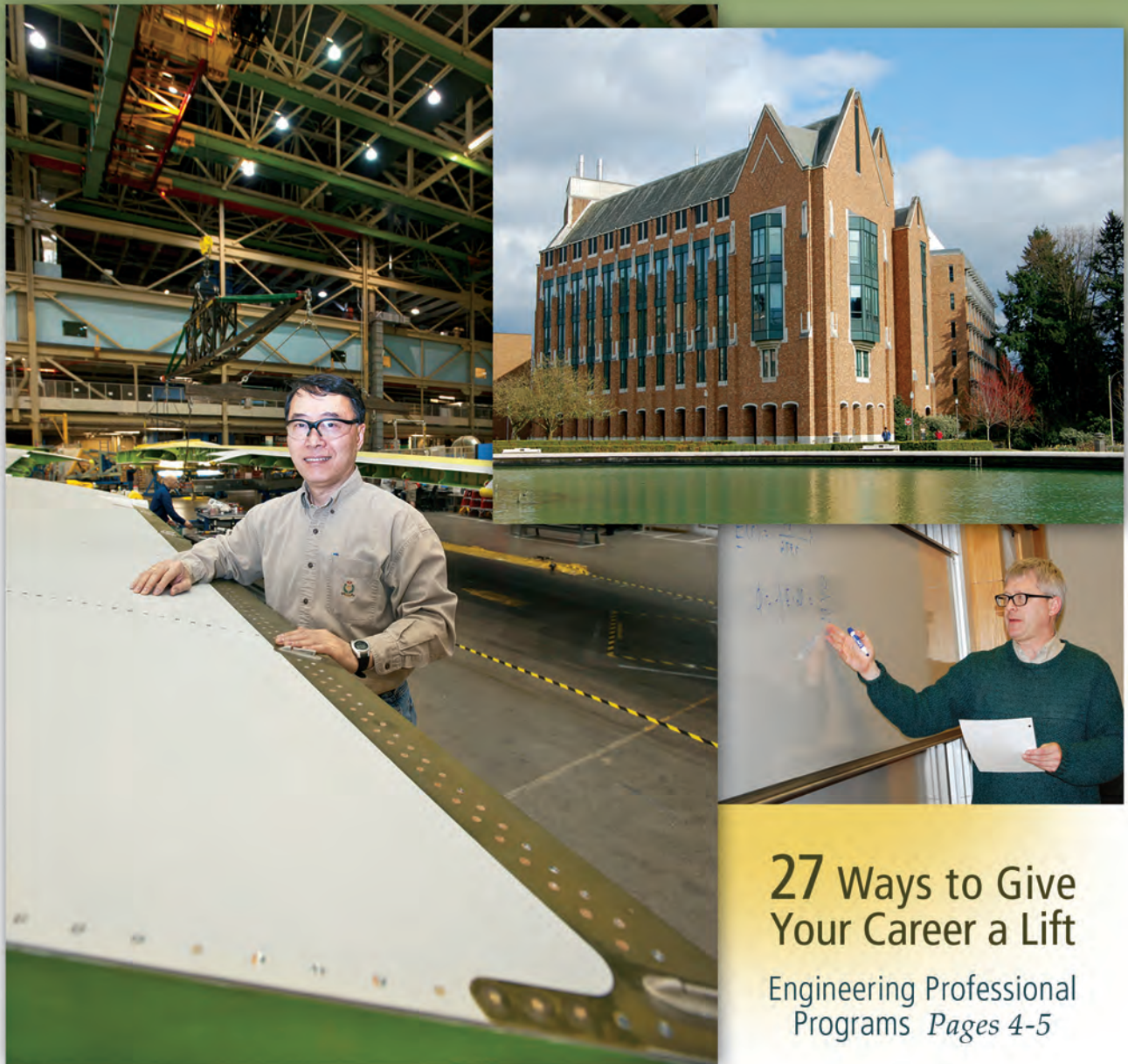


# *The* TREND *in Engineering*

THE UNIVERSITY OF WASHINGTON COLLEGE OF ENGINEERING NEWSLETTER **SPRING 2011**



**27 Ways to Give  
Your Career a Lift**

Engineering Professional  
Programs *Pages 4-5*

UW Engineering is greatly expanding its educational outreach efforts through master's degree and certificate programs for engineering professionals, the cover story for this issue of *The Trend*.

These programs offer great benefits to engineers seeking advanced training and to their employers, who rely on a highly educated workforce for the innovation, knowledge, and know-how needed to compete in today's global economy.

Based on US Department of Labor statistics, an engineering master's degree offers the best return on investment of any educational dollar. It opens career opportunities, affords a short payback time, and enormous lifetime net income gain compared to investment.

By every measure, the last three years have seen impressive growth in our professional programs. We've added more students and new courses; we've granted more degrees and taken in more revenue, which bolsters our graduate programs at a time when state budgets are tightening. To meet the growing need for continuing education, we aim

to double our capacity in the next five years. We hear raves about our faculty and their courses, and we firmly intend to maintain quality.

These programs are an important new connector between the college and local industry. Standard pathways to industry are high-end research partnerships and UW graduates who take entry-level positions. Professional programs are in the middle, providing cost-effective ways for companies to offer employees advanced training, and enabling our faculty to develop one-on-one ties that can lead to new collaborations.

Professional programs can also help us forge stronger relationships with industry and universities beyond the US. For example, we are negotiating aeronautical engineering partnerships in the Middle East and aeronautical, chemical, and civil engineering partnerships in China. From every perspective, professional education programs are win-win-win.

The college works with UW Educational Outreach for most administrative and marketing functions related to these programs. UWEO is one of the largest and most sophisticated extension programs in the nation.

For its efforts, the College of Engineering has received the 2011 Excellence in Engineering Education Collaboration Award from the American Society of Engineering Education. The award honors the composite materials program sponsored by the Department of Aeronautics and Astronautics and The Boeing Company, which has served more than 900 engineers since 2005.



## Pat Stayton Leading Molecular Engineering and Science Institute

The new Molecular Engineering and Science Institute will have a gleaming new home in January 2012 when it moves into the Molecular Engineering and Science Building under construction near the west entrance to campus. The building's research space will catalyze interdisciplinary collaborations and technology breakthroughs in the two main thrust areas of medical therapies and sustainable energy.

The institute's director is Pat Stayton, who holds the Washington Research Foundation Endowed Chair in Bioengineering. He also directs the UW Center for Intracellular Delivery of Biologics. Stayton is assembling clusters of faculty from Engineering and other UW units who will work across interdisciplinary boundaries.

"Pat Stayton is the right person for the job," said Dean Matt O'Donnell. "His world-class research in molecular drug delivery systems, coupled with his passion for teaching and outreach, make him the perfect founding director."

View of the MoE Building's south and west facades, covered with a temporary protective coating. See slide show updates and a web cam: <http://www.engr.uw.edu/about/bldgs/mole.html>



Photo by John Stamets

"From every perspective, professional education programs are win-win-win."

*Matt O'Donnell, Dean of the UW College of Engineering*



## UW leading \$7.5 million federal study

### How do animals on the wing sense and dodge obstacles? Findings may improve autonomous aerial vehicles

The Office of Naval Research recently awarded a five-year, \$7.5 million grant to a multi-university consortium led by the UW. The research teams will study how birds, insects, and bats sense their surroundings and use that information to control their movement. The teams will also look at balancing short-term navigation, such as avoiding obstacles or countering gusts of wind, with long-term goals, such as reaching a final destination. Findings could guide development of autonomous aerial vehicles that can adapt to obstacles and fly in unpredictable conditions — such as zooming through dense forests or landing on moving objects.

“Biological systems have very simple sensors, but lots of them. How do they use them? Is this something we can leverage for engineered systems?” asks principal investigator Kristi Morgansen, associate professor of aeronautics and astronautics. “We’re trying to make autonomous vehicles more effective at operating in cluttered or low-light environments, or around other moving objects.”

In the future, a flying vehicle operated without human direction could be smaller, lighter, and have faster response times. A truly autonomous vehicle would also be cheaper to operate and easier to deploy quickly in situations such as disaster relief.

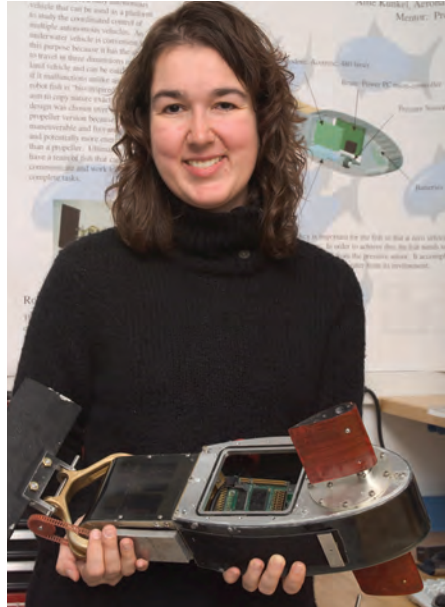
The multi-institutional team includes researchers at the UW, Boston University, the University of Maryland, and the University of North Carolina at Chapel Hill. The UW’s share of the grant is \$1.96 million. Tom Daniel, a UW professor of biology, is also involved in the research. This summer the UW will host a national workshop on bio-inspired engineering with a focus on flight.

Read more at: <http://www.aa.washington.edu/faculty/morgansen/index.html>

### Four Engineering Faculty Named UW Entrepreneurial Fellows

A new faculty fellows program honors the UW’s eight most entrepreneurial researchers — four from Engineering: Oren Etzioni (CSE), Vikram Jandhyala (EE), Yoky Matsuoka (CSE), and Buddy Ratner (ChemE, BioE). The program recognizes commitment to commercializing innovations for societal benefit.

Read more: [www.engr.uw.edu/news/news.html](http://www.engr.uw.edu/news/news.html)



Associate Professor Kristi Morgansen’s research team has developed and programmed groups of robofish to signal each other underwater and swim together without human intervention. Now she is turning her attention skyward.

## NAE Honors Hank Levy

UW Engineering’s newest member of the National Academy of Engineering is Hank Levy, who holds the Wissner-Slivka Chair of Computer Science & Engineering and has been department chair since 2006. He was among 68 new members and nine foreign associates elected this year for the highest professional distinction accorded an engineer. He joins an elite group of eight other active NAE members at the UW.

NAE honored Levy for his contributions to design, implementation, and evaluation of operating and distributed systems, and processor architectures. Levy has authored two books and over 100 papers on computer systems design, and has supervised 23 doctoral students and 17 master’s students. He has co-founded two companies, Performant and Skytap, and serves on several corporate advisory boards.



## CSE “Underdaws” Top the Field in National Cyber Defense Competition

A team of two CSE graduate students and six undergrads won the trophy in the three-day National Collegiate Cyber Defense Competition. Our underdogs lacked the formal training, funding, and uniforms of the eight other regional finalists, but trumped on skill and smarts.

Read more: <http://bit.ly/uwnews-cyberdefense>

## More UW Engineering News Online!

[www.engr.uw.edu/news/news.html](http://www.engr.uw.edu/news/news.html) (scroll down or search story titles)

- **UW Engineers Help Assess Risks in Wake of Japan Disasters**
  - **Controlling a Single Molecule’s Reaction with Light Could Improve Solar Cells**
- Engineers used nanotechnology to control and observe how molecules react when excited by ultraviolet light.
- **High Dose of Oxygen Enhances Natural Cancer Treatment**
- UW and WSU researchers have found that an environment of pure oxygen at high pressure significantly increases the cancer cell killing effectiveness of artemisinin, a compound isolated from wormwood.

# 27 WAYS . . . to give your career a Lift

Engineers at all career stages and from industry giants to startups are heading back to the classroom or to online courses for master's degrees or specialty certificate programs tailored for professionals. Hear about it from the source – alumni of and current students in UW Engineering Professional Programs. Read their full stories and others on our website: [www.engr.uw.edu/professional](http://www.engr.uw.edu/professional)

## Kristen Bengtson's Global Systems Training Widens Her Career Pathway

Kristen Bengtson fell in love with “space stuff” at age 4 when she saw astronaut Sally Ride on Sesame Street. She started flying lessons at 15, earned her pilot's license at 17, and is a certified flight instructor. A Boeing engineer since 2004, she has worked in a military unit, with a 737 team, Boeing Research and Technology, and the 787 program. While working full-time she completed the Global Integrated Systems and Engineering (GISE) certificate program, and in 2010 earned her master's degree in industrial and systems engineering. Her training and skill sets drew attention of program managers, who recruited her for special projects that quickly broadened her experience.

“I like to see the big picture in everything,” Bengtson said. “The GISE program trains you how to analyze and manage projects from a systems, global, and multicultural perspective. Boeing's customers and suppliers are worldwide, so this course was relevant to my work and my career goal to move into a management position.”

Bengtson now works at Boeing's Defense Systems Unit in Philadelphia with a team developing a strategy and business model for contracting with universities for engineering services. Boeing builds helicopters there, and now Bengtson has set her sights on learning their design process.

[Read more on the website.](#)

## Jack Peng Is an Expert in the Age of Composites

“My baby” is how Jack Peng thinks of the Boeing X-37B orbital test vehicle, which took its first flight in 2010. He helped redesign the carbon-carbon hot structure control surfaces structure while working for an aerospace contractor in Houston. Over 14 years as a specialist in aerospace composite structural design, analysis, and testing, he compiled an impressive pedigree of high-profile projects — the Delta IV rocket, Space Shuttle, and International Space Station.

The Boeing Company recruited him to Everett in late 2006 to work on composite wing components for the new 747-8, its largest plane yet. Even given his long experience and doctoral degree, Peng promptly signed up for three rigorous composite courses in a certificate program jointly sponsored by UW Engineering and Boeing Learning, Training, and Development.

“The courses teach the theory behind composites, so you are more confident in everything you do,” Peng said. “I would learn something in class and apply it the next day at work.”

With the March 20 first flight of the 747-8 Intercontinental passenger model, Jack Peng now has a big new baby.

[Read more on the website.](#)





## Michael Hansen Stays on Top of Change

Why would a successful telecommunications engineer with nearly 30 years of experience go back to school? Michael Hansen says it's "all about change." Not changing fields or employer — he has a terrific job at Intermec Technologies, world innovator and leader in bar code applications.

"The most exciting thing about my field is change," Hansen said. "Social media, wireless communications, and smart products are driving technology. I need to stay on top of developments, especially because my role at Intermec is to introduce new technology into the wireless unit."

Hansen chose Electrical Engineering's Professional Master's Program because he had reached the classic "fork in the road" for senior engineers — go into program management or dive deeper into the technical side. Although already on a management track, he chose the latter. "The push point for me is that as a leader you need to keep up with technology and academic advances so you can make good decisions," he said.

Now finishing year two in the three-year program, Hansen describes the UW faculty as "top notch." Next year under Professor Sumit Roy he will do an optional thesis project with practical application to his work. And the future?

"With a master's degree I will have the ability to take on an even more challenging role and the increasing responsibility that goes with it," Hansen said.

*Read more on the website.*

## Steve Rabin's Game Is Artificial Intelligence

Steve Rabin played his first video game at age 8; by age 17 he was working part-time in phone support for Nintendo of America, a job he held while a computer science and engineering major at UW. It's no surprise he launched his career at a series of startup game companies, but by 1999 he was back at Nintendo, where he is a principal software engineer and an expert on artificial intelligence, researching and developing tools for the Wii, DS, and next-generation games.

"One reason I returned to UW for a master's degree is that most of the people writing the books and articles I was editing had advanced degrees, so I thought my education should be on par with them, and I also wanted to expand my skills to further my work at Nintendo," Rabin said. "A business course focused on the software industry and managing technical staff was especially helpful to my supervisory role."

A course on human-computer interfaces benefitted his work developing tools for developers and a profiler for the 3DS hand-held system. Before he even finished the PMP program, Rabin was invited to teach courses in the UW Game Development Certificate Program and at the DigiPen Institute of Technology. *Read more on the website.*



## 27 UW Engineering Professional Programs

Professional engineering programs feature evening classes and some online learning options to meet needs of working professionals. Offerings include eight master's programs with two more in development, and 17 specialty training certificate programs across the following seven departments:

**Aeronautics & Astronautics**  
**Bioengineering**  
**Civil & Environmental Engineering**  
**Computer Science & Engineering**  
**Electrical Engineering**  
**Human Centered Design & Engineering**  
**Industrial & Systems Engineering**

► Information at: [www.engr.uw.edu/professional](http://www.engr.uw.edu/professional)



## Student Teams Win Big with Clever Solutions to Tough Problems

### Low-cost ultrasound system wins Gates grant

A low-cost ultrasound system developed by students was one of just 65 projects among 2,400 research teams from 16 countries to win a Bill & Melinda Gates Foundation \$100,000 Grand Challenges Explorations grant, which encourage scientists to explore bold and largely unproven ways to improve health in developing countries. Several students recently visited Uganda to visit rural health clinics and receive feedback on system use.

The portable, durable, and easy-to-use device features an ultrasound probe that connects via a USB port to a netbook with a touch-sensitive screen. The interdisciplinary team included students from computer science and engineering and human centered design and engineering, public health, and other disciplines. Key faculty advisors are Professor Beth Kolko, HCDE, and Dr. Robert Nathan, assistant professor of radiology.

**Read more at:** <http://bit.ly/uwnews-ultrasound>; <http://bit.ly/uwprojects-ultrasound>



Back Row (L-R): Professor Beth Kolko (HCDE), Waylon Brunette (doctoral student, advisor), and Ruth Anderson (CSE lecturer); Front Row: students Alexis Hope (HCDE), Pratik Prasad (CSE), and Wayne Gerard (CSE).



**New Entrepreneurs:** Cofounders of PotaVida (L-R) Tyler Davis, doctoral student at The Evans School; Jacqueline Linnes (BioE PhD '10), and Charlie Matlack, EE doctoral student.

**Read more at:** <http://bit.ly/uwnews-potavida> and <http://potavida.org>

### Clean water for the world's poorest regions

Clean drinking water is as precious as gold to more than a billion people living in poor, undeveloped regions. Disinfecting water in clear plastic bottles left in the sun is a simple concept and an old one, but it's hard to know when the water is safe to drink. A team of bioengineering and electrical and chemical engineering students solved that problem by developing an electronic sensor that monitors the clarity of the water and stops blinking when particles are no longer floating around.

In a competition hosted by a Boston company and sponsored by a Bolivian nonprofit that promotes solar disinfection, the team won a Rockefeller Foundation prize of \$40,000. Several of the students have established PotaVida, a nonprofit company to further develop, manufacture, and market the inexpensive device either to users or to nonprofits that promote solar disinfection. The team also recently won second place and \$5,000 in the 2011 UW Environmental Innovation Challenge (next story).

### Team captures grand prize for Voltaic

A team of undergraduates from Engineering and other UW programs drove away with the grand prize and \$10,000 at the 3rd annual UW Environmental Innovation Challenge held at Seattle Center Exhibition Hall. They created an electric vehicle modular drive train that can replace drive trains of gas-powered engines and can be customized to fit inside any car. The team installed one in a Honda Accord to demonstrate its capabilities.

The Voltaic team, based in Mechanical Engineering, bested 16 other finalist teams from the UW, WSU, WWU, and SPU. Voltaic is a company the students established to market their system to car manufacturers in the U.S., China, and India. Sponsors of the EIC competition are the Foster School of Business, the colleges of Engineering and the Environment, and the UW Center for Commercialization.



**Read more at:** <http://bit.ly/uwnews-eic2011> and <http://voltaicdrivesystems.net>

## High Honors Bestowed Upon Two Bioengineering Luminaries

**Buddy Ratner**, professor of bioengineering and chemical engineering, has won the 2011 Pierre Galletti Award, the highest honor bestowed by the American Institute for Medical and Biological Engineering. The institute of more than 50,000 biomedical engineers conveys this honor for contributions to public awareness of medical and biological engineering and promotion of the national interest in science, engineering, and education.

**Yongmin Kim**, professor of bioengineering and electrical engineering, received the 2010 Distinguished Service Award at the Engineering in Medicine and Biology Society conference in Buenos Aires. He was honored for outstanding contributions to education, the profession, and leadership in EMBS. Kim is an expert in medical imaging and next-generation ultrasound, and directs the Image Computing Systems Laboratory at the UW.



## Joe Sutter's Initials Soar in New 747

Boeing's largest passenger jet ever, the intercontinental 747-8, carries the initials of legendary Boeing engineer Joe Sutter (BSAA '43), who led development of the original 747 model. The 747-8 made its first flight on March 20. The company inscribed Sutter's initials in the jet as a tribute to the "father of the 747."

Sutter maintains close ties to Boeing as an influential leader among a group of retired executives whom Boeing leaders consult with on new plane development.

Sutter was honored last July with the first Flightglobal Lifetime Achievement Award, given by *Flight International* magazine at the Farnborough air show outside London.



## Energy Monitoring Innovations Put Shwetak Patel in Media Spotlight

Shwetak Patel, assistant professor of electrical engineering and computer science and engineering, has been all over the media for his home energy monitoring technology and for using electrical wiring as a wireless antenna system. He made the cover of *Seattle Business* as one of its top innovators for 2010 and also won the TechFlash Newsmaker of the Year Award, besting Paul Allen, Steve Ballmer, Jeff Bezos, and other noted business leaders.

## 2011 NSF CAREER Award First-Round Winners

So far this year, three junior faculty have won coveted National Science Foundation CAREER Awards. The grants typically provide funding of \$400,000 to \$500,000 over four to five years.

**Antonino Ferrante**, assistant professor of aeronautics and astronautics, specializes in computational fluid mechanics, primarily focused on turbulent flows relevant to such areas as aerodynamics, propulsion, and natural phenomena.

**James Fogarty**, assistant professor of computer science and engineering, explores human-computer interaction, user interface software and technology, and the obstacles to widespread adoption of ubiquitous sensing and intelligent computing technologies.

**Archis Ghate**, assistant professor of industrial and systems engineering, applies mathematical techniques to problems in operations management, economics, and medical treatment planning.

## Sloan Fellowship Honors

Three faculty are among the 118 early career scientists in the US and Canada to receive the prestigious Sloan Research Fellowships awarded by the Alfred P. Sloan Foundation. The grants provide \$50,000 over two years to pursue whatever lines of inquiry most interest the researchers.

**Anup Rao**, assistant professor of computer science and engineering, focuses his work on theoretical computer science, which he defines as "the mathematical study of the costs associated with manipulating information." While this is pure research, applications might include cryptography, error detection, or speeding up Internet traffic.

**Georg Seelig**, assistant professor of computer science and engineering and electrical engineering, studies how cells process information using complex biochemical networks, and how they can be engineered by using DNA and RNA molecules to program cellular behavior.

**Paul Wiggins**, assistant professor of bioengineering and physics, studies biological systems at the microscopic scale. For example, he looks at the forces involved when chromosomes separate to divide the DNA, or how the physical forces on a single-celled bacteria's nucleus affect its behavior.

## Bioengineering Undergrads Receive Goldwater Scholarships

Juniors Ben Dulken and Cameron Turtle are among 300 students nationwide to receive this prestigious award. Dulken conducts research in Dr. Suzie Pun's lab and hopes to pursue an MD/PhD in biomolecular engineering. Turtle studies the mechanisms of cardiac function in Dr. Michael Regnier's lab. He plans to pursue a PhD in bioengineering and a career in medical research.

## Class of 1961: It's your 50-year reunion!

Save the date • Friday, October 28, 2011

Celebrate with engineering classmates. In addition to university reunion plans, the college is planning a luncheon and lab tours for alumni.



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Send address comments or corrections to:

# The TREND in Engineering

## DIAMOND AWARDS

SIXTH ANNUAL DINNER

Friday, May 13, 2011, 6–9 PM

Don James Center, Husky Stadium

Please join Dean Matt O'Donnell,  
college faculty, and community friends  
as we honor these exceptional engineers.

Inquiries: 206.685.6843

coeevent@uw.edu



Jeffs



Ishimaru



Benedek



Stoebe



Nadella

The College of Engineering is honoring five eminent engineers with 2011 Diamond Awards for their outstanding professional and community achievements.

**George Jeffs** '45 BS, '48 MS AE *Distinguished Achievement in Industry* A leader in the nation's space program since its inception, Jeffs worked on Apollo missions to the Moon, Skylab, and the Space Shuttle.

**Akira Ishimaru** '58 PhD EE *Distinguished Achievement in Academia* A top expert in wave propagation and scattering, he advanced discoveries in ultrasound imaging and satellite and cellular communication.

**Andrew Benedek** '70 PhD CHEME *Entrepreneurial Excellence* Benedek's innovative work in membrane technology revolutionized water treatment and brought clean water to communities around the world.

**Thomas Stoebe** *Distinguished Service* As a UW MSE professor, Stoebe founded science and engineering outreach programs for underserved K-12 students and the UW Minority Science and Engineering program.

**Krishna Nadella** '02 MS, '08 PhD ME *Early Career* An expert in microcellular plastics, Nadella is leading a revolution to improve recovery and recycling of plastics as co-founder and CTO of MicroGREEN Polymers, Inc.

► Read more about the honorees at: <http://www.engr.uw.edu/da>