

the Trend

Autumn 2006: Volume 56, Issue 2

in engineering



Hot Ideas
out of the lab and
into the world... Page 6

Great Expectations

As fall quarter kicks off, you can feel the energy of new and returning students. As a new kid myself, I'm as excited as a first-year student.

Since mid-August, I've met with many faculty and staff members in a series of "boot camps." Each session introduced me to more of the college's work. Lots of days, it was intense, like drinking from a fire hose. We hashed out our strengths, our challenges, our plans for research and education initiatives, all in big chunks. It was exhausting and exhilarating, but gradually a theme emerged: the importance of community, not just our internal university community, but our connection to the communities where we live.



UW Engineering has a strong culture of interdisciplinary teamwork and research innovation, but the bar needs to be higher, with goals stretching to the global arena. This requires significant resources, always a major challenge.

An August 22 feature article in *The Seattle Times* reported that overall research funding at the UW

"Ideas to Innovation" (i2i) summit attended by 65 top executives of area companies as well as key local, state and federal leaders. Among a number of things, we talked about UW Engineering and its excellent track record in taking innovations to market. As dean, I will strengthen these partnerships.

How do students fit into this picture? Great expectations. We train students to be more than competent engineers seeking design or project management jobs. We prepare them to work in a complex, highly technological world. It means more undergraduates will participate in interdisciplinary research projects and industry internships. We teach

"We teach students to be innovators and entrepreneurs who improve communities and solve the world's big problems. We teach them to be leaders."

We came up with words describing what we want for our communities: health, security, prosperity, diversity, and sustainability. To make this vision a reality, we need communities, inside and outside the University, working together to address the big societal issues facing us in the twenty-first century. Technology will be essential in providing solutions.

this past year declined for the first time in at least two decades. In some areas federal research support is shrinking while, nationwide, competition is increasing dramatically.

UW Engineering proved a bright exception. During the 2005–2006 fiscal year, we set an all-time record for grant awards for research — nearly \$95 million — an almost 20% increase over the prior year. One major reason is that young faculty recruited during the past five or six years are now recognized for their exceptional research promise and are thus receiving major grants.

Under President Mark Emmert's leadership, the UW is also focusing more attention on its important partnerships with industry and government. UW Engineering played a major role in the University's recent

students to be innovators and entrepreneurs who improve communities and solve the world's big problems. We teach them to be leaders.

You can learn more about the i2i summit at www.washington.edu/research/industry. In this issue of *The Trend* you can also learn about some of the latest UW Engineering innovations moving from the lab into our communities for everyday use.

All this makes me excited to be here at the University of Washington.

MATTHEW O'DONNELL
Frank and Julie Jungers Dean
of Engineering

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Associate Dean Eve Riskin



Professor Cindy Atman



Assistant Professor Susie Pun

Faculty Win Prestigious National Honors

Eve Riskin, professor of electrical engineering and associate dean of academic affairs will receive the 2006 Hewlett Packard/Harriet B. Rigas Award from the Institute of Electrical and Electronics Engineers Education Society at an October 30 conference in San Diego. The award recognizes women who are making significant contributions to electrical and computer engineering education and encouraging increased participation of women in these disciplines. Riskin directs the ADVANCE Center for Institutional Change at the UW.

Cindy Atman, professor of industrial engineering and a leader in engineering education, has scored triple honors over the past year. On the national level she became a Fellow of the American Association of the Advancement of Science and of the American Society for Engineering Education. On June 1 she was installed as the inaugural holder of the Michael T. Bowie and Lella Blanche Bowie Endowed Chair. Atman directs the Center for Engineering Learning and Teaching at the UW and the Center for the Advancement of Engineering Education, a federally funded national initiative.

Susie Pun, assistant professor of bioengineering, received a Presidential Early Career Award for Scientists and Engineers at a White House ceremony on July 26. NSF director Arden Bement (photo) presented the award. Pun will receive up to five years of research funding for her work to develop a new technology to deliver genetic material to the nuclei of non-dividing cells.

UW Will Celebrate Life of Denice Denton

Tributes from UW colleagues, friends, and admirers nationwide arrived following news of Denice Dee Denton's death on June 24. Known by many as "D3," she led UW Engineering from 1996 to 2004. During her tenure as dean, the college rose significantly in the national rankings and she attained national stature as a dynamic leader and advocate for drawing women and underrepresented students to engineering. She became chancellor of UC Santa Cruz in February 2004.



Her passing is a great loss. The tributes to her are posted at www.engr.washington.edu/denton. All are welcome to celebrate her life at a memorial at the UW on November 2.

Memorial Program

Thursday, November 2, 4–5 pm
Kane Hall 130, reception to follow in the Walker-Ames Room

Ferguson Appointed Acting Chair of CEE

Professor John Ferguson will serve as acting chair of Civil & Environmental Engineering, following Scott Rutherford, who completed a five-year chair tenure in June. The college will conduct a national search for a permanent chair.

Ferguson is no stranger to the chair's seat, as he filled that role from 1992–1997.

An environmental engineer, he specializes in water quality and wastewater treatment. He earned his PhD at Stanford.



Illusion Tower Survives Shake, Rattle, and Roll



Four twisting columns circle a structural core supporting 29 square floor plates. Below: The proud team with its winning creation.



Onlookers proclaimed the 5'8" twisting tower the "coolest" structure, but never thought it would withstand the series of rigorous tests in the Undergraduate Seismic Design Competition at the 8th National Conference on Earthquake Engineering in San Francisco last April. By the end of the shake to failure test, the Illusion Tower, an aptly named "underdawg," had emerged unscathed. It was the only design with no structural damage among the entries from eight universities, including Georgia Tech and UC Berkeley. Kudos to our talented team of Civil & Environmental Engineering students for their ingenious design and impressive victory.

Recent innovations from UW Engineering are benefiting consumers, public agencies, and businesses through patents and licensing agreements arranged with the assistance of the UW Office of Technology Transfer.

Web Crystal Ball Predicts Air Fare Trends

Ever bought an airplane ticket well in advance of departure to get the cheapest price and then learned the fare later dropped significantly? In the volatile world of seat pricing, fares constantly fluctuate as airlines strive to pack planes and maximize revenue. A new Web-based service, Farecast.com, is aiming to ease at least one significant frustration of air travel — estimating when to whip out the credit card to get the best possible fare to your destination.

Farecast is the inspiration of Computer Science & Engineering Professor Oren Etzioni. He and colleagues created a data-mining program to gather airline pricing information from the Web and then developed sophisticated algorithms to predict whether ticket prices on specific routes are likely to rise or fall within the next seven days. Backed by \$8.5 million in venture capital, the site went live in June and consumers can now compare prices — and, unique to this site — check fare predictions for most major U.S. airlines to more than 55 airports nationwide. Farecast plans to expand to cover all significant markets in the U.S. and abroad.

The site has generated considerable media buzz with articles in *The New York Times*, *The Wall Street Journal*, *The Boston Globe*, and inclusion in *Time Magazine's* 2006 list of "50 Coolest Websites."

To Learn More: Visit www.farecast.com to see all the truly cool features and learn more about the predictive technology. Try it for your next trip!



Where Is My Bus? Tracking System Lets You Know

When does the next bus leave my stop? Is it on time or behind schedule? Riders in Seattle and Chicago with Internet access through a computer, cell phone, or other hand-held device can get quick answers through Bus Tracker, an online system using My Bus software developed by Electrical Engineering Professor Daniel Dailey.

Clever Devices, a New York company, licensed the software from the UW and links it with GPS devices on buses that continually feed location data to a transit agency computer. On a Bus Tracker Web page, a rider enters a route number and stop to get arrival time or track the bus in real time on a map. The Chicago Transit Authority is testing Bus Tracker on one route to enthusiastic response. "We hope to extend it system wide and then take it to other major U.S. cities," said Bill Long, president of Clever Devices. Chicago Mayor Richard Daley said it will "revolutionize customer satisfaction."

King County METRO adopted Bus Tracker in 2004 and records 145 million visitors annually.

To Learn More: See how Bus Tracker works at <http://transit.metrokc.gov/oltools/tracker.html>, or <http://ctabustracker.com/bustime/home.jsp>



Civil Engineering Professor Joe Mahoney (left) and Assistant Professor Steve Muench are big wheels in online paving education.

Pavia Gets Green Light on Internet Highway

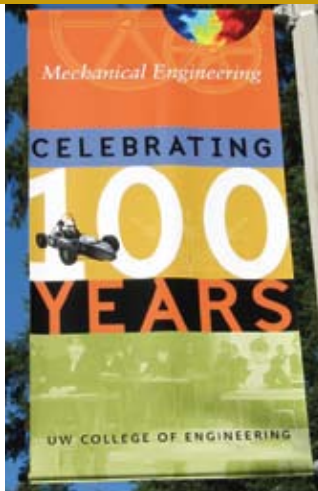
Our highways and byways may appear to be simple ribbons of asphalt and concrete, but dig deeper and you will learn about the complexities of isolation and construction joints, load transfer, and aggregate interlock. According to Steve Muench, assistant professor of civil and environmental engineering, contractors and their employees are often challenged to find time in their pressured schedules for needed training and updates on paving technology.

The solution is Pavia Systems, Inc., an online training company that allows employees to better fit training into their schedules and provides organizations the ability to easily track their progress. Pavia Systems evolved from research by Professor Joe Mahoney and Muench that was adapted for online learning as part of Muench's doctoral work. The pair arranged licensing agreements with the UW Office of Technology Transfer and Pavia Systems sped onto the Web this July.

To Learn More: See a longer article in *Washington Engineer*, www.engr.washington.edu/enews/2006-08/17.html or visit www.paviasystems.com.



UW ME alumni from the 1980s.



Mechanical Engineering Marks a Century

More than 200 alumni, friends, faculty, and staff celebrated on September 15 with programs at the UW and a festive dinner at Bell Harbor Conference Center overlooking Elliott Bay. ME Chair Mark Tuttle presented a Stirling fan to thank centennial co-chairs Sally and Warren Jewell.



Back to the Labs Cowabonga!
It was thrills but no spills during afternoon lab demonstrations.



ME Hall of Fame - Inaugural inductees attending the centennial celebration are (L-R) Roderick Kirkwood, James Morrison '54, Donald Petersen '46, and Professor Emeritus Albert Kobayashi '52.

JOIN THE DEAN'S CLUB!

The Dean's Club is a select group of alumni and friends whose support helps the college achieve its goals of world-class teaching, research, and public service. Donors who contribute \$1000 or more in one year to any area of the college become Dean's Club members. All gifts received during the fiscal year (July 1 to June 30) count toward recognition.

Dean's Club members receive:

- Invitations to special Dean's Club events
- *Dean's Update* — a biannual report offering an inside view on college happenings and the latest engineering research
- A Dean's Club area on the COE website (<http://www.engr.washington.edu>) — with event announcements and special programming
- Annual recognition in *The Trend in Engineering*

Dean's Club donors make a **fundamental difference** in the quality of our programs. Your commitment is important today and for the future.

For information on the Dean's Club and philanthropic opportunities, please contact Jeanne Thompson, 206.616.1231, jthompson@engr.washington.edu.



70-Year-Old Caps Career with a Doctorate in EE

Over a 37-year career at Boeing, John Thomas (right) worked on the Lunar Orbiter I, a Mariner spacecraft, and the B2 bomber. Eager for new challenges after retiring, he began graduate work in electrical engineering, earning his MS in 1998 and the right to be called Dr. Thomas in June. His advisor, Professor Emeritus Akira Ishimaru (left), lauds his intelligence and motivation, calling him "one of the best."

Hot Ideas Spin

*Do you feel a tinge of guilt tossing
Wish you could turn your vacation
Wouldn't it be terrific to know the right
And should you sprint to catch you
Engineering faculty and graduate
ingenious products to add
Read about them here and in the*

Krishna Nadella holds the first prototype cup (left), which failed the hot water test, and a perfected model.



A Greener Cup for Your Coffee

Ah, the perfect cup of Joe, sought in cafés across the land. For several mechanical engineers, however, the search is for the perfect cup — a more arduous quest, despite the deceptive simplicity of a vessel with a useful life measured in minutes.

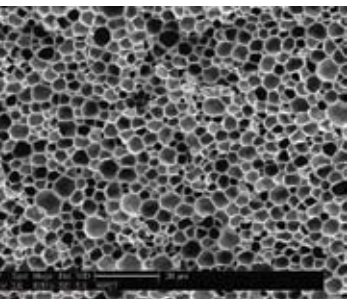
For ME Professor Vipin Kumar, a better coffee cup evolved from nearly 20 years of research. Now, Kumar, doctoral student Krishna Nadella, and Gregory Branch, an ME alumnus (MS '01) with a long career in manufacturing, are taking their revolutionary cup to market.

Within a few years, your takeout choice may no longer be polluting Styrofoam® or impractical-to-recycle paper. You could be drinking your extra-hot latté from a smooth plastic cup that's 80% air, made from 100% recycled materials (soda pop bottles), is 100% recyclable, and won't roast your fingers because it insulates to 350°F.

This high-tech microcellular polymer emerged from Kumar's Microcellular Plastics and Composites Research Lab and is now licensed by the UW to a spin-off company, MicroGREEN Polymers, Inc. Branch is vice president of engineering, Nadella is director of technology, and Kumar is a technical advisor to the startup, based in Arlington, Wash.

"It's not often that basic research comes so close to a product," Kumar says. "We are pleased that our ideas could become useful to society."

Kumar developed a process that injects carbon dioxide into solid PET plastic under high pressure, producing a material infused with millions of tiny bubbles. Over the years, Kumar and his graduate students worked to refine the technology and develop practical applications for a range of products. In 2002 a student team led by Nadella, with assistance from Branch, took second place in a business plan competition sponsored by the



The microcellular structure achieved by treating recycled PET plastic gives the coffee cup its unique strength, stiffness, and insulative properties.

UW School of Business. "The next step was to move into the real world and scale up, so we incorporated MicroGREEN in September 2002," Nadella says.

In 2003 the team won two seconds and a third in three business plan competitions, and plowed \$50,000 in winnings into MicroGREEN. Kumar acquired a machine to form prototype cups and trays in his lab. The first cup popped out on September 17, 2003 at 4:10 pm. Hot water deformed the bottom into a lumpy mass. With \$200,000 in technology development funds from the Washington Technology Center (WTC), the team pressed on with research, and 1000 cups and a year later, perfected the process. Being 80% air, a PET cup requires half the raw material of other cups and will be cheaper to produce and far less harmful to the environment.

By 2006 MicroGREEN had attracted \$2.5 million from "angel" investors. The company also recently won a second WTC grant for \$100,000 to develop an even greener product, a biodegradable cold tray made from polylactic acid, derived from corn.

MicroGREEN's Arlington plant started operations in January and has 14 employees. "As a research company we will develop the technology for manufacturing various products and then license it to existing companies," Nadella says. They are talking to all the major packaging manufacturers in the U.S. and Europe and have already signed a deal with a Japanese electronics manufacturer.

Microcellular polymers could find applications in construction materials, aircraft interiors, electronics, biomedical applications, and sports equipment such as kayaks. The next application likely to become a commercial product is a microcellular polishing pad for the semiconductor manufacturing industry.

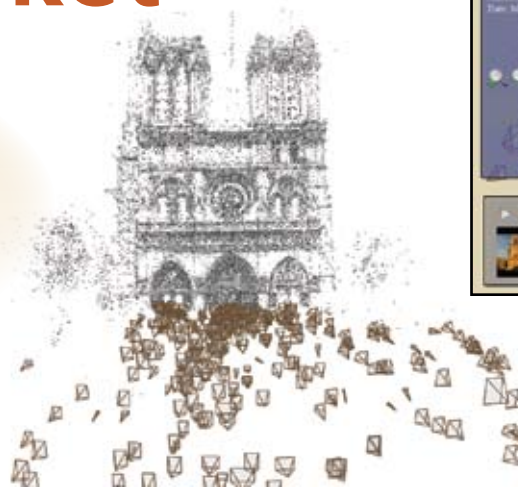
As it expands, MicroGREEN plans to hire future UW ME graduates. This is one spin-off that could shape up as a big win for the University and the environment.

To Learn More: Visit <http://www.microgreeninc.com/> and <http://faculty.washington.edu/vkumar/microcel/>.

Cover Photo: Professor Vipin Kumar (left) and doctoral student Krishna Nadella display prototype cups. Photo by Mary Levin, UW Photography.

Off to Market

away nonrecyclable coffee cups?
on photos into a 3D travelogue?
t timing to get a good deal on air fare?
our bus or is it behind schedule?
uate students have developed
dress all these situations.
e Innovators section on page 4.



A 3D "point cloud" of Notre Dame Cathedral, reconstructed from hundreds of images on the Web, describes the features recognized in the image. Visit the Web sites listed at the end of the article to see demonstrations and learn more about the technology.

Magic in an Interactive World of 3D Photos

If a picture is worth a thousand words, consider the power of hundreds of digital photos linked into a three-dimensional scene on your computer monitor.

Imagine visiting Rome's Trevi Fountain. With a few clicks of a mouse you zoom seamlessly from an aerial view to a virtual stroll around the plaza. See the fountain at sunrise or twilight, crowded with summer tourists or quiet on a rainy winter day. Zoom in for a closer look at the statue of Neptune, or a bas relief on the upper wall. About the only thing you can't do is toss in a coin. That is still beyond the creative reach of a team of researchers at UW Computer Science & Engineering and Microsoft Research. Still, they have come up with software magic that is the next best thing to buying a ticket to Rome or anywhere you may want to journey.

CSE doctoral student Noah Snively (left) and Associate Professor Steve Seitz review a Photo Tourism demo of the Trevi Fountain.



The first leg of this amazing new photo travel experience began in CSE's Graphics and Imaging Lab. Associate Professor Steve Seitz, doctoral student Noah Snively, and Microsoft researcher and Affiliate Professor Rick Szeliski chased a vision to turn random collections of 2D photos into a rich, immersive, 3D experience.

Snively tackled the challenge of developing mathematical algorithms and computer code to automatically identify similar elements in images taken by many photographers at different times from different perspectives and to identify the camera position for each. They built navigation tools into software they call Photo Tourism, so a viewer can move through complex 3D scenes.

Photo Tourism soon found a home in Microsoft Live Labs, a new research and rapid development unit focused on Web products. A Microsoft-UW team married Photo Tourism to new browsing technology called Seadragon, which provides smooth zooming around collections of images and multiresolution streaming between users and servers. The result is Microsoft's Photosynth.

When Photosynth is released later this year, it's sure to generate "Wows!" and find many applications. Once this system is fully deployed, photographers will have an exciting way to organize their own collections and integrate photos from friends, family, or from open sources on the Web. Other likely uses would be tourism promotion, real estate (take a virtual 3D tour of homes for sale), online product advertising (check out that motorcycle from all angles), interactive study of museum collections, and education in many disciplines.

To Learn More: For demos of Photo Tourism and Photosynth, visit the UW CSE and Microsoft Web sites:

- <http://phototour.cs.washington.edu/>
- <http://www.labs.live.com/photosynth/>



Engineering in the 21st century is a whole new world! I am honored and excited to lead UW Engineering at this time of challenge and opportunity. It is a pleasure to acknowledge the many alumni, friends, and organizations who partner with us. Private contributions encourage innovation and creativity and enable faculty and students to make discoveries that will benefit us all. The generosity of our alumni and friends is essential to our success. My thanks to each of you.

MATTHEW O'DONNELL
Frank and Julie Jungers Dean
of Engineering

Campaign UW Milestones

- Support for the University topped **\$1.8 billion** by July 31, 2006. The campaign goal is \$2 billion by 2008.
- The **College of Engineering** has reached nearly 85% of our goal to raise **\$250 million** for student scholarships, fellowships, professorships, capital projects, and programs.

To Make a Gift to Engineering Online, please visit http://uwfoundation.org/giving_opps/school_opps/engineering.asp

Honor Roll of Donors 2005~2006

This honor roll and its giving categories reflect gifts and pledge payments made during the 2005–2006 fiscal year. New pledge commitments and planned gifts made during this timeframe are also included in this list of annual support.

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Continued on page 10

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The college recently received a bequest from the estate of Paul Leach, '49. The plan made years ago will now benefit EE graduate students in the form of fellowships critical for the support of these scholars.

Each gift, whatever its form and function, is important. Generous alumni and friends are shaping the future for engineers at the University of Washington. Thank you.

STEVEN R. ROGEL, Chair, Campaign Executive Committee
 Chairman & CEO, Weyerhaeuser Company



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Opportunity to Make Lifetime Gifts from IRAs

On August 17, 2006, President Bush signed the Pension Protection Act of 2006, permitting some taxpayers to make charitable gifts from Individual Retirement Accounts (IRAs) without adverse tax consequences. Under previous provisions, any distribution of funds from an IRA was included in gross income, therefore taxable. The new law provides an exclusion from gross income of otherwise taxable distributions of up to \$100,000 per donor, per year, from traditional IRAs and Roth IRAs if this amount is transferred directly to a charity. Gifts must be made during 2006 or 2007 by plan owners who are at least 70 ½ when the gift is made.

If you would like to find out if you qualify to make a nontaxable gift from your Individual Retirement Account, please contact Jan Labyak at 206.543.8779 or labyak@engr.washington.edu.

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Joyce Cooper, associate professor, Mechanical Engineering

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Sinclair Yee, professor emeritus, Electrical Engineering

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