Single-handed fishing kit reels in top prize at Innovation Days 2007

From left: Mike Sracic, Elliot Haag, Dan Goesch and Logan Hamel (front pictured: Dave Tengler) won first place and $2,500 in the 2007 Schoofs Prize for Creativity with his Adaptive Fishing Kit, a device that adapts a standard fishing rod and reel so that people with injuries, paralysis or amputation can use it with one arm.

The Adaptive Fishing Kit, a kit that converts a standard fishing rod and reel so that people can use it with only one arm, took the top prize and $10,000 in the 2007 Schoofs Prize for Creativity during the Innovation Days idea and invention competition on the UW-Madison campus. The kit, with an estimated retail price of $120, would provide a means for amputees, stroke victims, or others with injuries or paralysis to enjoy the sport of fishing. Brian “Sunya” Nimityongskul got the idea for a system for one-armed fishing while recovering from shoulder surgery last summer. “I wanted to be fishing and not sitting at home,” he says. “Being an engineer, I decided I’d do something about it.” The greatest challenge was turning his abstract idea into a working prototype, says Nimityongskul. “It’s multiple mini designs compiled into one.” He worked on the prototype during his free time, designing and machining it himself—even making a short instructional DVD on how to install and operate the kit. Then he decided to enter his invention in the Innovation Days competitions February 8 and 9. The Adaptive Fishing Kit also won second place and $1,250 in the Tong Prototype Prize. “It’s really nice to be rewarded for your work—not only in money, but also in seeing all these great designs,” says Nimityongskul. “There were a lot of other really great designs, and I wouldn’t have minded losing to a number of them.” Next, he plans to talk to contacts in industry and take steps to market the kit.

The Ladder CAT also won second place in the Schoofs Prize for Creativity and the $1,000 Younkle Best Presentation Award. In addition, team member Sracic won the $1,000 Sorenson Design Notebook Award. The students hope to develop the product further to expand its use beyond construction.

“As of right now we have one main application that we designed it for, but as we progress and move our design further, we could consider more features that would allow it to be more cost effective and efficient for a home use,” says Sracic. A panel of five judges chose the winners based on creativity, innovation, and probability of market success. Twenty student teams presented their ideas and inventions during the two-day event. (Continued on page 4)

APPLIED EDUCATION: Biomedical engineering undergrad curriculum—and new competition—stress real-world challenges

Part of a unique curriculum infused with real-world design opportunities, a new competition for UW-Madison biomedical engineering undergraduate students places an even greater emphasis on applying their engineering knowledge to actual problems in biology and medicine. The Tong Biomedical Engineering Design Awards reward biomedical engineering undergraduate teams that design innovative solutions and develop outstanding prototypes. Their work addresses real challenges that UW-Madison medical and life sciences faculty and area biomedical companies face and offer for the students to solve. The inaugural competition took place May 4, when nearly 150 biomedical engineering students displayed posters and prototypes of medical devices and innovations that they designed and refined for a semester or more.

These inventions—among them, a bioreactor for tissue engineering, a system for reliably calibrating a cardiovascular catheter to measure internal blood pressures, and coatings that may reduce infections from urinary catheter use—underscore student initiative, ingenuity and creativity. The BME program itself has a heavy emphasis on getting students to really understand the problems they’re trying to solve—versus just coming up with a solution that may not work at all for the clinical environment,” says UW-Madison electrical and computer engineering alumnus Peter Tong, who via the Tong Family Foundation sponsors the competition. A panel of six external judges evaluated the student designs and prototypes based on their technical merit, functionality, appearance and construction, and adherence to client requirements. One student team from each class—sophomore, junior and senior—received a Tong Biomedical Engineering Design Award. (Continued on back page)
The College of Engineering is leading a transformation in engineering education to meet the challenges of an increasingly global and interdisciplinary environment.

This semester, we were honored to welcome National Academy of Engineering President William A. Wulf as the inaugural speaker of the College of Engineering Distinguished Lecture Series, Visions for the 21st Century. These lectures unite the university community with leaders in technology, education and organizational transformation whose insights transcend disciplines. Their perspectives are designed to inspire faculty, staff and students and enrich the ongoing conversation about shaping the future of the College of Engineering and the University of Wisconsin-Madison.

In his lecture, Wulf discussed how accelerating change in the global marketplace has profoundly altered how we design and deliver goods and services. The practice of engineering has changed dramatically in response. Unfortunately, with rare exceptions, the curriculum and pedagogy by which engineering education is delivered to students has not kept pace with these changes.

Wulf challenged us to address how and whom we attract to study engineering and how we retain those students in college and in the profession. He believes we must question the notion that the BS degree alone qualifies engineering graduates to practice engineering and examine the real-world experiences of the faculty we hire and the system of rewards that sets faculty priorities.

He noted that technology has an increasing role in our everyday lives. Global technology issues affect the well-being of our society in such monumental and unexpected ways that we as engineers must also concern ourselves with the technological literacy of all our people, especially those we choose to represent us in making important public policy decisions. View Wulf’s presentation at mediasite.caewisc.edu.

As you know from reading previous Pinpoint columns, the College of Engineering faculty and staff have been working on these issues for the past few years as part of our engineering 2010 initiative. The COE 2010 Task Force recently solicited proposals from faculty and staff that address development, implementation, assessment and dissemination of projects that demonstrate major advances in providing a contemporary undergraduate engineering education.

In response to its request for proposals, the task force received an impressive 29 proposals from 128 collaborators with requested funding totaling $1.36 million. Anticipated available funding is $500,000. An eight-member committee of faculty, staff and students from across the college is reviewing the proposals in preparation for making recommendations to the task force. Final funding decisions are expected in early May. A public poster session featuring funded proposals will be held prior to the end of the semester.

This initiative is another important step toward realizing our vision of creating a College of Engineering that is more than the sum of its parts.

Paul S. Peercy
Paul S. Peercy, Dean
NSF CAREER AWARD:
Resident bacteria may help clean phosphorus from eutrophied lakes

In recent years, city of Madison residents have focused new attention on water-quality problems ranging from beach closings to unsightly, odoriferous blue-green algae blooms caused by an overload of phosphorus within area lakes. In reality, those problems began in the city more than a century ago. They originated in a era when “wastewater treatment” meant dumping largely untreated sewage back into the lakes, says Civil and Environmental Engineering Assistant Professor Katherine McMahon. “Phosphorus is something that, once it gets into the lakes, it’s very hard to get out,” she says.

Recipient of a prestigious $400,000 National Science Foundation CAREER award, which provides funding to early-career faculty for creative projects that effectively integrate research and education, McMahon will use her expertise in wastewater engineering and in biological systems to study the bacterial community in dissimilar eutrophied lakes—two in Madison and one in China—to learn more about how those bacteria affect phosphorus cycling in the lakes.

In eutrophied lakes, or those contaminated with excess nutrients, phosphorus generally is trapped in the sediments at the bottom. In spring, the lake “turns over” and the phosphorus becomes a major ingredient in that giant, oxygen-rich mixing bowl. It’s a recipe for an algae bloom.

In summer, cooler water far below the lake surface traps phosphorus on the lake bottom, where McMahon’s previous research suggests that bacterial communities release it in a biological process similar to that which is responsible for enhanced biological phosphorus removal, or EBPR, a method often used during wastewater treatment. In fact, McMahon will use new tools in molecular biology and recent research advances that apply to EBPR processes to help her develop hypotheses about how phosphorus is released into the water column by bacteria during the summer, and taken up during the spring and fall.

Traditionally, limnologists who study lake phosphorus group bacteria into a single “black box,” says McMahon. Conversely, she seeks to identify specific bacterial populations present within eutrophic lakes, learn how those populations respond to changing lake conditions, and learn how they work as a community to cycle phosphorus.

For three years, she will collect weekly bacteria samples in multiple locations from Madison Lakes Mendota and Wingra during ice-off seasons and monthly samples when the lakes are frozen. Likewise, her collaborator, Guang Gao of the Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, will sample Lake Taihu, a large, shallow lake in Jiangsu Province, China, that supplies drinking water to 40 million people in Shanghai and surrounding cities. “We are looking at the relationship between what types of bacteria are present and the availability of phosphorus in the water,” says McMahon.

She and her students also will incubate water samples in the lab. In one experiment, they will add radioactive phosphorus that will help them track which bacteria are responsible for phosphorus recycling. Ultimately, McMahon hopes her research will contribute to a future solution to excess phosphorus in any lake. “Eutrophication of fresh-water lakes is a problem everywhere in the developed world, and in many developing countries as well,” she says.

Working with graduate students Ashley Shade and Ryan Newton, UW-Madison Center for Biology Education Outreach Program Director Robert Bohanan, and staff in the UW-Madison Center for the Integration of Research, Teaching and Learning, McMahon will expand her current middle-school outreach activities, which include activities that inspire students to think like environmental engineers, to include inquiry-based activities based on phosphorus-driven eutrophization.

In addition, she will develop a three-week summer workshop on microbes and water quality for underrepresented high school students who participate in the UW-Madison Pre-college Enrichment Opportunity Program for Learning Excellence (PEOPLE) program.
Chemical engineering alumnus Richard J. Schoofs sponsors the Schoofs Prize for Creativity and electrical and computer engineering alumnus Peter P. Tong sponsors the Tong Prototype Prize through the Tong Family Foundation.

Competition alumnus Matthew Younkle, president of Y Innovation LLC and president and CTO of Laminar Technologies LLC, sponsors the Younkle Best Presentation award. Chad Sorenson, a competition alumnus and judge, founding principal of Sologear Corp. and founder of Fluent Systems LLC, sponsors the Sorenson Design Notebook Award.

2007 SCHOOFs PRIZE FOR CREATIVITY WINNERS:
- **First place and $10,000** —Adaptive Fishing Kit, a device that adapts a standard fishing rod and reel so that people with injuries, paralysis or amputation can use it with one arm, invented by Brian “Surya” Nimityongskul.
- **Second place and $7,000** —Ladder CAT, a device for safely lifting loads up the entire span of an extension ladder, developed by Mike Sracic, Elliot Haag, Dan Goesch, Logan Hamel and Dave Tengler.
- **Third place and $4,000** —BugsTOP, a pond surface agitator that prevents mosquito breeding, developed by Paul Grogan, Kevin McMullen, Mike Tupek, Ryan Larson, Jacob Notbohm and Colin VanDercreek.
- **Fourth place and $1,000 (tie)** —Smart Brake, an electronic device that monitors wheel acceleration and applies brakes to prevent a rollator walker from rolling away from its user on hills or during a fall, invented by Adam Anders.
- **Fourth place and $1,000 (tie)** —Motorcycle Lighting Innovations, a helmet-mounted indicator system and map light for motorcycle drivers, invented by Chris Meyer.

2007 TONG Prototype PRIZE WINNERS:
- **First place and $2,500** —Ladder CAT, developed by Mike Sracic, Elliot Haag, Dan Goesch, Logan Hamel and Dave Tengler.
- **Second place and $1,250** —Adaptive Fishing Kit, by Brian “Surya” Nimityongskul.
- **Third place and $700** —BugsTOP, developed by Paul Grogan, Kevin McMullen, Mike Tupek, Ryan Larson, Jacob Notbohm and Colin VanDercreek.
THE JUDGES

DAVE FRANCHINO is the president and an owner of Design Concepts Inc., a nationally recognized new product innovation firm in Madison, Wisconsin. Design Concepts has collaborated with hundreds of clients on new product innovation programs through the integrated application of design strategy, user-focused product research, human factors, mechanical and electrical engineering and 3-D prototyping. Franchino lectures on engineering and project management at UW-Madison and frequently speaks on new product design and innovation. Prior to joining Design Concepts, he worked for 12 years for GM/Saturn as a project leader, enginee...
Nanotechnology meets biology and DNA finds its groove

The molecular biologist: The object of fascination for most biologists is the DNA molecule. But in solution, DNA, the genetic material, is like a tangled knot, looking more like a battered ball of yarn than the famous double helix. To study it, scientists generally are forced to work with collections of molecules floating in solution, and there is no easy way to precisely single out individual molecules for study.

Now, however, scientists have developed a quick, inexpensive and efficient method to extract single DNA molecules and position them in nanoscale troughs, or “slits,” where they can be easily analyzed and sequenced.

The technique, which according to its developers is simple and scalable, could lead to faster and vastly more efficient sequencing technology in the lab, and may one day help underpin the ability of clinicians to obtain customized DNA profiles of patients.

The new work was reported February 8, 2007, in the Proceedings of the National Academies of Science by a UW-Madison team of scientists and engineers.

“DNA is messy,” says David C. Schwartz, a UW-Madison genomics researcher and chemist and the senior author of the PNAS paper. “And in order to read the molecule, you have to present the molecule.”

To attack the problem, Schwartz and his colleagues turned to nanotechnology, the branch of engineering that deals with the design and manufacture of electrical and mechanical devices at the scale of atoms and molecules. Using techniques typically reserved for the manufacture of computer chips, the Wisconsin team fabricated a mold for making a rubber template with slits narrow enough to confine single strands of elongated DNA.

The new technique is akin to threading a microscopic needle with a thread of DNA, explains Chemical and Biological Engineering Professor Juan de Pablo, a co-author of the study. The team has a way, he says, of “positioning the DNA molecule right where we want it to be. It is important that we can manipulate it with such fidelity.”

The system, says Schwartz, promises bench scientists a convenient and easy way to make large numbers of individual DNA molecules accessible for study. The ability to quickly get lots of molecules lined up for sequencing and analysis, says Schwartz, means entire genomes—for species or individuals—soon could become more accessible to science.

Scientists, Schwartz explains, already know how to take DNA and stiffen it by removing salts from its chemical makeup. But confining the molecule and presenting it for analysis is laborious, engaging armies of lab techs worldwide to prepare DNA samples for their moment in the lab. “To get DNA molecules to do this on surfaces is really hard,” says Schwartz.

The system developed by Schwartz, de Pablo and their colleagues could change all of that. By figuring out a way to take individual DNA molecules and present them in a confined, linear fashion, the genetic information encoded in the arrangement of the base pairs that make up the molecule can be scanned and read like a bar code.

Long DNA molecules are remarkable polyelectrolytes whose physical dimensions are controlled by the presence of counterions that partly shield intermolecular electrostatic interactions. Shielding is reduced under extremely low ionic strength conditions, stiffening DNA molecules, and reflected by a dramatic increase in the polymer persistence length. A new nanofluidic device (cartoon and upper fluorescence micrograph) captures this effect for creating ordered arrays of highly stretched DNA molecules.

The key to the new technology, argues Schwartz, is that the system is comprehensive, inexpensive and simple enough to lend itself to large-scale efforts to analyze DNA.

“It’s a simple technology that works, and that’s demonstrated to work for genome analysis,” says de Pablo. “It’s a very robust method that can be used in a variety of settings.”

Chemical & Biological Engineering Professor Michael Graham was among the members of the research team. The work underpinning the new DNA sampling method was supported by grants from the National Science Foundation and the National Institutes of Health.

BARNACLE BUSTERS:

UW-Madison scientists have devised a potentially ingenious solution to the multi-million dollar problem known as “biofouling,” a chronic headache that has plagued the shipping world for centuries.

In biofouling, marine organisms such as mollusks and barnacles firmly latch on to submerged boat hulls like secret underwater stowaways. Writing in the journal Biofouling, the researchers report promising results from early tests of their idea: to stave off aquatic hitchhikers by shooting tiny electric jolts through the undersides of boats. In preliminary experiments, the scientists write, such electric zaps curbed the accumulation of marine life by up to 50 percent.

“It’s unlikely we would be able to prevent biofouling entirely due to the enormous diversity
A project by UW-Madison researchers has come one step closer to making fusion energy possible. The team, headed by Electrical & Computer Engineering Professor David Anderson, has spent 17 years designing the HSX vessel and coils. Sweden, the HSX vessel and coils rest on a support superstructure surrounded by instruments and computers that monitor energy transport. Professor David Anderson (pictured) is the lead investigator on the project.

The cutting edge of magnetic device development: tokamaks and stellarators. The HSX is the first stellarator to use a quasi-symmetric magnetic field. Stellarators do not have currents, and therefore no disruptions, but if they succeed in their goal, the UW-Madison technology will revolutionize industry. The next step for the project is to establish how much symmetry in the coils is necessary to achieve low transport rates. The researchers hope to make the coils easier to engineer, thinking that the concept of the quasi-symmetrical stellarator is a doughnut-shaped device that uses semi-helical magnetic coils to confine the plasma. Principles used in the HSX could someday be incorporated into fusion generators—"the reason Anderson and his team began designing the HSX 17 years ago," he says. "It's an exciting field. It's something where one can contribute positively to mankind with an energy source that's completely sustainable, doesn't involve nuclear proliferation or radioactive waste, with a limitless fuel supply," says Anderson. "Plus, the machines look cool."

The carpet of sea life that steadily grows on standing or moving boat hulls also causes a kind of drag effect in water, which means that ships need a lot more fuel—up to 30 percent more, by some estimates—to compensate. The problem of biofouling goes back to the dawn of time, with organisms that cling to boat hulls end up going wherever the boats go. That has spelled ecological disaster for the local fauna in the seas," says lead author Rodolfo Perez, a doctoral candidate in civil & environmental engineering. "But even reducing the hull-cleaning cycle by just a bit would be a huge, tremendous advance."

Biofouling has been a raging issue because aquatic organisms that cling to boat hulls end up going wherever the boats go. That has spelled ecological disaster worldwide—including in Wisconsin—where the invasive zebra mussel and quagga mussel have invaded the Great Lakes and beyond. "When the idea actually works. Other challenges also remain, such as determining how to produce a "blanket" of electrodes that would cover and adhere to a boat's entire hull. But if they succeed in their goal, the UW-Madison technology will not only start a revolution in biofouling prevention, but can be of use in many other fields, Anderson says. "This technology has applications beyond boat hulls as it could be used for optical sensors, food packaging, piping, and filters, to name a few possibilities."

But if they succeed in their goal, the UW-Madison technology will not only start a revolution in biofouling prevention, but can be of use in many other fields, Anderson says. "This technology has applications beyond boat hulls as it could be used for optical sensors, food packaging, piping, and filters, to name a few possibilities."

The U.S. Navy alone has poured millions into the search for effective anti-fouling measures. Until recently, naval and commercial shipping lines largely have relied on a type of anti-fouling paint that reduces biofouling when coated onto a boat's hull. However, the paint contains a chemical known as tributyltin, which is known to be toxic to marine life. Studies have linked the chemical to unnatural sex changes in mollusks, for example, and deformations in oysters. Scientists around the world have been exploring other anti-fouling alternatives. Some are working on a "nonstick" organic polymer, for example, that organisms would be unable to latch onto. Meanwhile, scientists at UW-Madison have taken a radically different approach. Their vision is to coat the hulls of boats with thousands of microscopic electrodes—basics terminals that conduct electricity—that would gently zap any organisms that come near. Made of a metal known as titanium, the electrodes would be placed only a tiny distance apart—between 8 and 25 microns—where 1 micron measures a millionth of a meter.

In small-scale tests, Perez evaluated the anti-fouling power of the electrodes and confirmed the huge potential of the UW-Madison concept. But now the researchers say they must understand why their idea actually works. Other challenges also remain, such as determining how to produce a "blanket" of electrodes that would cover and adhere to a boat's entire hull.

To take a scrape at a shipping industry headache

Currently, the unique design of the HSX in fact loses less energy, meaning that fusion in this type of stellarator could be possible. Plasma is very hot, ionized gas that can conduct electricity—essentially, it's what stars are made of. If heated to the point of ignition, hydrogen ions could fuse into helium, the same reaction that powers the sun. This fusion could be a clean, sustainable and limitless energy source. Current plasma research centers around two types of magnetic plasma confinement devices: tokamaks and stellarators. The HSX aims to merge the best properties of both by giving a more stable stellarator the confinement of a more energetically economic tokamak. "The slower energy comes out, the less power you have to put in, and the more economical the reactor is," says Canik. Tokamaks, the current leader in the fusion race, are powered by plasma currents, which provide part of the magnetic field that confines the plasma. However, they are prone to "disruptions." The problem is you need very large plasma currents and it's not clear whether we'll be able to drive that large a current in a reactor-sized machine, or control it. It may blow itself apart," says Canik.

Stellarators do not have currents, and therefore no disruptions, but they tend to lose energy at a high rate, known as transport. The external magnetic coils used to generate the plasma-confining field are partially responsible for the high transport rates in conventional stellarators. The coils add some ripple to the magnetic field, and the plasma can get trapped in the ripple and lost. The HSX is the first stellarator to use a quasi-symmetric magnetic field. The reactor itself looks futuristic: Twisted magnetic coils wrap around the warped doughnut-shaped chamber, with instruments and sensors protruding at odd angles. But the semi-helical coils that give the HSX its unique shape also direct the strength of the magnetic field, confining the plasma in a way that helps it retain energy. The team designed and built the HSX with the prediction that quasisymmetry would reduce transport. As the team's latest research shows, that's exactly what it does. "This is the first demonstration that quasisymmetry works, and you can actually measure the reduction in transport that you get," says Canik.

These results excited and relieved the researchers who have spent years working on the project. "We all thought the machine would do what it's turning out to do, but here are a million reasons why it might not: the theory might be wrong, we might have built it badly," says Anderson, "but everything is panning out and supporting the fact that the ideas on which it was based were correct, and really point the way of the future for the stellarator."
The rolling hills of the Scottish highlands are dotted with small stone houses. Their residents, mostly farmers and craftsmen, enjoy a peaceful existence miles from the nearest city—so far, in fact, that they are not connected to the nearest power grid.

That is where Electrical and Computer Engineering Associate Professor Giri Venkataramanan began his sabbatical. He did not travel to Scotland to enjoy its peace and tranquility, but rather as part of a team building an electricity-generating wind turbine. Without connection to energy utilities—power lines cost between $50,000 and $1 million per mile, says Venkataramanan—the region’s inhabitants must generate their own power.

Wind turbines, machines that use the energy from the wind to turn a generator, are common in the area. “Every house has one or two turbines. They also use solar panels and have batteries to store charge for when there’s no wind or sun,” says Venkataramanan. “They live pretty comfortably.”

The team had no prior turbine-building experience, but came prepared to saw, drill and weld. It took the team one week to build the turbine, by hand, from the raw materials. Turbines the size of this one generally average 200 watts at a reasonably windy site. At this rate, one turbine can generate enough electricity in a day to power the modest needs of a small home, says Venkataramanan.

“That was a very eye-opening experience for me. Even in that primitive setting, we were able to accomplish something. I was quite impressed,” says Venkataramanan. “I thought, we ought to do something like that on campus.”

Inspired by that thought, he spent the rest of his sabbatical learning how to implement a program like this, at his university campus.

A few months after returning from Scotland, Venkataramanan traveled to the Tokyo Institute of Technology to lecture about his research activities. While he was there, he investigated a new undergraduate program in international development engineering, which focuses on sustainable global development.

Venkataramanan then spent three months as a visiting research associate at the University of California-Berkeley. While conducting research and writing a paper on rural electrification for the Journal of Energy Engineering, he also assembled a team of students to build a wind turbine like the one he built in Scotland. Although without a full-scale workshop or credit, the students worked weekends to assemble the turbine in a team member’s garage.

The students’ enthusiasm for the project did not wane after Venkataramanan’s departure, and the workgroup continues to meet. “Since I left Berkeley, they’ve developed more wind-focused activities and are planning to install two or three more wind turbines,” he says.

While at UC-Berkeley, Venkataramanan also visited other schools and institutions focused on sustainable energy development. The efforts he witnessed inspired him, such as the University of Colorado-Denver student team that not only built a wind turbine, but also installed it in a tribal community in India.

For the spring of 2006, Venkataramanan received a fellowship as a visiting researcher at the Federal University of Minas Gerais (UFMG) in Belo Horizonte, Brazil. “The first thing I did in Brazil was get a bunch of students together to build a wind turbine,” he says. Despite bureaucratic red tape, the team found the parts it needed and finished the turbine.

To finish his sabbatical, Venkataramanan spent the summer as a visiting scientist at Gazi University in Ankara, Turkey, where he also recruited a team of students to build another wind turbine, bringing his number of construction endeavors to four. With these experiences fresh in his mind, he returned to UW-Madison in fall armed with ideas for ways Wisconsin students could help develop rural energy.

Venkataramanan is planning several courses that will give students opportunities to learn about and work with energy technology. This spring, he piloted a section of Introduction to Engineering (InterEgr 160) that focuses on small-scale wind turbines, intending to integrate it into the curriculum long-term. He also has integrated renewable energy technologies and developing electric grids into his ECE 714 course, Utility Applications of Power Electronics, focusing on under-developed and off-grid communities.

To give students hands-on experience, Venkataramanan is planning a section of the service-learning program Engineering Projects in Community Service that will enable them to build and install a renewable energy system, such as wind turbines, in an off-grid community. Venkataramanan believes that adding rural, renewable energy development to an engineering curriculum could make a difference not only for the students involved and the communities they reach, but also on a global level. “There are two billion people without electricity access in the world. That’s one-third of the population. Many of these communities don’t have economic wealth for people to go and build power lines. By engaging our students in projects like this, they can learn to think globally and perhaps come up with creative solutions for the future,” he says. “The potential for what our students and faculty can do is unlimited; we just have to be creative.”
College of Engineering researchers will play a key role in a number of recently funded Wisconsin Institute for Discovery seed grant research projects.

Funded by major gifts from UW-Madison alumni John John and Tashia Morgridge, the Wisconsin Alumni Research Foundation (WARF), and the state of Wisconsin, the $150 million Wisconsin Institutes for Discovery Building is intended to be the hub of an innovative public-private initiative for interdisciplinary research.

Launched last spring by the Morgridges and WARF, the UW-Madison patenting and licensing organization, a seed grant initiative is providing $3 million in research funding. The effort is intended to jump-start research in the Wisconsin Institute for Discovery and stimulate interest in the new institutes to inspire multidisciplinary teams of researchers to help advance the fundamental understanding of human biology, to provide the foundation for tools and approaches to address some of the challenging problems facing human health and welfare.

Researchers initially submitted more than 220 letters of intent; a faculty committee reviewed and rated those letters of intent based on scientific merit and alignment with the institute mission and objectives. The committee selected 35 letters of intent for full proposals, rated and reviewed by another faculty committee. Ultimately, College of Engineering Dean Paul Peercy, chair of the seed grant selection process, and Marsha Selzer, interim director of the Wisconsin Institute for Discovery, along with a committee of UW-Madison associate deans, selected eight proposals to receive seed grants.

College of Engineering faculty members are participants in five of the eight proposals:

- **Micro-optical systems inspired by biology**
  - Taking its cue from the lenses found in mammalian eyes and the compound eyes of insects, an eight-member team of electrical engineers, biomedical engineers, surgeons, ophthalmology researchers and optics experts will use micro-engineering techniques to create low-cost and biologically friendly microlenses with performance superior to their natural counterparts. Led by Electrical and Computer Engineering Assistant Professor Hongrui Jiang, the team also will explore applications of the microlenses in medical tools such as fiber endoscopes, in advanced microscopy methods such as laser-scanning microscopy, and in eye surgery.
  - Biomedical Engineering Professors David Beebe and John White are among the project co-investigators.

- **Healing chronic wounds**
  - School of Veterinary Medicine and Biomedical Engineering Professor Christopher Murphy will lead a seven-member team of chemists, biologists, engineers and surgeons. The team, which includes John T. and Magdalene L. Sobota Professor of Chemical & Biological Engineering Nicholas Abbott and Smith-Bascom Professor of Chemical and Biological Engineering Paul Nealey, will address chronic, hard-to-treat wounds, such as diabetic patients’ foot ulcers and the pressure sores people with limited mobility experience. Differing radically from previous approaches, the scientists’ proposed strategy involves “engineering” the wound bed to promote favorable behaviors by cells that accelerate healing and lead to quicker patient recovery times.

- **Screening for drugs that affect receptors on “excitable” cells**
  - A seven-member team of chemists, biologists, engineers and materials scientists will develop a unique system for identifying compounds that can regulate receptors found on “excitable” cells, such as neurons. These receptors, known as ligand-gated ion channels, have become important targets in the quest to develop new drugs, but are notoriously difficult to study with established drug screening techniques. Led by Anesthesiology Professor Robert A. Pearce, the researchers propose to use atomic force microscopy as the core of a system that will assess the effects of drugs on the receptors under fleeting conditions that represent their natural activation state. Lynn H. Matthias Professor of Electrical and Computer Engineering Robert Blick, Erwin W. Mueller and Bascom Professor of Materials Science & Engineering Max Legally, and Biomedical Engineering Assistant Professor Justin Williams are among the project co-investigators.

- **Large-scale production of human embryonic stem cells**
  - Chemical and Biological Engineering and Biomedical Engineering Associate Professor Sean Palecek will join principal investigator Derek Hess, a bio-manufacturing expert in the UW-Madison Waisman Center, and Timothy Kamp, a human embryonic stem cell (hESC) scientist in the School of Medicine and Public Health, in developing a precision-controlled bioreactor system for producing large batches of hESC in culture that consistently meet strict requirements for quality. Many experts believe the current lack of such a system is a major obstacle in the path to using hESC in clinical applications, such as transplantation, as well as for non-clinical uses, such as drug toxicity testing. The team also will attempt to produce heart cells, known as cardiomyocytes, on a large scale from hESC.

- **New scientific tools for drug discovery and their use in education**
  - Biomedical Engineering Professor David Beebe and Assistant Professors Kristyn Masters and Robert Jeraj (also School of Medicine and Public Health) are part of a team of chemists, biologists, physicists and engineers that will create an advanced microscale system for identifying compounds that can control migrating cells involved in chronic inflammatory disorders, such as asthma and inflammatory bowel disease. Led by Pediatrics Professor Anna Huttenlocher, the team then will test the anti-inflammatory effects of these potential new drugs in a novel zebrafish animal model. With help from a UW-Madison education researcher and a teacher from Madison West High School, the group also will develop zebrafish into a tool for teaching students about the biology of inflammation and the process of drug discovery.

Served for completion in 2010, the Wisconsin Institutes for Discovery Building is planned for the 1300 block of University Avenue and will serve as the nucleus of the two institutes: the public Wisconsin Institute for Discovery and the private Morgridge Institute for Research. The state-of-the-art facility is intended not only to bring together scientists from a broad spectrum of disciplines, but also to serve as a venue for the arts and humanities, education and outreach, and study of the interdisciplinary research process itself.
DARPA gives $1.1 million to UW-Madison researchers for quantum-box semiconductor lasers

The Defense Advanced Research Projects Agency (DARPA) has awarded a $1.1 million grant to a team of UW-Madison researchers. Led by Electrical and Computer Engineering Professor Dan Botez, Assistant Professor Irena Knezevic, Professor Luke Maest and Chemical and Biological Engineering Professors Thomas Kuech and Paul Nealey, the team will develop and perform research on quantum-box semiconductor lasers emitting in the mid-infrared (mid-IR) range with 25 times higher electrical-to-optical power conversion efficiency than conventional mid-IR lasers. This work will develop the first practical mid-IR lasers for a vast array of applications ranging from defense to medical diagnostics. The team members’ broad expertise includes nanophotonics, nanopatterning, nanofabrication, crystal growth and nano-device modeling. The project will benefit from technologies developed in the Reed Center for Photonics and the NSF-funded Nanoscale Science and Engineering Center.

Nuclear energy research initiatives funded

Competing in an overall field of 79 proposals, UW-Madison research teams received three of 10 recently awarded Department of Energy University-Nuclear Energy Research Initiative (U-NERI) grants, which support innovative research in advanced nuclear technologies. Under the grants, which total approximately $1.73 million over three years, the researchers will conduct multiscale modeling and experimental projects to study fission product transport in TRISO-coated particle fuels, oxidation and surface modification treatments of candidate materials for very high temperature reactor pressure vessel applications, and materials corrosion and heat transfer issues in the use of liquid salts as media for process heat transfer from very high temperature reactors. The researchers include Engineering Physics Professors Michael Corradini and Gerald Kulcinski, Assistant Professor Todd Allen, Research Professor Kumar Sridharan and Associate Scientist Mark Anderson, and Materials Science and Engineering Assistant Professors Izabela Szlufarska and Dane Morgan.

In its March 30 issue, U.S. News & World Report ranked the UW-Madison College of Engineering 14th in the nation for graduate education, compared with 15th in 2006. The college tied with Texas A&M University. UW-Madison has nine disciplines ranked in the top 20, with chemical engineering and nuclear engineering ranked in the top five.

U.S. News ranks college graduate programs 14th

International Study Abroad Program Coordinator Marianne Bird Bear was named the 2007 United States faculty advisor of the year at the IAESTE (International Association for the Exchange of Students for Technical Experience) 2007 conference in Washington, D.C. in February. IAESTE members are committed to the core goals of promoting the importance of global skills through international experience, developing leadership skills, and preparing engineering and science students with the global competencies necessary to be more responsible and effective citizens of the world.

iSiEy rated No. 1 in scholarly productivity

Academic benchmarking company Academic Analytics rated the UW-Madison Department of Industrial and Systems Engineering first in its newly released 2005 Faculty Scholarly Productivity Index. The index ranks 7,294 doctoral programs in 104 disciplines at 354 institutions. Productivity for each faculty member was measured in grant dollars, publications, journal citations, and honors and awards received. The aggregated z-score for the Department of Industrial & Systems Engineering placed it in the top 1.5 percent of productive departments. UW-Madison also was rated third in nuclear engineering. Read more at chronicle.com/stats/productivity.

Three students tie for Steuber Writing Prize

“*The Pterodactyl and the Ameoba*” by biomedical engineering sophomore Vidhya Raju, “You can’t live on the outside” by mechanical engineering sophomore Eyleen Chou and “Response and recovery reefs after hurricane activity” by biomedical engineering junior Michele Lorenti tied for the top prize and $3,000 each in the 2007 Steuber Prize for Excellence in Writing. Two students received an honorable mention and $1,000 each for their essays. Electrical engineering sophomore Thomas Fleming wrote “The boy who would be king” and biomedical engineering senior April Zehm wrote “Where have all the cowgirls gone?”

Bird Bear named IAESTE U.S. advisor of the year

Chemistry graduate student Mike Boll demonstrates an uncontrolled combustion reaction by igniting a hydrogen-filled balloon during the group’s Fun session at Engineering EXPO 2007. A student-organized event, EXPO brought thousands of elementary, middle school and high school students to the engineering campus April 19-21 to witness demonstrations and participate in hands-on learning activities. Attendees also participated in competitions designed to test their ingenuity while promoting engineering problem-solving skills.

Civil and Environmental Engineering Professor Emeritus James L. Clapp dies

Civil and Environmental Engineering Professor Emeritus James L. Clapp died March 31 after a long struggle with Alzheimer’s and Parkinson’s disease. He earned a bachelor’s degree in naval science and BS, MS and PhD degrees in civil engineering (1956 through 1964), all from UW-Madison. He was a first lieutenant in the U.S. Marine Corps as an engineering company commander and later joined the Department of Civil and Environmental Engineering, where he began as an assistant professor in 1964. Clapp became dean of the University of Maine at Orono College of Engineering & Science in 1978 and returned to UW-Madison in 1984. He retired from the university in 1995.

He was a pioneer in remote sensing education and research and received the Congressional Medal for Antarctic Service for ice-flow studies in Antarctica in the 1960s. On campus, he was a member of the first executive committee of what is now the Gaylord Nelson Institute for Environmental Studies. Clapp also chaired the Wisconsin Land Records Committee, whose work became a national model for land information modernization.

He received numerous awards for teaching and research excellence, including the Steiger Award for Outstanding Teaching (1948), Polygon Outstanding Teacher (1972, 1973, 1975, 1985), New England Section ACSM Outstanding Educator (1977), ACSM National Fennel Award for Outstanding Educator (1981), and ACSM Presidential Citation for Meritorious Service (1987, 1989).

He is survived by his wife, Susan; sons Lee (Judith), Len (Jennifer) and Don; sister Jo-Ann Sivley, and many nephews and nieces.

EXPO 2007

Making connections, launching careers

Y. AUSTIN CHANG

Chang received his MS in chemical engineering from the University of Washington in 1955 and his PhD in metallurgy from UC-Berkeley in 1963. He joined the College of Engineering in 1980. Chang has received numerous awards for both his research and teaching, including multiple awards from the Minerals, Metals and Materials Society, of which he was president in 2000, and ASM International (formerly the American Society for Metals). He counts his election to membership in the National Academy of Engineering (1996) and foreign membership in the Chinese Academy of Sciences (2000) among his highest honors.

His continued presence on campus may cause some to wonder what he thinks that I am a scholar researcher, a teacher, a lecturer and someone who cares for the institution and the community," Chang says.

Chang also has been instrumental in improving undergraduate education in the Department of Materials Science and Engineering, including updating laboratories and enhancing curriculum.

"I like to think that I am a scholar researcher, a teacher, a lecturer and someone who cares for the institution and the community," Chang says.

David Larbalestier

David Larbalestier is renowned for his expertise in superconductivity.

Through his research, he has made major advances in high-field superconductivity and its applications, for which he was made a member of the National Academy of Engineering in 2003. He is the director of the Applied Superconductivity Center (ASC), which studies superconductive materials for applications including cryogenics, magnetism, and microscopy.

In recent years, ASC research on magnesium diboride, a new high-temperature superconductor, has gained considerable attention. The ASC is celebrating its 25th year. Larbalestier received both his BS (1960) and PhD (1970) in metallurgy from Imperial College, University of London. He was named L.V. Shubnikov Chair in 1990 and Granger Professor of Superconductivity in 1996.

Retiring from the Department of Materials Science & Engineering, Larbalestier moved to a warmer climate. He and the ASC relocated to Florida State University.

Tom Lillesand

"I talk with Civil & Environmental Engineering Professor Tom Lillesand and he'll trace a distinguished career filled with many mentors—the most significant of whom, he says, was his father, head of aerial mapping for the local U.S. Department of Agriculture office. "I helped locate control points on photos and then went with him into the field to mark these points on the ground," says Lillesand. "It was during those times that I came to realize that I wanted a career related to mapping and imagery."

A Madison native, Lillesand earned bachelor's (1969), master's (1970) and PhD (1973) degrees, all in civil and environmental engineering, from UW-Madison. He began his academic career at the State University of New York College of Environmental Science and Forestry at Syracuse University, then moved to the University of Minnesota.

In 1982, he joined the faculty at UW-Madison and now maintains affiliations with several programs. "I returned to UW because it was different: different in terms of quality, number of colleagues in the mapping sciences, and faculty governance," says Lillesand. "Madison just offered so many more opportunities, including returning home." Respected for his work in photogrammetry, remote sensing, surveying and mapping, particularly as they relate to environmental, transportation and commercial issues, Lillesand says he is most proud of his positive influence on others. "I have prided myself on being a demanding mentor and a thorough researcher—traits I believe have rubbed off on my students," he says.

Lillesand is co-author, with Ralph Kiefer and Jonathan Chipman, of the textbook Remote Sensing and Image Interpretation, a widely adopted text both nationally and internationally. He has served on the NASA/USGS Landsat Program advisory committee and continues advisory involvement with the American Society for Photogrammetry and Remote Sensing. In addition, he has participated in countless initiatives to apply university expertise for the benefit of the state.

He plans to remain active as a faculty member emeritus, a researcher and a consultant. He also hopes to spend time with his family, travel, and fish more often for muskies near his cabin in the Minocqua area.

Frank Scarpace

Although he now is renowned for his contributions to the mapping community, Frank Scarpace's first exposure to remote sensing didn't come until he was in the midst of postdoctoral research in physics at UW-Madison, where he earned his PhD in physics in 1971. During his summer job in Boulder, Colorado, at the National Center for Atmospheric Research, Scarpace worked with thermal scanning and realized he didn't want to spend his career working in a lab.

Eventually, he completed postdoctoral work in civil engineering under UW-Madison Professors Ralph Kiefer and Jim Clapp. He became an assistant scientist with what now is the Gaylord Nelson Institute for Environmental Studies (IES) and, in 1974, joined the faculty in civil and environmental engineering and IES as an assistant professor.

Despite the completion of postdoctoral work in civil engineering, Scarpace's expertise in photogrammetry and geodetic science, from the National Oceanic and Atmospheric Administration for three years. He spent much of his time on ships, doing hydrographic surveys, tidal benchmarking and nautical charting.

When he left NOAA, he returned to the University of Illinois and earned master's and PhD degrees before joining the UW-Madison faculty in 1979. Vonderohe's research projects have ranged from analyzing and designing spatial/temporal reference frameworks, to testing the accuracy of digital spatial data, to developing management schemes and applications for real-time information telemetered by intelligent vehicles, to conceptual data modeling for spatial/temporal information systems. He also is known as the technical mentor to students and the ASC relocated to Florida State University.

Early in his career, Scarpace focused mainly on remote sensing; more recently, he has directed his research toward photogrammetry. In particular, he develops computer algorithms to more efficiently and correctly identify and quantify environmental resources from satellite and aerial images. In addition, he developed terrain-mapping software called OrthoMapper, which he continuously updates, that has helped to teach students the nuances of creating digital orthophotos from both current and older aerial images.

A constant in his tenure on campus is Scarpace's love of teaching and his positive relationship with his students. He has been the major advisor for about 25 PhD students and nearly 60 master's degree students.

He and his wife, Peggy, have a Florida home where they spend winters. He advises several students and plans to stay involved in research and product development in his business, Image Processing Software, Inc.
**Chemical and Biological Engineering**

A March 16 story in the Chicago Tribune profiled Jeffrey Sprecher (BS ’78), whose 7-year-old Atlanta-based company, Intercontinental Exchange Inc., or ICE, recently launched an unsolicited $9.9 billion bid for the 150-year-old Chicago Board of Trade, potentially breaking up a proposed historic marriage between the CBOT and Chicago Mercantile Exchange. According to the story, the bold move culminates a meteoric rise for Sprecher in the rough-and-tumble world of futures trading.

In February, Curtis-Wright Corporation named Allan A. Kozinski (PhD ’71) to its board of directors. During his career, Kozinski has held senior management positions for British Petroleum, Amoco and Quaker Oats. He currently lives in Incline Village, Nevada. News of Kozinski’s appointment appeared on yahoo.com.

**Civil and Environmental Engineering**

A Febh Graham & Associates engineer-in-training, John Vendel (BS ‘01) has passed the Fundamentals and Principles and Practice of Engineering examination and now can register as a professional engineer. Vendel is a project engineer in the FGA Civil Division, based in the Rochelle office. News of his accomplishment appeared in The Monroe (Wisconsin) Times.

University of Maryland Professor of Civil and Environmental Engineering Ahmet Aydilek (PhD ’00) received the 2006 Arthur Casagrande Professional Development Award from the American Society of Civil Engineers (ASCE). The award is the highest ASCE research award given to a junior researcher and was established to provide professional development opportunities for outstanding young practitioners, researchers and teachers of geotechnical engineering.

**Electrical and Computer Engineering**

A March story in the Wisconsin State Journal about Gillware, a growing Madison company that specializes in retrieving data from failed computer hard drives, quoted Greg Piefer (BS ’99, MSNEEP ’04, PhD ’08) (Med/Phys ’06), company chief technology officer.

In February, Axcels Technologies Inc. named Patrick Splinter (BS ’81) an Axcels Fellow, the highest company technical award. Director of engineering and technology development for Axcels, Splinter is recognized industry-wide for his contributions in ion implantation for advanced semiconductor manufacturing. News of the award appeared in The Salem News, Beverly, Massachusetts.

**Engineering Physics**

Oak Ridge National Laboratory researcher Steven J. Zinkle (BS ’80, MS ’82, MSMS&E ’85, PhD ’85) won the Department of Energy Ernest Orlando Lawrence Award, which honors mid-career scientists and engineers for outstanding contributions to the nation’s security and health. Zinkle’s work focuses on the development of advanced technologies for Internet infrastructure, small power systems, and in-situ monitoring of subsurface processes.

**Mechanical Engineering**

Virginia Tech Assistant Professor of Mechanical Engineering Dennis Hong (BS ’94) received a National Science Foundation Faculty Early Career Development Program (CAREER) Award to create a robotic locomotion mechanism based on the motion of single-cell organisms. A semi-professional magician, Hong lectures on the science of magic and its applications to engineering.

The Society of Manufacturing Engineers named Warren R. DeVries (BS ’71, MS ’73, PhD ’73) the 2007 recipient of the Albert M. Sargent Progress Award for his pioneering research in material removal processes and manufacturing systems. DeVries is dean of engineering at SXG Pinnacle Academy, the University of Maryland, Baltimore County; he is a leader in the national push for excellence in engineering education.

**Alumni News & Notes**

Tell us what you’re up to! PERSPECTIVE Editor, 215 N. Randall Ave., Madison, WI 53706 or perspective@engr.wisc.edu

Please let us know if you and your alma mater are mentioned in the news—we’ll highlight it here. If you’re being interviewed, don’t forget to mention that you’re a graduate of the University of Wisconsin-Madison College of Engineering! And as always, tell us your news.

‘MAKAI’: Alumna’s dreams point toward the ocean

A t age 12, Sarah Smith accompanied her mother to work at what then was the Packard Electric Division of General Motors. It was “Take Your Daughter to Work Day,” a day that included what Smith calls an absolutely fascinating engineering tour: “I learned so much that day about how the electronics in a car work and how many little things go into creating a user-friendly HMI (a human-machine interface) that I’ve been hooked ever since.”

Smith earned her bachelor’s degree in electrical engineering, with an emphasis in power engineering, in December 2006. “What interests me most about power engineering is that you can really see it and touch it,” she says. “I prefer big machines to micropneumatics, and utility engineering, motors, generators, and so on have always satisfied that desire to be able to really see what makes things work.”

She was commissioned as an Ensign in the U.S. Navy December 17, 2006, and now is stationed aboard the USS Reuben James (FFG-37), a 4,000-ton warship commissioned in the U.S. fleet in 1986. Originally used for anti-submarine warfare and now used for anti-narcotic and maritime interception operations, the ship in October 1998 joined the “Ke Koa O Ke Kai” Destroyer Squadron 31, home-ported in Pearl Harbor, Hawaii.

There, Smith, who is the ship electronic materials officer, is learning about her weapons systems and becoming qualified to drive her. “In the ‘Ke Koa O Ke Kai’ Destroyer Squadron 31, home-ported in Pearl Harbor, Hawaii, I’m satisfied that desire to be able to really see what makes things work.”

In February, Curtis-Wright Corporation named Allan A. Kozinski (PhD ’71) to its board of directors. During his career, Kozinski has held senior management positions for British Petroleum, Amoco and Quaker Oats. He currently lives in Incline Village, Nevada. News of Kozinski’s appointment appeared on yahoo.com.

A Febh Graham & Associates engineer-in-training, John Vendel (BS ‘01) has passed the Fundamentals and Principles and Practice of Engineering examination and now can register as a professional engineer. Vendel is a project engineer in the FGA Civil Division, based in the Rochelle office. News of his accomplishment appeared in The Monroe (Wisconsin) Times.

University of Maryland Professor of Civil and Environmental Engineering Ahmet Aydilek (PhD ’00) received the 2006 Arthur Casagrande Professional Development Award from the American Society of Civil Engineers (ASCE). The award is the highest ASCE research award given to a junior researcher and was established to provide professional development opportunities for outstanding young practitioners, researchers and teachers of geotechnical engineering.

University of Maryland, Baltimore County; he is a recipient of the Albert M. Sargent Progress Award for his pioneering research in material removal processes and manufacturing systems. DeVries is dean of engineering at SXG Pinnacle Academy, the University of Maryland, Baltimore County; he is a leader in the national push for excellence in engineering education.

The Society of Manufacturing Engineers named Warren R. DeVries (BS ’71, MS ’73, PhD ’73) the 2007 recipient of the Albert M. Sargent Progress Award for his pioneering research in material removal processes and manufacturing systems. DeVries is dean of engineering at SXG Pinnacle Academy, the University of Maryland, Baltimore County; he is a leader in the national push for excellence in engineering education.

The Monroe, a semi-professional magician, Hong lectures on the science of magic and its applications to engineering.

Virginia Tech Assistant Professor of Mechanical Engineering Dennis Hong (BS ’94) received a National Science Foundation Faculty Early Career Development Program (CAREER) Award to create a robotic locomotion mechanism based on the motion of single-cell organisms. A semi-professional magician, Hong lectures on the science of magic and its applications to engineering.

The Society of Manufacturing Engineers named Warren R. DeVries (BS ’71, MS ’73, PhD ’73) the 2007 recipient of the Albert M. Sargent Progress Award for his pioneering research in material removal processes and manufacturing systems. DeVries is dean of engineering at SXG Pinnacle Academy, the University of Maryland, Baltimore County; he is a leader in the national push for excellence in engineering education.

The Monroe, a semi-professional magician, Hong lectures on the science of magic and its applications to engineering.

Virginia Tech Assistant Professor of Mechanical Engineering Dennis Hong (BS ’94) received a National Science Foundation Faculty Early Career Development Program (CAREER) Award to create a robotic locomotion mechanism based on the motion of single-cell organisms. A semi-professional magician, Hong lectures on the science of magic and its applications to engineering.

The Society of Manufacturing Engineers named Warren R. DeVries (BS ’71, MS ’73, PhD ’73) the 2007 recipient of the Albert M. Sargent Progress Award for his pioneering research in material removal processes and manufacturing systems. DeVries is dean of engineering at SXG Pinnacle Academy, the University of Maryland, Baltimore County; he is a leader in the national push for excellence in engineering education.

The Society of Manufacturing Engineers named Warren R. DeVries (BS ’71, MS ’73, PhD ’73) the 2007 recipient of the Albert M. Sargent Progress Award for his pioneering research in material removal processes and manufacturing systems. DeVries is dean of engineering at SXG Pinnacle Academy, the University of Maryland, Baltimore County; he is a leader in the national push for excellence in engineering education.
Rod Hassett (BS ’62) returned to campus some 40 years after he earned his degree here in civil and environmental engineering—and he noticed many big changes.

Yet, as Hassett looked at the faces of students in the civil and environmental engineering senior capstone design course (which he co-teaches with CEE Professor Jeff Russell), he saw one thing that remained largely unchanged. Only a handful of students were African American.

“I think there is a need for African-American students to become engineers,” says Hassett, who retired in 2002 as vice president of Madison-based Strand Associates. “My life’s experience has taught me that a diverse group makes smarter, more intelligent decisions within engineering activities. And to help promising students who plan to pursue an engineering degree at UW-Madison.

The fund will provide two $5,000 scholarships annually; recipients will receive the scholarship in both their freshman and sophomore years. At that point, the College of Engineering will maintain the scholarship through the recipients’ graduation, provided they maintain their GPA and remain students in the college.

Dear Alumni and Friends,

If ever you find yourself searching for inspiration, return to the College of Engineering campus. We are amazed, awestruck and inspired everywhere we turn.

Our talented and innovative faculty, staff and students are engaged in groundbreaking technology advancement, a powerful driver of social and economic progress. Increasingly, the world is turning to engineers for answers to global problems once thought impossible or too complex to address. Even a brief visit to the labs and classrooms here can convince one that nothing is impossible. This gift report includes the names of those who were inspired to make contributions to the College of Engineering. We thank them for their commitment and generosity. Inspiration is important, but without knowledge, commitment and action, little can be accomplished. Your support is a critical component in turning knowledge into invention.

(Pictured above, from left)
- Brad Jolin, Director of Development
  608/263-5129—Brad.Jolin@uwfoundation.wisc.edu
- Deb Holt, Director of Development
  608/263-9779—Deb.Holt@uwfoundation.wisc.edu
- Kelly De Haven, Director of Development
  608/263-9562—Kelly.DeHaven@uwfoundation.wisc.edu

CREATE THE FUTURE: The Wisconsin Campaign Priorities for the College of Engineering (COE)

| STUDENTS | $30,000,000 | GOAL $30,000,000 |
|–––––––––––|–––––––––––|–––––––––––|
| Graduate Student Fellowships | $14,000,000 | 7,246,871 |
| Undergraduate Student Scholarships | $10,000,000 | 8,257,743 |
| Women and Minorities in Engineering | $3,000,000 | 2,783,943 |
| Student Activities, Awards, Prizes | $3,000,000 | 5,179,644 |
| FACULTY | $30,000,000 | GOAL $30,000,000 |
| Endowed Chairs | $15,000,000 | 339,043 |
| Endowed Professorships | $10,000,000 | 7,280,359 |
| Faculty Recruitment and Development | $5,000,000 | 1,298,850 |
| DEPARTMENTS AND PROGRAMS | $60,000,000 | GOAL $60,000,000 |
| Program Enrichment and Enhancement | $10,000,000 | 24,668,625 |
| Consortia and Centers | $25,000,000 | 14,060,401 |
| COE Fund For Excellence (Unrestricted) | $4,000,000 | 7,718,180 |
| Business For Engineers | $1,000,000 | 18,000 |
| FACILITIES | $30,000,000 | GOAL $30,000,000 |
| Mechanical & Industrial Engineering Building | $27,600,000 | 15,468,148 |
| Student Learning Center | $10,000,000 | 415,036 |
| Engineering Campus Aesthetic Improvements | $500,000 | 56,110 |
| Other | $900,000 | 6,382,876 |

TOTAL | $150,000,000 | $128,798,479

ME construction nears completion... and the balcony returns!

SAVE THE DATE: As part of the 60th annual Engineers’ Day festivities, the college will dedicate the new Mechanical Engineering Building October 20. Currently, workers are constructing and finishing interior offices and laboratories. In late July, faculty and staff will start moving into the building, which will be up and running for the start of fall classes.

Promoting diversity within engineering

King student George Reistad is the first Hassett Scholarship recipient. A participant in the UW-Madison PEOPLE program, Riestad hopes to study mechanical engineering. “This scholarship means a lot to me because I’m very interested in mechanical engineering,” he says. “The scholarship will help me financially. It will take my mind off the financial burden and help me focus on my studies.”

College of Engineering Assistant Dean for Diversity Affairs Steven Clark calls Hassett’s scholarship a wonderful initiative. “As we try to produce a more diverse pool of engineers, scholarships and other resources are needed to recruit students to the college and support them financially through graduation,” he says.

“Whenever an alumnus is willing to give back to support the college, it’s always, always welcome.”
When College of Engineering graduates enter the workforce, they will be a part of a unique marketplace that extends far beyond U.S. borders. Most likely, they will have colleagues, clients, collaborators or suppliers in cities around the world. “They need cross-cultural communication skills,” says Marianne Bird Bear, director of International Engineering Studies and Programs in the College of Engineering. “Whether they work their entire lives in the United States, or whether they work overseas, they need to be able to work effectively with people whose native language might not be English, or whose cultural background might be different from their own.”

Annually, more than 75 College of Engineering students work with Bird Bear to arrange study-abroad trips—culturally enriching experiences that enable them to live and learn in places like Santiago, Chile; Budapest, Hungary; Copenhagen, Denmark; Sendai, Japan; or Brisbane, Australia, among many others. “Students who study abroad come home with a global perspective and an understanding of people and systems that simply can’t be taught in a classroom,” she says. “It has a lifelong impact.”

Enabling engineers to study abroad

Fernando and Carla Alvarado agree. “I think that in many cases, a lack of opportunity to have such experiences makes the U.S. a little insular,” says Fernando, a professor emeritus of electrical and computer engineering who was born in Lima, Peru. “I would like to think that perhaps by sending our people to go outside their comfort zones and see the big world out there, they will become better citizens, better engineers, and better graduates when they return—better people in general.”

The Alvarados recently endowed a study-abroad scholarship fund that will enable even more engineering students to broaden their world view via an international experience. “There are a lot of costs on the front end—airline tickets, visas, passports—things that students often don’t have the money to take care of,” says Bird Bear. “This gift will really fill a gap between students who don’t have financial need and those who just couldn’t do it without that assistance.”

A research scientist emerita in the college Center for Quality and Productivity Improvement who earned her PhD in industrial engineering in 2003, Carla says that “up-front” student support plays a key role in making the entire study-abroad trip possible. “They can get student loans to pay for tuition, but to actually have the money to buy that plane ticket, to have some startup cash in your pocket, to maybe do a little side travel, maybe a few extra meals—that’s something else,” she says.

Spangler expands his investments in the College of Engineering

Harvey Spangler is a common name on the College of Engineering campus. You’ll see it on the list of donors to the Engineering Centers Building. It’s known to students who receive Spangler scholarships and faculty who receive the Spangler Technology Enhanced Instruction Award. Chemical & Biological Engineering Professor Michael Graham currently holds a Harvey O. Spangler Professorship. Soon, another professorship will bear Spangler’s name.

Spangler is an endowing a second professorship and considers this gift, and his many others to the College of Engineering, an investment. “It’s an investment in the future of our country, really,” Spangler says. “As a nation and as a college we have to be able to compete in the world. The college can compete much better if they have great faculty than if they don’t. It’s about as simple as that.”

Spangler graduated from UW-Madison in 1956 with a BS in chemical engineering and a commission in the United States Army Corps of Engineers. He worked for what is now the ExxonR & Engineering Co. in New Jersey. Initially he focused on fluid catalytic cracker operating problems, and later designed various refinery and chemical plants.

In 1979 Spangler was selected to be a member of the Ammonia Safety Committee, a subcommittee of the American Institute of Chemical Engineers (AICHE), and was the committee chair in 1985. He also was chair of the AICHE Safety and Health Division in 1989. He retired in 1991.

Spangler says one of the most pleasant gifts he received after graduating from the College of Engineering in 1956 was the knowledge that he had graduated from one the top-rated universities in the country. His support ensures today’s students will continue to receive that same gift.

Seireg fellowship offers students clinical experience

Kaiser Chair of Mechanical Engineering Ali Seireg was best known for his research on biomechanics, or treating the human body as a machine. He taught in the College of Engineering for 31 years before his retirement in 1997 and maintained a presence on campus until his death in 2002. He authored seven books and more than 300 papers, edited two journals for the American Society of Mechanical Engineers, and created a “walking-machine” prototype for paraplegics, which was exhibited at the Seattle World’s Fair and the History of Medicine and Science Museum in London. He was an award-winning educator and internationally recognized engineer.

And to his wife, Shirley, he was a hero. In the mid-1970s, Shirley was suffering from pain in her left knee. The cartilage in the joint had been deteriorating since she’d injured the knee in a horse-riding accident at age 17. The pain became severe enough to hamper Shirley’s daily routine, even making it difficult to carry a pot of water from the stove to the sink.

To help his wife, Ali applied his biomechanical expertise to designing a knee and leg brace for her. “It was the best in the world at the time,” says Shirley. “It’s an investment in the future of our country, really,” Spangler says. “As a nation and as a college we have to be able to compete in the world. The college can compete much better if they have great faculty than if they don’t. It’s about as simple as that.”

Spangler graduated from UW-Madison in 1956 with a BS in chemical engineering and a commission in the United States Army Corps of Engineers. He worked for what is now the Exxon Research & Engineering Co. in New Jersey. Initially he focused on fluid catalytic cracker operating problems, and later designed various refinery and chemical plants.

In 1979 Spangler was selected to be a member of the Ammonia Safety Committee, a subcommittee of the American Institute of Chemical Engineers (AICHE), and was the committee chair in 1985. He also was chair of the AICHE Safety and Health Division in 1989. He retired in 1991.

Spangler says one of the most pleasant gifts he received after graduating from the College of Engineering in 1956 was the knowledge that he had graduated from one the top-rated universities in the country. His support ensures today’s students will continue to receive that same gift.

The Alvarados have placed few restrictions on how recipients use their $11,000 scholarship. Rather, says Fernando, he and Carla hope simply that their gift will contribute overall to a more enriching time abroad. “If it turns out the best thing is to give them some spending money so they can go to restaurants with new friends, to make the experience better, then so be it,” he says.

Civil and environmental engineering student Paul Pebler (who will attend Hong Kong University in fall 2007), mechanical engineering student Rachael VanDenMeerendonk (who will study at Universidad Politecnica de Valencia for the academic year), and mechanical engineering student Chris Meyers (who will spend the academic year at the University of Sheffield, United Kingdom) are the first scholarship recipients. Each student plans to use the award to travel. VanDenMeerendonk and Meyers both hope to travel to Spain and around Europe. “I will most likely use the Alvarado scholarship award money to travel throughout Europe as much as I can—simply expanding my knowledge of the world,” says Meyer. “It only makes sense to see as much of the world while I still can.”

Likewise, Pebler will travel throughout Hong Kong and to surrounding countries. “My family had a foreign exchange student from Japan when I was in high school and I have always wanted to go and visit her home country,” he says. “Now I just might be able to do it.”
In addition, a follow-up award will provide funding and employment for up to two students to further research, develop and protect their designs in collaboration with a biomedical engineering faculty member. “A prototype is probably one of the most essential tools for engineers to validate whether what they have in mind is practical,” says Tong. “Particularly for entrepreneurs, who are going to raise capital to do what will fulfill their dreams, if they have a feasibility model, or a ‘good prototype’, they probably will have a higher chance of raising the capital they need.”

APPLIED EDUCATION: Biomedical engineering

The Tong competition contributes deeply to the Department of Biomedical Engineering culture of integrated education, discovery, innovation and entrepreneurship. The department is home to the only biomedical engineering undergraduate program in the country that provides real-world design projects every semester for every biomedical engineering student, says Biomedical Engineering Professor and Chair Robert Radwin.

“Creating new medical instruments, making the world accessible to people with disabilities, or developing new therapeutic devices requires that we educate engineers in multiple disciplines, foster innovation, and instill a strong command of design,” he says. “The Department of Biomedical Engineering has taken up that challenge by educating a new type of biomedical engineer who is equally adept in engineering and the biosciences, and who is skilled in applying their knowledge through the process of design.”

In the design courses, “clients” include university medical and life sciences faculty, biomedical engineering companies and, occasionally, individuals with specific rehabilitation needs. At the start of each semester, students choose projects, form teams, schedule meetings and plan brainstorming sessions. Then they spend long hours experimenting and designing their devices. The intensive process requires that teams meet regularly and file progress reports with their mentor or client company.

The process mirrors the kind of environment the students will encounter in their professional careers, says Tong. “It’s not a one-shot deal—it’s a continuous process and the department promotes very good teamwork among the students,” he says. “Faculty teach the students how to work together and that is also very unique. This is not a solo, one-man job. In industry, very seldom can you do things by yourself anymore. You really have to work with a team.”

Several past projects have been very successful and have led to some unique, patentable designs, says Radwin. “Every year, a number of biomedical engineering student design projects are accepted by the Wisconsin Alumni Research Foundation for patenting and licensing,” he says. “At least one recent project has already spun off into a startup company. I anticipate that this process will be greatly accelerated through the Tong follow-up awards.”

The students’ efforts culminated May 4 in a final presentation at the Biomedical Engineering Student Design Expo, a public event that offered each team the opportunity to demonstrate and explain its project and to participate in the Tong competition.