that would not be possible without the capabilities provided by a fiber infrastructure. The fiber essentially provides unlimited bandwidth and will be able to carry hundreds of gigabits of data per second.

ICS will also be bolstering the engineering wireless infrastructure. The bottom line is that the upgrade supports the high-performance computing research and academic networking needs of the college.

“This contribution provides the students an immediate opportunity for exploration and practical experience, including future engineering curriculum expansion, as they solve the energy issues of the next generation.”



Although final specifications for the panels and installation will not be complete until late 2008, the proposed system is rated at 50 kW and will provide an estimated 55,000 kilowatt hours of carbon-free electricity to the building annually.

SOLAR PANELS TO HELP POWER NEW BUILDING AND STUDENT DEVELOPMENT

General Electric (GE) has donated a photovoltaic solar array that will be incorporated into the new Stinson-Remick Hall of Engineering. “With more than 400 Notre Dame alumni, GE is proud to make a donation that will promote awareness of clean technology solutions and support the

University’s goal to expand and enhance the learning opportunities for our future technical leaders,” said **Lorraine Bolsinger**, vice president for ecomagination at GE. “This contribution provides the students an immediate opportunity for exploration and practical experience, including future engineering curriculum expansion, as they solve the energy issues of the next generation.”

The array — the first application of renewable energy on campus — will be monitored by a system in the McCourtney Learning Center, where undergraduates will be able to track the energy being generated. This also gives faculty the opportunity to build course curricula around the system.



A \$500,000 in-kind gift of solar panels was announced by **Susan P. Peters**, vice president for executive development and chief learning officer, during the closing reception of the first Notre Dame Energy Week on October 12. Energy Week is a student-run event promoting awareness and responsible use of energy resources; see related article on page 36.

Faculty Promotions/Anniversaries

Each year, faculty are honored for their academic contributions and years of service to the University. The following engineering faculty were recognized during the 2007 President’s Dinner:

25 YEARS OF SERVICE —

Yih-Fang Huang, professor
Electrical Engineering

J. Keith Rigby Jr., associate professor
Civil Engineering and Geological Sciences

PROMOTIONS —

To Emeritus

John J. Uhran Jr.
Computer Science and Engineering

To Professor

Clive R. Neal
Civil Engineering and
Geological Sciences

To Associate Professor with Tenure

Ryan K. Roeder
Aerospace and Mechanical
Engineering

To Associate Professional Specialist

Kerry Meyers
EG10111/10112 Course
Co-coordinator

New Faculty

Joining the College of Engineering this academic year are:

Marina Blanton, assistant professor
Computer Science and Engineering

David P. Devine, assistant professional specialist and director of undergraduate studies
Civil Engineering and Geological Sciences

Scott Emrich, assistant professor
Computer Science and Engineering

Vijay Gupta, assistant professor
Electrical Engineering

Andrew Kennedy, assistant professor
Civil Engineering and
Geological Sciences

Joshua Shrout, assistant professor
Civil Engineering and
Geological Sciences



General Salute

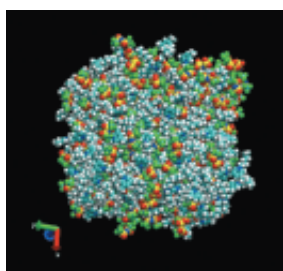
On Sept. 15, at Maxwell Air Force Base in Montgomery, Ala., Jeffrey W. Talley, associate professor of civil engineering and geological sciences, was promoted from the rank of colonel to brigadier general in the U.S. Army Reserves. His family was present for and participated in the ceremony.

Talley most recently served as strategic planner for the War on Terrorism Directorate of the Joint Chiefs of Staff (JCS). He remains one of a handful of reserve officers who have been appointed to the JCS. He also spent six months serving in Iraq as chief of operations in charge of 4,000 engineers and soldiers for the U.S. Army's 416th Engineering Command, receiving the Bronze Star for his service.

Associate Professor
Jeffrey W. Talley
accepts the flag of a
brigadier general from
his son, **Christopher**.
Each member of the
family participated in
the ceremony.

The Green Party

According to the article “Making Dirty Coal Plants Cleaner” in the July 13 issue of *Science*, emissions from coal-fired plants are responsible for almost a third of the greenhouse gases caused by humanity. In the United States alone, the gases these plants produce surpass the amount generated by cars and all other industries combined. Is it any wonder that finding a way to curb these carbon emissions is a popular idea? **Edward J. Maginn**, professor of chemical and biomolecular engineering, who is quoted in the article, says there are basically three approaches to capturing the carbon dioxide (CO_2) in flue gas: pre-combustion capture, post-combustion capture, and oxy-firing. Maginn, along with **Joan F. Brennecke**, the Keating-Crawford Professor of Chemical and Biomolecular Engineering and Director of the Notre Dame Energy Center, **William F. Schneider**,



The Notre Dame team uses atomic-scale simulations of ionic liquid-carbon dioxide interactions to complement their laboratory experiments.

associate professor of chemical and biomolecular engineering, and a team of Notre Dame researchers are concentrating on post-combustion activities, which apply to the majority of the world's power plants. What's unique about their activities is that they are using ionic liquids (ILs), a relatively new class of chemicals that are liquid at room temperature, to create an environmentally friendly absorption process.

“One of the exciting things about research is how pursuing one activity can shed light on another and open totally new avenues of possibility,” Maginn says. While the team was working to make green solvents for the chemical industry, they found the CO_2 they were using in the experiments dissolved in the ILs. This led to a few other experiments, and now the team is working on a federally funded project to capture and separate CO_2 in carbon-based electric generation power plants.

In fact, they have established a Cooperative Research and Development Agreement for the project and are working with DTE Energy, Detroit, Mich.; Babcock and Wilcox, Baberton, Ohio; EMD Chemicals, Inc., Gibbstown, N.J.; Trimeric, Buda, Texas; Air Products, Allentown, Pa.; and the National Energy Technology Laboratory, Pittsburgh, Pa. To date they have identified more than 20 new ILs that dissolve CO_2 . They also have designed new ILs with enhanced CO_2 solubility and developed advanced molecular modeling capabilities to make quantitative predictions of IL properties based only on chemical structure.

Face Recognition Report Released

In a National Institute of Standards and Technology report released earlier this year, researchers suggested that face recognition technology has improved drastically since Sept. 11, 2001. According to **Kevin W. Bowyer**, the Schubmehl-Prein Chair of the Department of Computer Science and Engineering, and **Patrick J. Flynn**, professor of computer science and engineering, participants in the studies upon which the report was based, false recognition rates in such systems have dropped by 90 percent.

Accuracy rates are also now near 99 percent, with the performance of iris recognition systems similar to that of face recognition systems.

Bowyer and Flynn have been researching the feasibility of image-based biometrics and multi-biometrics for several years. With the assistance of students in the department, they have amassed one of the largest databases of faces in the world.

Other organizations participating in the study included the School of Behavioral and Brain Sciences in Richardson, Texas; Schaefer Corporation in Arlington, Va.; and Science Applications International Corporation, headquartered in San Diego, Calif.



Fighting GLOBAL WARMING

U.S. Geological Survey predictions suggest that, because of climate changes, by 2030 there will be no glaciers left in Montana's Glacier National Park.

There are many reasons for all of us to be taking a hard look at the amount and types of energy that we use: rising gasoline prices, volatile natural gas prices, high dependence on foreign energy resources, national security issues, smog, and acid rain. While some of these reasons may demand our attention on a daily basis, the most compelling reason to reassess our energy use is undoubtedly the link between global climate change and the burning of fossil fuels. Al Gore aptly brought this link to the attention of the American public with the movie "An Inconvenient Truth."

In the United States, we use approximately 3.4 TeraWatts of energy — roughly one quarter of the energy consumed worldwide. Approximately 85 percent of that comes from fossil fuels — petroleum, natural gas, and oil. We use energy for transportation (e.g., gasoline), for generating electricity, and for heating and cooling, roughly in equal proportions.

There is no single "silver bullet" that will meet our energy challenges. The solution is to pursue all avenues. Conservation — like driving more fuel-efficient vehicles and using compact fluorescent lighting — is vital. Improvements in energy efficien-

cy, both of consumer appliances and industrial processes, are other necessary steps. Capturing and sequestering carbon dioxide (CO_2) from existing and future fossil fuel (coal and natural gas) driven power plants is absolutely critical. Expanding safe production of additional nuclear power, that does not produce CO_2 , has even been endorsed by some environmental groups, despite concerns about nuclear waste disposal. Of course, dramatic improvements and growth in renewable energy sources must be the ultimate focus of our efforts.

Currently, renewables comprise only seven percent of our total energy use, with more than 90 percent of that being hydroelectric power and biomass (ethanol and biodiesel). Solar and wind combined meet only about two thousandths of our energy needs.

Even before the Intergovernmental Panel on Climate Change issued its most recent report in February 2007, which shows that scientific data provides very high confidence that global warming has been caused by human activity, Notre Dame was working to develop new, more energy-efficient, and cost-effective methods for capturing CO_2 from power plants. Current

Photo courtesy of Glacier National Park



technology to capture CO₂ would almost double the cost of electricity. Once captured, CO₂ can be used for enhanced oil recovery or stored safely in underground geologic formations. Using some newly developed compounds called ionic liquids, Notre Dame researchers are working with industrial collaborators DTE Energy, Babcock & Wilcox, Air Products, EMD Chemicals Inc., Trimeric, and the National Energy Technology Laboratory on break-through technology to remove CO₂ from flue gas. A \$3 million project awarded from the Department of Energy last fall was the largest award given to an academic institution for new CO₂ capture technology development.

The CO₂ capture project is part of the Notre Dame Energy Center (energycenter.nd.edu), which also focuses on improvements in energy efficiency, clean coal technology, safe nuclear waste disposal, and renewable energy — especially efficiently capturing wind energy and developing the next generation of solar energy collection devices.

In addition to promoting research, the energy center administers the Slatt Fellowships for energy-related undergraduate research, has an active Student Advisory Board, and works

with the University's energy and environmental issues committee (green.nd.edu) to implement energy conservation and green energy policies on campus. The energy center was instrumental in securing a donation of solar cells from General Electric for the roof of the new engineering building (see related article on page 25), as well as a microturbine for student research projects from NiSource Energy Technologies. In October, the energy center also hosted an energy conference on campus.

Through the energy center, Notre Dame is doing its part to fight global warming. What about you?

A member of the Notre Dame faculty since 1989, Joan F. Brennecke serves as the Keating-Crawford Professor of Chemical and Biomolecular Engineering and director of the Notre Dame Energy Center.





2007 Engineering Honors

The College of Engineering is pleased to share the names of many of the undergraduates honored by their departments this year. Each has shown incredible dedication and passion to a specific field of endeavor and to their individual communities.

Aerospace and Mechanical Engineering

Aero Propulsion Award

David Lettieri, Rocky Point, N.Y.

Patrick Deviny Scholarship Award

David Lettieri, Rocky Point, N.Y.

Vince P. Goddard Award for

Aerospace Design

Michael Moore, Oak Park, Ill.

Rockwell Automation Design Award

Jesse Batsche, Cincinnati, Ohio

David Rowinski, Independence, Ohio

Sigma Gamma Tau Honor Award

Elizabeth Rollins, Houston, Texas

Zahm Prize for Aeronautical Engineering

David Lettieri, Rocky Point, N.Y.

Chemical and Biomolecular Engineering

Chemical Engineering Alumni Award

Timothy Kegelman, Yorktown, Va.

Ailis Tweed-Kent, Pittsfield, Mass.

Kenton Zimmerman, Sunman, Ind.

Chemical Engineering Faculty Award

Rebecca Ladewski, Lawrence, Mich.

Chemical Engineering Research Award

Nathan Stober, Granger, Ind.

Materials Certificate Program

John Heyink, Cleveland, Ohio

Jessica Nadai, Shelby Township, Mich.

Nathan Stober, Granger, Ind.

John Treacy Award

David Tagler, Darien, Ill.

Civil Engineering and Geological Sciences

American Society of Civil Engineers

Activity Award

Matthew Bries, Perrysburg, Ohio

Carlin J. Hebert, Bennington, Vt.

Leroy D. Graves Academic

Improvement Award

Colin Burke, Bellmawr, N.J.

Sydney Kelsey Outstanding Scholar Award

Patrick Murren, Camp Hill, Pa.

Rev. Alexander Kirsch, C.S.C. Award

Tara Devine, Northport, N.Y.

Kenneth R. Lauer Award

Patrick Murren, Camp Hill, Pa.

James A. McCarthy Scholarship

Carlin J. Hebert, Bennington, Vt.

Walter L. Shilts Award for Undergraduate
Achievement

Christopher Nanovic, Jim Thorpe, Pa.

Jennifer Pruchink, Windber, Pa.

Computer Science and Engineering

Outstanding Computer Engineering

Senior Award

Dylan Brandtner, Shelby Township, Mich.

Outstanding Computer Science

Senior Award

Kevin Braun, Landisville, Pa.

Daniel McGee, Grand Rapids, Mich.

STUDENT ACHIEVEMENTS AND EVENTS

The Big Finish

On Commencement weekend, three engineering students took on duties in addition to the role of graduating senior. During Commencement Mass on Saturday, May 19, **Colleen O'Hagan**, electrical engineering, presented an intercession in Irish, and **Andrew Magee**, computer science and engineering, served as a cantor. **Carlin Hebert** (right), civil engineering and geological sciences, offered the invocation during the University's 162nd Commencement Exercises on Sunday, May 20.



Electrical Engineering

International Engineering Consortium

William L. Everitt Award

Mario Enrique Chiu de la Fuente,
Guatemala City, Guatemala

James L. Massey Award

Colleen O'Hagan, Stafford, Va.

Basil R. Myers Award

Elizabeth Reed, Fairfax, Va.

Arthur J. Quigley Award

Martin Nguyen, Allentown, Pa.

Lawrence F. Stauder Award

Andrew Williams, Rancho Cucamonga, Calif.

2007 Valedictorian Candidates from the College of Engineering

Carlin J. Hebert, civil engineering and
geological sciences

Andrew Magee, computer science and
engineering

Starting salaries were up as much as 10 percent across the board for graduates of the Class of 2007.

According to **Lee Svete**, director of the Notre Dame Career Center,

engineering graduates led the pack with the highest median salary (\$57,500).

A total of 88 percent of Notre Dame seniors graduated with plans already in place for employment or post-secondary education; 35 percent of those students had accepted employment offers prior to graduation.

More than 93 percent of the engineering students who applied were accepted into graduate programs. Those entering the workforce joined companies such as Accenture, BAE Systems, Deloitte Consulting, GE Healthcare, Herren Associates, Hewlett-Packard, IBM, Lockheed Martin, Microsoft, Raytheon, and the U.S. Patent & Trademark Office. Others are entering medical or law school or joining service programs, such as the Alliance for Catholic Education, and some are entering Air Force pilot training or Naval flight school.

According to Svete, the key to post-graduation success is GPA, leadership positions on campus, and a solid portfolio with good interview skills. Most important, he says, "Follow your passion, don't just follow the economy."

For more information, visit the Career Center at careercenter.nd.edu.

How's that Job Market?



Rev Thomas A. "Pops" Steiner, C.S.C., served as dean of the College of Engineering from 1928-38.

The Legacy of "Pops" Steiner

It is hard to imagine that the impact of an individual whose term as dean of the College of Engineering ended more than 50 years before most of the Class of 2007 were born could still be felt. But it's true.

Before he graduated in 1899 with a degree in civil engineering, **Rev. Thomas A. Steiner, C.S.C.**, was also a member of the University's first varsity basketball team.

He worked for the Illinois Central and Big Four Railroads after graduation and returned to the University in 1911 to teach. Entering the novitiate in 1914, he joined the civil engineering faculty shortly after his ordination in 1918.

During his 10 years as dean, Steiner made a great impact on the course of the College of Engineering and the University. The Cushing Hall of Engineering was built and dedicated during his tenure. (It replaced the original engineering structure that had been severely damaged by a fire during his first year as dean.) He was also instrumental in the development of a new steam and water pumping plant and the plan to solve some of the University's heating problems by placing conduits in a concrete tunnel system that would carry heat around campus.

An ardent supporter of the inclusion of liberal arts studies in engineering programs, Father Steiner believed this type of two-pronged approach offered students a broader outlook and gave them greater versatility. He was truly concerned about students in the college.

The feeling was mutual: In 1948, former students of "Pops" Steiner established the Rev. Thomas A. Steiner Awards in his memory. This prize is presented annually to seniors who exhibit a dedication to the application of engineering principles, a zeal for learning, outstanding leadership qualities, and a commitment to the values and tenets of the University. Nominated by their individual departments, Steiner recipients are selected on the basis of their cumulative grade-point averages, campus activities, and community service.

The 2007 recipients of the Steiner Prize are **Michael Gerardi**, electrical engineering; **Rebecca Ladewski**, chemical and biomechanical engineering; **David Lettieri**, aerospace and mechanical engineering; **Andrew Magee**, computer science and engineering; **Patrick Murren**, civil engineering and geological sciences; and **David Rowinski**, aerospace and mechanical engineering. They are the current-day examples of the well-rounded individuals "Pops" Steiner hoped to encourage in the pursuit of a career in engineering.



The 2007 Steiner honorees are (front row, left to right) **David Rowinski**, **Rebecca Ladewski**, and **Andrew Magee** and (back row, left to right) **Michael Gerardi**, **Patrick Murren**, and **David Lettieri**.

Persistence Pays Off

Adele Fleury, **John Kinney**, and **Adam Sporinsky** were selected as the 2006-07 winners of the Americo Darin Prize in Engineering. Awarded in recognition of significant improvement in academic performance from the First Year

of Studies through the second year within the College of Engineering, the prize is presented in the fall semester after the sophomore year. It is especially significant because it is funded by the family of Americo Darin.

Darin, the son of Italian immigrants, faced many hardships in his life, including the death of his father when Darin was 10 years old. He

completed the Ford Engineering Apprenticeship Program, but was unable to attend college because he needed to support the family. He started working for Ford when he was 18, but he always felt that not having a college education hampered him. He and his family developed the prize in 1999 to encourage students who, like Darin, struggle for excellence and succeed.



Work Hard. Play Hard.

In one of the research projects led by **Surendar Chandra**, assistant professor of computer science and engineering, it might be hard to tell the difference ... even if you're watching the students in action. Chandra, along with **Adele Fleury** and **Adam Lusch**, two engineering undergraduates working on this independent study, have been collecting information to see how people involved in multi-player games using handhelds, such as Nintendo® DS, impact other wireless users.

Wireless networks are ubiquitous in many organizations and most universities. Gamers create a wireless network among themselves without using, or necessarily requesting, permission from network administrators. So it is important to understand the impact of gamers on the rest of the network, in this case, the Notre Dame campus.

During their experiments, the team found that Nintendo DS usage had a negligible effect on User Datagram Protocol (UDP) traffic, one of the core protocols for the Internet. However, interference to Transmission Control Protocol (TCP) traffic was dramatic, as throughput for Web users dropped from just over 5 Mbps to between 2 and 3 Mbps, even though the volume of game data was not high. Fleury and Lusch, with the help of fellow undergraduates, such as **Vincent Thomas** (B.S., CSE '07, shown

here), who took time out of their busy schedules to "play," found that the Point Coordination Function (PCF) used by Nintendo to arbitrate channel access interacted with the Distributed Coordination Function (DCF) of typical wireless access points, causing major interference with the wireless traffic of other local network users.

The team's findings will be published in a paper titled "Do Nintendo Handhelds Play Nice? An Analysis of Its Wireless Behavior" in the proceedings of the Sixth Annual Workshop on Network and Systems Support for Games (NetGames 2007). Hosted by the Centre for Advanced Internet Architectures, NetGames will be held September 19-20, 2008, in Melbourne, Australia.



Joseph Basconi



Patrick Brown



Shawn Coleman



Kyle Kron



Felipe Witchger

Plugging into Creative Juices

The Notre Dame Energy Center has named five recipients of the 2007 Slatt Fellowship. They are **Joseph Basconi**, **Patrick Brown**, **Shawn Coleman**, **Kyle Kron**, and **Felipe Witchger**. Created by **Christopher Slatt** (B.S., EE '80) and **Jeanine Slatt**, in honor of his

father **Vincent P. Slatt** (B.S., EE '43), the fellowship supports undergraduate research, up to \$5,000, in the field of energy systems and processes for hands-on projects.

Selected projects, which began this summer, cover a wide range of topics. For example, Basconi, a sophomore in the Department of Chemical and Biomolecular Engineering, is studying the impact of Daylight Saving Time on energy consumption in Indiana.

Brown, a sophomore, is investigating single-wall carbon nanotube-based photochemical solar cells. He is

focusing on the desired properties necessary for harvesting light energy.

Coleman is working on first-principle prediction of active sites for catalytic hydrogenation. His findings will help provide insight into the development of improved catalytic materials and processes. Coleman is a sophomore studying chemical and biomolecular engineering.

Kron, a sophomore in aerospace and mechanical engineering, is performing finite element analyses of SiC-Si₃N₄ nanoceramic composites for high-temperature structural applications, such as earth and space-based power generation systems.

A junior, Witchger's project studies biofuel development and sustainability in Latin America. Witchger is pursuing energy studies and economics.

SERIOUS FUN

*The Engineering
Honors Program*

What does taking AP (honors) courses in high school, graduating in the top five percent of the class, and participating in a variety of service programs and extracurricular activities in high school get a student? The chance to do it all again in college. Sounds like a ton of fun. But that's exactly what the nation's top students (especially those interested in engineering) are looking for.

Engineers are problem solvers by nature; they create the technologies of tomorrow. They also become leaders in industry, in their communities, and in government. But it doesn't happen overnight. It happens because they are able to take advantage of the opportunities presented to them, opportunities like the Engineering Honors Program.

Admission to the program is by invitation only, extended to students who have already been admitted to Notre Dame, have expressed a desire to pursue a career in engineering, and meet the academic requirements of the program. Admission is also limited to 19 full-time entering freshmen each year. These are some of the best and brightest students at the University.

Once admitted, the fun begins. First-year students in the program are required to take special honors sections of both engineering and humanities courses. Although there are no specific course requirements for students after their first year, engineering honors participants must develop and complete an independent research project during their time at Notre Dame. This work can begin as early as their sophomore year. During this project, which must encompass a minimum of two semesters, students work closely with an individual faculty adviser, who guides them in researching and writing a thesis. The thesis must be completed and defended during their senior year.

Honors students have the opportunity to attend special technical seminars — covering topics such as bioengineering, energy, high-performance computing, nanotechnology, wireless computing, and environmental sciences. They also have the chance to interact with visiting





scholars and go on field trips, ranging from museum outings to technical tours led by industry professionals and research partners of the University. Every activity in the program is geared to help prepare students for the next step, including admission to graduate school or the submission of applications for graduate fellowships and other scholarship programs, such as Rhodes and Marshall.

It's a full load, but the group still finds time to wind down and enjoy college life. They barbeque. They go to the beach. They even "kill"; one of their most recent activities was a riveting game of Assassins,

because water guns are always fun, and tracking other players is a challenge.

The entire program is a challenge, but one that the students welcome. It provides special opportunities for engineering and scientific research, cultural enrichment, and social interaction. It promotes the whole individual, while encouraging the students to achieve beyond their expectations.

For more information, contact Associate Professor Ken D. Sauer, the director of the Engineering Honors Program, at Sauer@nd.edu.

*Although they couldn't all make it for the photo, 54 students are enrolled in the Engineering Honors Program. Seven are out of the country as part of the University's study abroad program: Five are spending the semester in London, one in Perth, Australia, and one student is studying in Oxford, England for the entire year. The honors program, now in its third year, is funded by the Huisling Family Foundation Fund for Excellence. Director **Ken D. Sauer**, associate professor of electrical engineering, credits the students; **John J. Uhran Jr.**, professor emeritus of computer science and engineering, who founded the program; and **Cathy Pieronek**, director of academic programs, for its success.*



Top photo: In July 2007, **Mike Schafer**, middle, and students (not pictured above) presented a prototype of the Notre Dame battery monitor and control device to members of South Bend's City Safety Board. Middle photos: The device was designed by undergraduates in the Department of Electrical Engineering as part of their senior capstone project. It monitors several electronic items in vehicles. Bottom photo: **Jason Kulick** gets ready to demonstrate how the prototype works in a police car.





Home Bodies

The College of Engineering, like the University, stresses service, giving back to the community. Almost 80 percent of Notre

Dame's undergraduates participate in community service activities during their time on campus. Engineering students often gravitate toward projects that offer them a chance to use their unique skills, such as working with the Notre Dame chapter of Habitat for Humanity to build homes for local families in need. **David J. Kirkner**, associate professor of civil engineering and geological sciences, serves as faculty adviser. To learn more about the Notre Dame chapter of Habitat or to volunteer, visit www.nd.edu/~habitat.

We've Got It Covered

In addition to their normal duties — working with first-year engineering students to help them better understand engineering and assist with the first-year engineering course sequence, Engineering Peer Mentors develop a wide range of extracurricular activities for the freshmen. From barbecues and movie nights to community service projects, such as making fleece blankets for elderly cancer patients, there's always something going on.



That's So High School

Now she's a freshman at Yale University studying chemistry and environmental studies, but not that long ago **Melissa Baranay** was working in the Environmental Molecular Science Institute (EMSI) at Notre Dame on her project for the International Science and Engineering Fair. She was just a high school student.

During her junior and senior years in high

school, Baranay worked at Notre Dame with Professor **Jeremy B. Fein** (center), director of EMSI and the Center for Environmental Science and Technology, and graduate student **Dan Alessi**. "I never really thought about studying environmental science in college, and I never considered a career in research, but that has all changed," she says.

Of course, it didn't

hurt that she did quite well in the competition with her project, "A Survey of Cadmium Adsorption onto Soil Samples." Baranay placed first in the physical science division at the state level. At the international fair in Albuquerque, N.M., she received a U.S. Army award for the "most outstanding science project" in the environmental science category.

PRETTY IN PINK

Engineering at the Potawatomi Zoo

Although its inhabitants are real animals, a zoo is like a city, with many of the same needs. "When you think about it," says **Lloyd H. Ketchum Jr.**, associate professor emeritus of civil engineering and geological sciences, "a zoo, with its roads, bridges, and other built environments, offers many of the same engineering challenges as a cityscape. It's a great place for our students to exercise their skills, while helping a community organization."

Students in the Department of Civil Engineering and Geological Sciences have been "engineering" at South Bend's Potawatomi Zoo since 2004. As in other years, this past semester two student teams focused on specific needs. One team prepared a preliminary plan for a proposed American River Otter exhibit, and one developed plans for an expansion of the flamingo exhibit.

Just as with any project they will encounter in the human world, the student engineers needed to pay close attention to the inhabitants, the creatures that will live in the environment they are creating. This means they had to research the animals, talk to zookeepers, and study the guidelines for animal care set forth by the Association of Zoos and Aquariums. They also visited other zoos that house the same animals.

According to **Terry DeRosa**, director of the zoo, whether there are two birds or 20, flamingos act with one mind. They don't mix well with other birds. They like their space open and airy, and they don't particularly care to have humans around. Add this to the fact that, like most zoos, Potawatomi is on a limited budget, and students find that the simpler and more flexible their solutions are, the better. In other words, they have to be very creative.

The students' suggestions included the addition of a circular pump in the wading pool to make it self-cleaning and decrease the number of times zookeepers have to enter the exhibit. They also suggested installing mirrors, re-positioning the zookeeper's entrance, and evicting the other birds currently sharing the space. After reviewing bids from professional contractors and obtaining additional funding, the zoo hopes to be able to implement the students' designs.

Ketchum is the faculty adviser for the Civil Engineering Service Projects program. For information on the different projects, visit www.nd.edu/~cegeos/Service/Local.htm.



Left to right: After presenting their plans for a new American River Otter exhibit to zoo officials, **Dalton Shaughnessy**, **Daniel Scolaro**, **Josef Pappas**, **Manuel Nuno**, and **Colin Roach** pose for a team photo.



Left to right: **Peter Courtney**, **Nathan Boudreau**, **Claire Laurentius**, **Charlotte Low**, and **Lloyd H. Ketchum Jr.** stand at the back of the current flamingo exhibit at the Potawatomi Zoo. It borders the patio of the zoo's refreshment stand, a very busy location.

The Benefits of Collaboration



Stephen E. Silliman

For several years, **Stephen E. Silliman**, professor of civil engineering and geological sciences and associate dean for educational programs in the College of Engineering, has traveled to Benin, West Africa. He and several Notre Dame students, graduates and undergraduates, have been working in conjunction with **Moussa Boukari**, professor of earth sciences at Université d'Abomey-Calavi in Benin.

Silliman, Boukari, and students from both universities have been studying the quality of water derived from groundwater wells, including the development of technological and sociological means to empower the local population so they can collect water quality data from their village wells. Other projects that have developed from the collaboration involve studying the source of uranium in groundwater wells, modeling saltwater intrusion, developing collaborative drilling projects, promoting wellhead protection, and working with primary and secondary schools in rural Benin to establish an educational exchange with K-8 schools in Indiana.





The work, supported by the a number of foundations and private benefactors, as well as the National Science Foundation, has proved very rewarding. Silliman believes that this project holds a number of benefits to those involved. "The focus on research as applied to these complex issues in Benin has the potential to impact the local population through helping them better understand and maintain their critical water resources. It also has the potential to impact the students in Benin through providing access to new technologies (techniques in hydrology), as well as to ongoing collaboration with colleagues in the United States. Finally, it has the potential to impact participating Notre Dame students by providing them with a rigorous, multidisciplinary, international research experience, while challenging them to see the talents, strength, and beauty of both their Beninese peers and the Beninese people."

For more information about the college's work in Benin, visit www.nd.edu/~silliman/Development/benin.

Photos of Benin supplied by Pamela Crane and Stephen E. Silliman

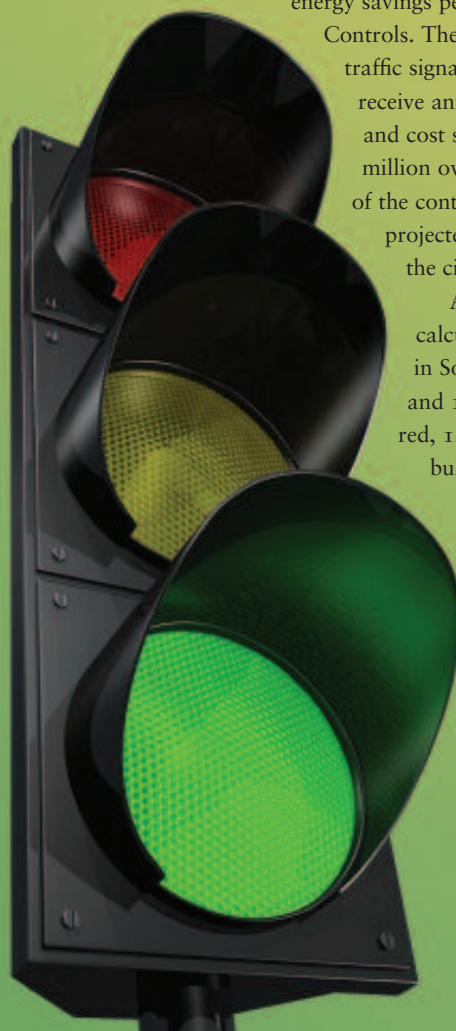
Another Bright IDEA

Having a university in your backyard has its benefits. Over the last eight semesters, **Douglas C. Hall**, associate professor of electrical engineering, and several teams of undergraduates have been working with the South Bend Public Works and Division of Engineering to quantify the benefits of replacing all of the incandescent bulbs in the city's traffic lights with light-emitting diode (LED) units. The students studied the cost savings (incandescent bulbs must be replaced annually, even if the bulbs are still functioning, and they use more energy) and time savings (when work crews don't have to change bulbs, they can focus on other needs). Another consideration was safety. When an incandescent signal burns out, the whole light is gone. In contrast, LEDs do not suddenly burn out. They can operate for years with slowly decreasing brightness, which eliminates driver confusion and the ensuing chaos that occurs when a signal suddenly fails. Incandescent bulbs typically last 18 months, while LED signals can continue to meet brightness regulations for up to 10 years.

Most recently, Hall and senior **Patrick Cash** were involved in the months-long process as the city reviewed responses to its Request for Quotation to replace the incandescent lights. After in-depth interviews and selection discussions, South Bend chose to pursue a guaranteed energy savings performance contract with Johnson Controls. The company will switch out the city's traffic signals with LEDs, and the city will receive annual audits showing the energy and cost savings, which is projected at \$1.97 million over a 10-year period. Under the terms of the contract, if the energy savings are not as projected, Johnson Controls has to pay the city the difference.

As part of the project, students' calculations encompassed all of the bulbs in South Bend: 1,600 red, 1,241 yellow, and 1,586 green bulbs in traffic lights; 99 red, 146 yellow, and 154 green left-turn bulbs; and 1,100 pedestrian signals.

For more information about the students' study and LED technology, visit www.nd.edu/~leds.



ALUMNI HIGHLIGHTS

Francis X. (Tim) BRADLEY Jr., (B.S., AME '39; M.S., Mathematics '49; and J.D. '49) was honored for his distinguished service as a Notre Dame alumnus when the University presented him with the Rev. John Cardinal O'Hara Award during a special Reunion 2007 ceremony on June 1.

In May 2007, **Robert J. MAY Jr.** (B.S., AME '68) was presented with the College of Engineering Alumni Honor Award by the Department of Aerospace and Mechanical Engineering. Most recently, May served as the executive director of the Aeronautical Systems Center, Air Force Materiel Command, at Wright-Patterson Air Force Base in Dayton, Ohio. He is now retired.

Adrienne R. MINERICK (M.S., CBE '03; Ph.D., CBE '03), assistant professor of the Dave C. Swalm School of Chemical Engineering at Mississippi State University, received a 2007 Faculty Early Career Development Award from the National Science Foundation for her proposal, "ABO Blood Antigen Dielectrophoresis for Medical Diagnostics: Synergy with Desktop Experiment Modules." As with other CAREER awards, Minerick's integrates curriculum with research activities.

Dmitry KOPELEVICH (Ph.D., '02, CBE)
received a 2007 Faculty Early Career
(CAREER) award from the National Science
Foundation (NSF) for his proposal, "Multi-

scale Modeling of Self-assembly and Structural Transitions in Amphiphilic Systems." He is an assistant professor at the University of Florida. The CAREER award is NSF's most prestigious award in support of junior faculty members.

Joseph W. TEDESCO (B.S., CEGEOS '72) has been named the sixth dean of the Cullen College of Engineering at the University of Houston, effective January 1, 2008. He most recently served as professor and chair of the University of Florida's Department of Civil and Coastal Engineering.

In May 2007, **Celeste VOLZ FORD** (B.S., AME '78) was appointed to the board of directors of Foundry Networks Inc. Ford is the founder and CEO of Stellar Solutions, a provider of aerospace engineering products and services. She also launched Stellar Ventures, a venture investment enterprise, and organized the London-based Stellar Solutions Aerospace Ltd., a systems engineering and strategic planning support company. Ford is a member of the College of Engineering's Advisory Council.

Jinhui XU (Ph.D., CSE '00) was promoted to associate professor in the Department of Computer Science and Engineering at the State University of New York at Buffalo. He also serves as the director of graduate admissions for the department.



May



Minerick



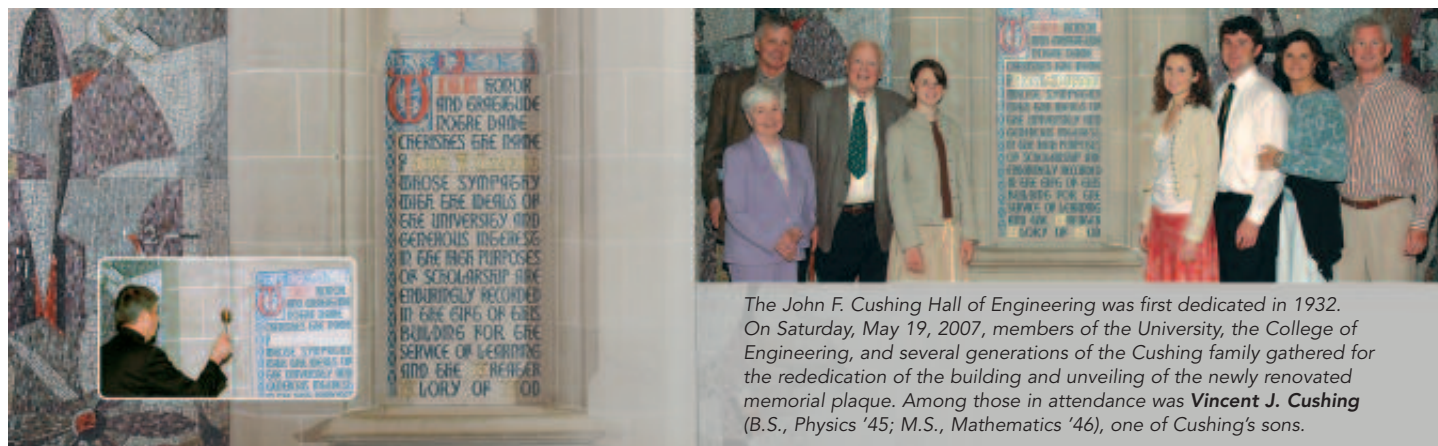
Kopelevich



Tedesco



Volz Ford

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The John F. Cushing Hall of Engineering was first dedicated in 1932. On Saturday, May 19, 2007, members of the University, the College of Engineering, and several generations of the Cushing family gathered for the rededication of the building and unveiling of the newly renovated memorial plaque. Among those in attendance was **Vincent J. Cushing** (B.S., Physics '45; M.S., Mathematics '46), one of Cushing's sons.

To submit information for **Alumni Highlights**, offer story ideas, or comment on *Signatures*, contact the editor at: nwelding@nd.edu

The Side Door of the Basilica

Even people who never attended the University recognize the words inscribed above the side door of the Basilica: God, Country, Notre Dame. According to 1st Lt. **Jeffrey Newcamp**, that's all anyone needs to know about Notre Dame and the impact its alumni can have on the world. Newcamp, who graduated in 2004 with a bachelor's degree in aerospace engineering, is doing what he loves and is making a difference.

As an aerospace engineer at the Warner Robins Air Logistics Center, Robins Air Force Base in Georgia, his primary responsibility is to provide worldwide engineering support for all C-130 aircraft. He also provides aircraft battle damage repair (engineering assistance) for battlefield needs. In 2006, he was deployed to Southwest Asia where he designed and assisted in the execution of more than 100 nonstandard aircraft repairs at five coalition bases. He describes battlefield engineering as a fast-paced, real-life test of engineering skills. "You're no longer dealing with a problem on paper — in the field, the airplane needs an accurate repair with no guesswork. Otherwise, the pilot's life is on the line."

"Being an engineer carries huge responsibility, but it also offers huge opportunity," he says. "I knew the College of Engineering would be a challenge. ... AME 454 (Propulsion), taught by Professor Eric Jumper, was one of the toughest classes I had. The MATLAB programs he required us to write kept me up many nights. Three years later, I found myself benefitting from his instruction."

One night Newcamp was asked to repair an augmentor link for an F-16 Falcon engine, which required extensive knowledge of the operating temperatures and pressures in a typical jet engine. He says he had confidence in his ability and the repair because of Jumper's course. The plane was flying sorties two days later. On a separate occasion, Newcamp had to assess the damage (and recommend appropriate action) regarding a deployed F-15 Eagle that had ingested a foreign object, damaging several of the rotor blades. After completing the job, he e-mailed Jumper a thank you for insisting that aerospace engineering students at Notre Dame learn jet engines. "Being able to put my education into practice drives my passion for engineering," says Newcamp, who has numerous Air Force ROTC friends (fellow graduates of the University) who are now pilots.

While Newcamp acknowledges that the Air Force is one of many outlets for Notre Dame graduates, he stresses that it is definitely a place where engineers can make an impact. "Every day, I touch airplanes. I fix them and help keep the flyers safe. I get to work with amazing professionals who have a common mission (to keep the planes in the air) and I am able to utilize my engineering skills for our country as part of an incredible team."



*In 2004,
**Jeffrey
Newcamp**
graduated
with Top*

Cadet honors (#1 cadet in the program) from the Notre Dame Air Force ROTC program. Today, he is a 1st Lt. in the Air Force, has earned his master's degree from the Air Force Institute of Technology, served overseas, and received numerous awards and commendations, including the Global War on Terrorism Service Medal, the Air Force Achievement Medal (with one Oak Leaf Cluster), and the Air Force Expeditionary Service Ribbon with Gold Border.



*Top photo: Undergraduate **Jeffrey Newcamp** works with members of his senior design team on their capstone project, G2D2, an 8.36-lb. remote-controlled plane. They incorporated composite structure to reduce weight and winglets to reduce drag. Bottom photo: Depot liaison engineers with the 379th Expeditionary Maintenance Operations Squadron, 1st Lt. **Jeffrey Newcamp**, right, and 2nd Lt. **Mark Eilertsen** pose in front of a B-1 Lancer at a base in Southwest Asia during deployment there in 2006.*

Flying Ships, Sailing Vessels, and More

Photo courtesy of Mike Siegel, The Seattle Times



Notre Dame alum Peter Janicki is the founder, president, and chief executive of Janicki Industries, located in Sedro-Woolley, Wa.

The third generation of a pioneer logging family, Peter Janicki graduated from Notre Dame in 1986 with a bachelor's degree in civil engineering. (He also holds a master's degree in mechanical engineering from the University of Washington.) After a few years working in industry, Janicki decided he wanted to start his own company, but he didn't want to live in the city. Today, he owns his own company and lives on a 40-acre farm with his wife and five sons. He keeps sheep and, for fun, plows his fields with draft horses. But there is nothing "small town" about the business he and his brother, John, run. Also a Notre Dame alum, John graduated from the University in 1984 with a degree in architecture.

Janicki Industries, at 500 employees strong, is the go-to company for innovative molds for fuselages, superyachts, and other large items made with advanced composite materials. The machines the company uses to create these one-of-a-kind molds may employ off-the-shelf components, but Janicki has designed and built them himself for very specific purposes. And he's done quite well since founding the company in the early 1990s.

For example, the molds Janicki Industries built for the Boeing 787 are so innovative that they were kept under wraps ... literally. The company, also a leader in the marine industry, develops proprietary tooling processes used by world-class builders. Recent projects include BMW/Oracle's entry in the 32nd America's Cup USA 87 and USA 98, owned by billionaire Larry Ellison.

Like other engineers, Janicki is a problem solver, which means he's not content to rest on his laurels or the company's approximately \$56 million in sales. He is continually working to refine the automated processes on existing projects, while developing new ones, including a revolution-



Janicki Industries designs and builds tools and molds used in the aerospace, marine, and transportation industries.

Photo courtesy of Mike Siegel, The Seattle Times



Photo courtesy of Janicki Industries

ary steam engine that could power vehicles using wood and yard waste. His drive and determination are most likely fueled by something he learned from his father ... "There's only a penalty for not trying to move forward."

In March 2007, Janicki Industries announced plans to expand its facilities — an additional 150,000 square feet of manufacturing space — to accommodate the increased demand for composite aerospace tooling.

Photo courtesy of James Hutchinson



Cleaning Up

Working in conjunction with Catholic Charities of New Orleans, **James Hutchinson** (B.S., ME '68) and 11 other volunteers from several parishes in Webster, N.Y., spent a week in May 2007 gutting and cleaning up New Orleans homes in the aftermath of Hurricane Katrina. Hutchinson, who retired from Xerox and now spends his time helping people understand their pension options, nicknamed the group "the dirty dozen." Like many of the volunteers, he was struck by the devastation and is equally anxious about the future of the levee system and hurricane research and tracking. See related story on page 18.



An American high school student, Joe Meany, left in light brown coat and cap, poses with other members of the crew of the Mayflower II as they prepare for the 1957 voyage.

Making History Again

Fifty-five days on a ship that measures approximately 25 feet wide by 106 feet long may not sound like a luxury cruise, but for 17-year-old Joe Meany, it was the trip of a lifetime. One that bore repeating. Meany, a 1961 graduate of the Department of Electrical Engineering, was part of the original crew when the Mayflower II began its voyage from Plymouth,

England, to Plymouth, Mass., in 1957. In July 2007, he joined seven of the eight surviving members of that crew — Fred Edwards, Michael Ford, Joe Meany, Peter Padfield, Joseph Powell, Adrian Small, David Thorpe, and John Winslow — in celebrating the 50th anniversary of the arrival of the Mayflower II in Plymouth Harbor.

Meany was a high school student when he first served aboard the ship. He had never sailed before, but earned the position of cabin boy by winning the top prize for citizenry from the Boys Club of America earlier that year. His duties included working the rigging, manning the wheel, and making sure that senior crew members were fed ... on time.

The trip was a life-changing event for him in more than one way. In addition to making the historic voyage, he “graduated” on board, celebrating his commencement with the crew in a makeshift cap and gown. He met then-Vice President Richard M. Nixon and appeared on the television show “I’ve Got a Secret.” He also received a full scholarship offer from the University of Notre Dame, which he accepted. Today, he is a retired product manager for Digital Corporation and lives in Marlborough, Mass.

Joe Meany, seated, and his bunkmate, Graham Nunn, served as cabin boys on the 1957 voyage of the Mayflower II.



©Plymouth Plantation



Photo courtesy of Wesley Ennis, The Daily News Tribune

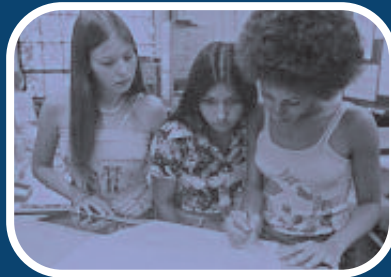
Joe Meany, now 67, was a guest aboard the Mayflower II when she sailed into Cape Cod Bay as part of the ship's golden anniversary celebration in July 2007.

signatures

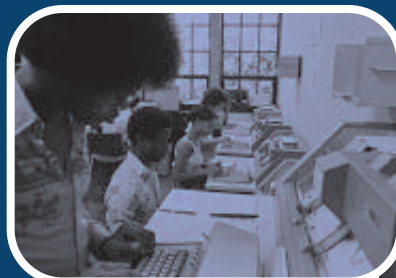
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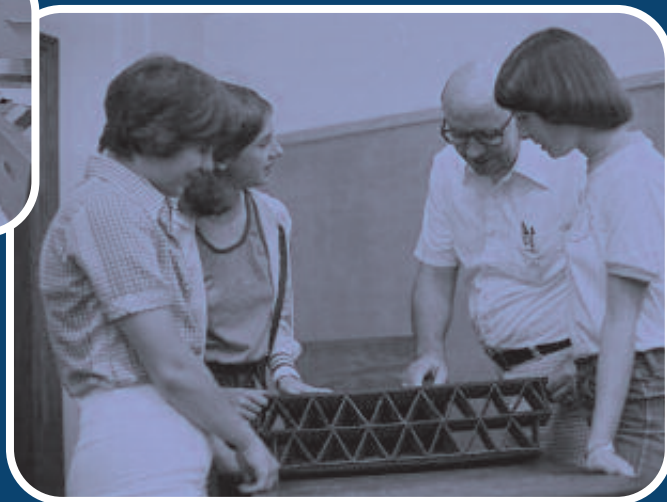
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Even back in 1989, high school students were having fun (and learning about engineering) as they competed to see who could make the most structurally sound, and most cost-effective, bridge. Some things don't change.



Looking Back



From basic engineering concepts, design, and computer use to industry field trips and a taste of college life, high school students have been able to explore engineering during a three-week summer course since 1976. Throughout the years with the help of dedicated faculty, such as **Raymond Brach**, now a professor emeritus of aerospace and mechanical engineering, and **Stuart McComas**, also professor emeritus of aerospace and mechanical engineering, the fledging program has continued to grow. *See a related story on page 2.*

