



Today's **Seawater** is Tomorrow's **Drinking Water:**

UCLA Engineers Develop Revolutionary Nanotech Water Desalination Membrane

Around-the-Clock Healthcare

Handheld Medical Device Offers at-Home Therapy

Connecting with High Schools Online

Virtual Tutoring Boosts Interest in Engineering



The UCLA Henry Samueli School of Engineering and Applied Science has built its reputation through innovative research and high quality education that stresses critical and creative thinking.

With the rise of globalization, engineers and scientists in the United States will need to compete on a different level if we are to remain a leader in development of new technologies. I believe we can do so if

we focus on collaborative, interdisciplinary research and education that is truly innovative.

Building on strong tradition of paradigm shifting research, we encourage our faculty and students to pursue projects with the potential to revolutionize our world, just as the Internet has done.

Despite our ambitious goals, however, we are hampered by space and new faculty hiring limitations on campus. To better support the type of groundbreaking research for which we are known, UCLA Engineering is pursuing the establishment of an off-site research institute in Southern California.

Such an institute will allow us to hire additional researchers and to move our research out of the labs and into development and eventually commercialization. It also will provide our students with hands-on experience in applied research and development of new products, and offer new research opportunities for faculty. And in the long run, commercialization of products developed at the institute will add to the competitiveness of the U.S.

I believe such an off-site research institute will add a valuable component to our threefold mission of education, research, and service, and help us remain on the forefront of dynamic, world-changing research.

Sincerely,

Vijay K. Dhir
Dean

UCLA Engineer

Dean

Vijay K. Dhir

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CALENDAR OF UPCOMING EVENTS

UCLA Schoolwide Technology Forum

DeNeve Plaza
Monday, May 3, 2007

UCLA Alumni Reception sponsored by Google

San Francisco Bay Area
Monday, May 7, 2007

Student Projects Reception

James West Alumni Center
Thursday, May 17, 2007

Young Alumni Reunion

UCLA
Saturday, May 19, 2007

Senior Class Dinner

UCLA
Friday, June 1, 2007

UCLA Alumni Reception sponsored by Broadcom

Orange County, CA
Monday, June 4, 2007

Engineering Commencement

Pauley Pavilion, UCLA
Saturday, June 16, 2007

Save the Date

November Awards Dinner
Friday, November 2, 2007

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UCLA Engineering Joins International Defense Partnership

By Marlys Amundson



Researchers Sarah Rothenberg and Nithya Ramanathan examine sensors in the field.

Faculty and students from the UCLA Henry Samueli School of Engineering and Applied Science are part of a multi-million dollar collaborative research team exploring wireless and sensor networks for defense.

Computer science professors Deborah Estrin and Mario Gerla and electrical engineering professor Mani Srivastava are part of a new International Technology Alliance (ITA) in Network and Information Sciences. The ITA brings together researchers from academia and industry in the United States and the United Kingdom to address problems in network theory, secure systems, sensor information processing and delivery, and distributed coalition planning and decision making.

The alliance's research will support military operations, which depend on the ability of forces to quickly gather, interpret, and share battlefield information to coordinate actions.

"We're looking at issues of sensor data integrity," noted Srivastava. "We want to be certain that the information received from the sensors is meaningful and correct, since there are many ways it

could be compromised. The sensors, embedded in the physical world, are unattended and vulnerable."

Srivastava and Estrin will be examining the various problems that might affect sensor integrity – from benign causes to deliberate attacks on the system, such as acoustic interference for a sound sensor or spurious inputs to a chemical sensor.

To detect when sensor information may not be accurate, the UCLA researchers are using statistical analysis similar to that used by banks to detect fraud. Estrin and Srivastava will also partner on developing technologies that are fault tolerant so that even if some data is corrupt, the rest can be used to generate accurate and useful reports.

"This is the first major collaboration between the U.S. and the UK at this scale on a military project," said Gerla. "The funding agencies are very interested in seeing where it will lead."

Gerla and his colleagues will be looking at mobile networks to support communication between soldiers, tanks, airplanes, and other units, which can be subject to disruption or jamming.

"We're designing protocols that are robust to support the broadcasting of messages across the nodes," Gerla explained. "For instance, how quickly and efficiently can an alert be sent to the troops. Is a message stored and then passed along when two units come into contact? Or should we use unmanned aerial vehicles to serve as communication points?"

The 24-member consortium will address both fundamental research and technology transition. The program could last 10 years with up to \$135.8 million in research funding from the UK Ministry of Defence, U.S. Department of Defense, and some consortium members.



New Plasma Method Replaces Traditional RF Systems

By Marlys Amundson



Chen and Torreblanca

Electrical engineering professor Francis (“Frank”) Chen is proof that retirement doesn’t mean you stop working. Twelve years after retiring, he has conceptualized, designed, and built a new machine for plasma etching and coating that is more efficient than current models.

Plasma generators are routinely used in industry for fabricating circuits with exacting precision and for coating materials. Helicons, a type of electromagnetic wave, produce high density plasmas that are useful for flat-panel displays, optical coatings, solar cells, and web-coating for packaging.

However, the space and power requirements for helicon sources have prevented their wide-spread use because of their additional cost and complexity in comparison with other RF plasma generators.

“Though single sources can handle the etching of computer chips,” commented Chen, “large surfaces such as flat-panel displays can be covered only with multi-

ple sources. Since helicons can produce ten times more plasma than other sources, they would be more energy efficient. But a large helicon source would require a huge electromagnet. We have found a way to use small, strong permanent magnets to do the job.”

A helicon wave absorbs RF energy and creates plasma. The plasmas produced are not the tiny plasmas in each pixel of a plasma TV, but are large plasmas able to cover the large sheets of glass used to make LCD computer and TV displays. In the future, the transistors and conductors in these displays can be etched with much less polluting effluent if plasma is used.

Chen and graduate student Humberto Torreblanca used a program developed by the late UCLA adjunct professor Donald Arnush to compute the plasma fields and determine the optimal size and shape of each plasma tube. The new system reduces the complexity of helicon designs by replacing the large, heavy electromagnet with an array of doughnut-shaped permanent magnets.

“It’s the first plasma source designed with theory,” said Chen, “not trial and error. By being able to calculate the interaction of the magnetic fields with the helicon waves, we could design an array of tubes to produce a smooth plasma treatment of a large surface.”

Read more about the new system, please visit
<http://www.engineer.ucla.edu/news/2006/plasma.html>

Today's **Seawater** is Tomorrow's **Drinking Water**: UCLA Engineers Develop Revolutionary Nanotech **Water Desalination Membrane**



Professor Eric Hoek in his lab.

Reed Hutchinson

Researchers at the UCLA Henry Samueli School of Engineering and Applied Science have developed a new reverse osmosis (RO) membrane that promises to reduce the cost of seawater desalination and wastewater reclamation.

BY MELISSA ABRAHAM

Reverse osmosis desalination uses extremely high pressure to force saline or polluted waters through the pores of a semi-permeable membrane. Water molecules under pressure pass through these pores, but salt ions and other impurities cannot, resulting in highly purified water.

The new membrane, developed by civil and environmental engineering assistant professor Eric Hoek and his research team, uses a uniquely cross-linked matrix of polymers and engineered nanoparticles designed to draw in water ions but repel nearly all contaminants. These new membranes are structured at the nanoscale (the width of human hair

is approximately 100,000 nanometers) to create molecular tunnels through which water flows more easily than contaminants.

Unlike the current class of commercial RO membranes, which simply filter water through a dense polymer film, Hoek's membrane contains specially

synthesized nanoparticles dispersed throughout the polymer — known as a nanocomposite material.

“The nanoparticles are designed to attract water and are highly porous, soaking up water like a sponge, while repelling dissolved salts and other impurities,” Hoek said. “The water-loving nanoparticles embedded in our membrane also repel organics and bacteria, which tend to clog up conventional membranes over time.”

With these improvements, less energy is needed to pump water through the membranes. Because they repel particles that might ordinarily stick to the surface, the new membranes foul more slowly than conventional ones. The result is a water purification process that is just as effective as current methods but more energy efficient and potentially much less expensive. Initial tests suggest the new membranes have up to twice the productivity — or consume 50 percent less energy — reducing the total expense of desalinated water by as much as 25 percent.

“The need for a sustainable, affordable supply of clean water is a key priority for our nation’s future and especially for that of California — the fifth largest economy in the world,” Hoek said. “It is essential that we reduce the overall cost of desalination — including energy demand and environmental issues — before a major drought occurs and we lack the ability to efficiently and effectively increase our water supply.”

A critical limitation of current RO membranes is that they are easily fouled — bacteria and other particles build up on the surface and clog it. This fouling results in higher energy demands on the pumping system and leads to costly cleanup and replacement of membranes. Viable alternative desalination technologies are few, though population growth, over-consumption and pollution of the available fresh water supply make desalination and water reuse ever more attractive alternatives.

With his new membrane, Hoek hopes to address the key challenges that limit more widespread use of RO membrane technology by making the process more robust and efficient.



Hoek displays a vial of nanoparticles and a piece of his desalination membrane.

Reed Hutchinson

“The need for a sustainable, affordable supply of clean water is a key priority for our nation’s future and especially for that of California — the fifth largest economy in the world.”

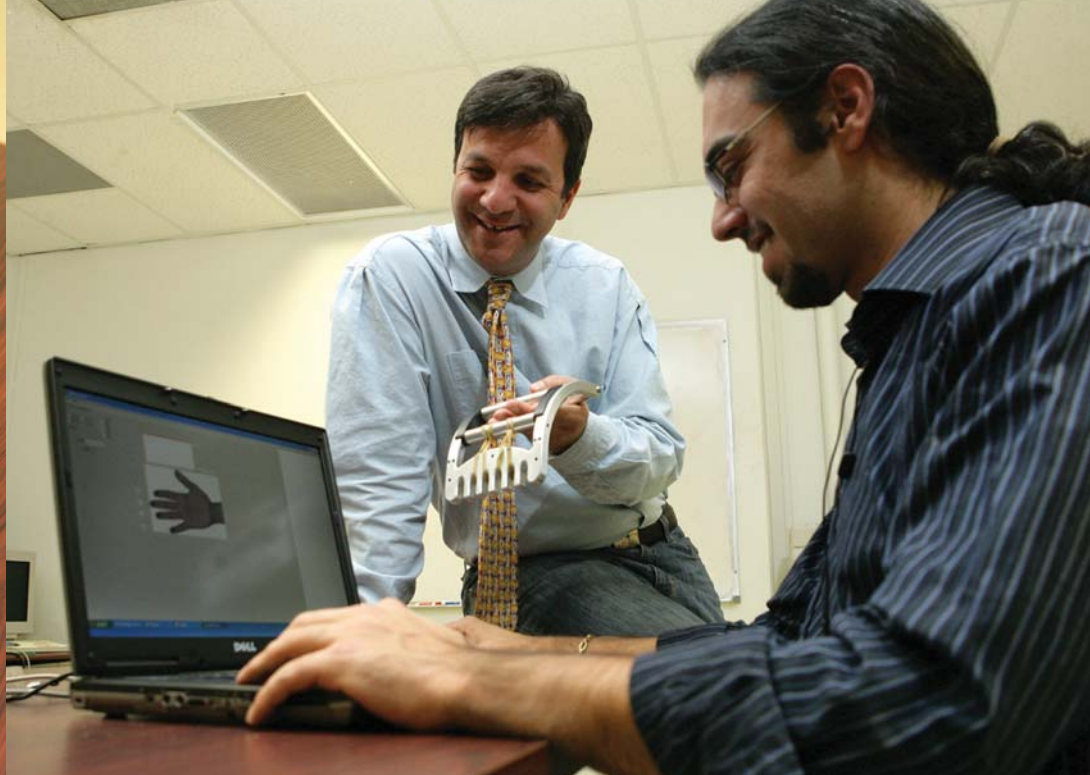
“I think the biggest mistake we can make in the field of water treatment is to assume that reverse osmosis technology is mature and that there is nothing more to be gained from fundamental research,” Hoek said. “We still have a long way to go to fully explore and develop this technology, especially with the exciting new materials that can be created through nanotechnology.”

Hoek is working with NanoH2O, LLP, an early-stage partnership, to develop his patent-pending nanocomposite membrane technology into a new class of low-energy, fouling-resistant membranes for desalination and water reuse. He anticipates the new membranes will be commercially available within the next year or two.

The first viable reverse osmosis membrane was developed and patented by UCLA Engineering researchers in the 1960s. The school also is home to the Water Technology Research Center,

founded in 2005, which seeks to advance the state of desalination technology and to train the next generation of desalination experts. Hoek co-founded the center with UCLA chemical engineering professor and center director Yoram Cohen.

“We as a nation thought we had enough water, so a decision was made in the 1970s to stop funding desalination research,” Hoek said. “Now, 30 years later, there is renewed interest because we realize that not only are we running out of fresh water, but the current technology is limited. We lack implementation experience and we are running out of time. I hope the discovery of new nanotechnologies like our membrane will continue to generate interest in desalination research at both fundamental and applied levels.”



New Research Offers Baby Boomers Round-the-Clock Health Care, with a ‘Cyber Twist’

Professor Majid Sarrafzadeh and graduate researcher Foad Dabiri work on their CustoMed device and software.

Handheld Device Developed by UCLA Engineer Allows Doctors to Customize Patient Care

BY MELISSA ABRAHAM

As an estimated 78.2 million baby boomers nationwide reach their later years, researchers are continually looking for ways to improve their quality of life. A professor at the UCLA Henry Samueli School of Engineering and Applied Science hopes his recent research — using a small wireless computer and tiny sensors — will help older patients with mobility issues or loss of sensation avoid unnecessary and costly trips to the doctor or therapist while improving their ailments in record time.

The new CustoMed medical monitoring device, developed by UCLA engineering professor Majid Sarrafzadeh in conjunction with UCLA neuroscientist Reggie Edgerton, promises patients experiencing neuromotor impairment as a result of traumatic injury or chronic disease the ease and affordability of substantially shortened therapy and recovery times and the ability to complete their therapy at home while still under the watchful supervision of their doctor.

Using a CustoMed portable handgrip device containing tiny wireless sensors, patients who need restorative therapy for their wrists or hands, for example, can practice their doctor-prescribed exercises at home each day rather than visiting a physical therapist, as they normally would do.

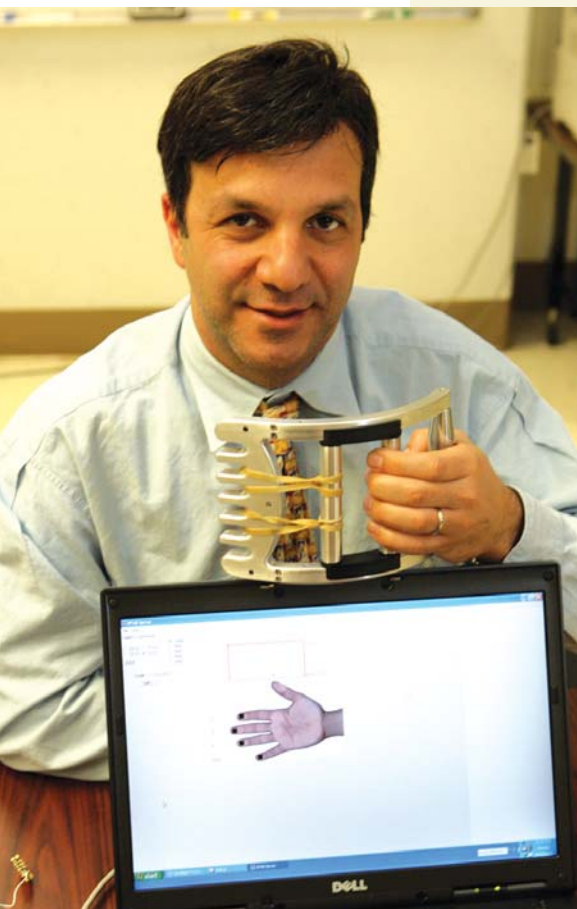
And unlike traditional therapy, the data from each of these home therapy sessions is monitored, stored and transmitted to the patient's doctor wirelessly through the Internet. At the end of the

day or the end of the week, the doctor can review the information, see how the patient is progressing and, if need be, change the course of therapy or even schedule an immediate follow-up appointment based on the information.

“Most patients visit the doctor after surgery and are asked to rate their pain and tell their doctor how much they have been moving the affected area,” said Sarrafzadeh. “This usually results in a very qualitative but not very informative answer. The patient says, ‘Oh, I haven’t been moving my wrist or my back much’ or ‘I’ve been moving my knee a lot lately,’ but what does that really mean?” By using the CustoMed device, the doctor can see patterns of movement and stress on the injury and make or adjust therapy recommendations. It’s a huge step forward in round-the-clock treatment.”

“This device should enhance our patient care — we can readily monitor the status of a patient and change the therapeutic prescription on a daily basis and know exactly the performance capability of that patient during the recovery process,” said Edgerton, a professor of physiological science. “The

Sarrafzadeh and a CustoMed prototype.



device is also designed to have important motivational features for the patient. It’s an exciting development.”

Not only does the patient have the ongoing support of the doctor, but because they can perform the exercises at home and receive direct feedback, they are more likely to complete the prescribed therapy, Sarrafzadeh said. Another benefit is that the recovery time may be considerably shortened.

“In speaking with medical doctors about this device, many feel that patient recovery could see a dramatic improvement, from six months of recovery time to mere weeks, because the patient has greater access to the therapy and greater control of their own recovery,” Sarrafzadeh said. “That’s incredibly encouraging for patients who want their therapy to be highly effective, affordable and flexible enough to meet their lifestyle. Many seniors today are active and want to stay that way, so this kind of treatment is especially significant for them.”

With very little adjustment, the device also can be used to monitor patients who have undergone knee surgery or who have spinal cord injuries. By adding a few additional components to the CustoMed device, the movement of an injured knee or spinal area can be monitored 24 hours a day, seven days a week.

Sarrafzadeh and his graduate researchers — Foad Dabiri, Tammara Massey and Ani Nahapetian — have been working on a number of related devices, including a pressure-sensing tennis shoe. The shoe would be a breakthrough for diabetic patients who have lost sensation in their feet, alerting them when blood flow has been compromised and preventing the possible loss of a foot.

Much like a pocket PC, the basic technology of the CustoMed device is similar from application to application, so the device can be customized to fit individual needs in a relatively short amount of time, allowing the patient take it home directly from the physician’s office.

“Rather like an off-the-shelf computer, the devices all start out the same, but you can add different bells and whistles to fit the individual,” Sarrafzadeh said. “So it’s extremely flexible to meet both the doctor’s and the patient’s needs.”

The CustoMed devices, which are currently being tested in human trials, may be available to consumers as early as next year. Sarrafzadeh and his colleagues anticipate that the durable device will retail at around \$200 to \$300, depending on the customization needs.

“Many seniors today are active
and want to stay that way,
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especially significant for them.”



UCLA Engineering student tutor Jonathan Yip checks Mayfield's online tutoring forum.

Reed Hutchinson

Connecting Online:

UCLA Engineering Launches Virtual Tutoring Program to Boost Declining Interest in Math, Science Among High Schoolers

BY MELISSA ABRAHAM

In an effort to boost declining interest in math and science among U.S. students, UCLA's Henry Samueli School of Engineering and Applied Science is launching an innovative pilot tutoring program called the Engineering and Science Corps. Unlike conventional tutoring programs, however, this one is entirely virtual.

"The US is rapidly losing its dominance in the technology sector. We have a responsibility to do everything we can to turn this trend around," said UCLA Engineering Dean Vijay K. Dhir. "Most students who lose interest in math and science do so in junior high and high

school because they feel they can't understand the subject matter or do the homework. Our online tutoring program is a very effective way to ensure that interested students are receiving the encouragement and help they need to maintain their interest in math and science."

About 20 UCLA Engineering undergraduates volunteered to spend their time tutoring high school students in courses that are traditionally seen as precursors to a successful engineering education: precalculus, algebra, trigonometry, physics, and computer science. Tutors attend an initial orientation

session at UCLA, and are then matched with a school based on their interests and the courses being offered. The curriculum and homework assignments for the class they are tutoring are provided in advance so they can prepare.

The volunteers each set aside at least two hours per day, three times a week, to be available via email to answer questions and coach the high school students. The high school teacher and UCLA Engineering's education coordinator monitor the exchanges, which can also provide instructors with valuable insight into any problem areas for their class.

In partnership with UCLA Engineering, many of the high schools also have set up password protected online forums where students can post questions and have a dialogue with their classmates as well as the tutors – a kind of online study group.

“The response has been very good,” Mayfield High School instructor Jack Blumenthal said. Blumenthal’s precalculus class received tutoring for the first time last quarter, and plans to participate this quarter as well. “The kids have access to tutoring via an active forum, and as an added benefit they are also starting a dialogue with the UCLA Engineering students, which helps them to see what they themselves can achieve.”

As far as the “virtual” aspect of the tutoring program is concerned, Blumenthal admitted, “It’s not one of the tools that older people would go to, but for kids, they love it and it’s a great way for them to connect with the subject.”

UCLA Engineering already is winning allies with their approach – five area high schools have signed on to the effort: Mayfield Senior High School, Marlborough High School, and LAUSD Schools Belmont Learning Center, Southeast High School in South Gate, and Jordan High School. More schools are expected to be added.

Volunteer Nicky Virdone, who attended high school at Mayfield and is now in her second year at UCLA Engineering, said she became involved in the program because she “felt it was a really good way to give back. I love bioengineering, and I want other students, particularly women, to realize that this can be a very rewarding career choice for them as well. It was very important to me to not just give students the answer, but to just show them how to figure it out for themselves.”

High school student Jeania Ree Moore at Mayfield, who has worked with Virdone, said the experience has been very helpful. “The tutoring Nicky provided helped me to understand problems, and different ways to solve problems – unlike the book, which just

“The US is rapidly losing its dominance in the technology sector. We have a responsibility to do everything we can to turn this trend around.”

Dean Vijay K. Dhir

shows the answer. I liked the tutoring program a lot and I know the others students in my class also liked it,” Moore added.

Sixteen-year-old Megan Palos from Mayfield agrees. “The online application was easy to use, and the tutors were quick to reply. Sometimes there isn’t time to go over all of the issues in class, and if there are difficult problems, you ask your friends, but sometimes they don’t know the answer either. Having the online tutors to ask was so helpful. The program has really given me a sense of confidence where math is concerned. When I understand the subject, I have a greater interest in it. I’m not sure yet if I want to get an engineering degree, but I’m definitely considering it. The program was of great benefit to me.”

Understanding that a strong science and engineering workforce in the U.S. means better opportunities for everyone in the field, tutor Jonathan Yip, now in his third year at UCLA Engineering studying mechanical engineering, says he wanted to get involved in the program because he wanted to help younger students. “I remember when I was a high school student and I needed help, and it was frustrating not to have anyone to ask. The students I tutor are so excited to have help, it’s a good feeling to be able to show them how to tackle difficult problems – to give them the right information so they can do it on their own.”

The pilot tutoring program, directed initially by engineering education

coordinator Frank Nevarez and more recently, Jeanine Moreno, started out small with five schools, but so far, the program estimates it has the potential of reaching more than 400 students this academic year alone, which will last from now until June in accordance with area school schedules. That figure will continue to increase as the tutoring program grows, and a number of other schools already have expressed interest in joining.

Said Moreno, “It’s our hope that this program will provide opportunities for high school students across the Southland, and eventually, if it continues to be successful, that it can serve as a model program for universities and colleges across the nation.”

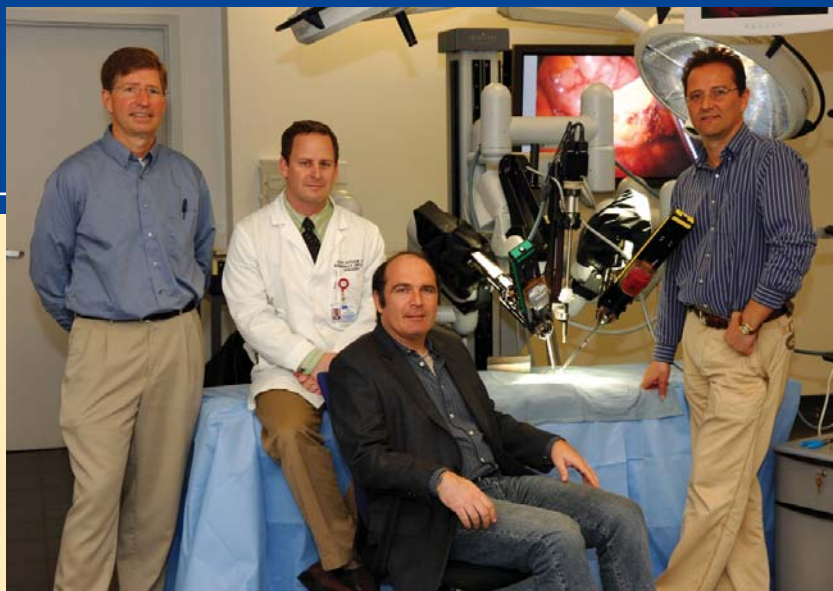
For more information, or to become involved in the program, please contact Jeanine Moreno at 310.825.3008, or via email at jmoreno@ea.ucla.edu.

Reed Hutchinson



Mayfield High School student Jeania Ree Moore meets her virtual tutor in person – UCLA Engineering student Nicky Virdone.

GUIDED SURGERY TOOL BRINGS EXPERTISE TO REMOTE LOCATIONS



Collaborators Greg Carman, Dr. Eric Dutson, Petros Faloutsos, and graduate researcher Vasile Nistor.

Dr. Eric Dutson and mechanical and aerospace engineering professor Greg Carman demonstrate guided surgery training.

COLLABORATIVE SYSTEM OFFERS NEW TRAINING METHOD

BY MARLYS AMUNDSON

Researchers at the UCLA Henry Samueli School of Engineering and Applied Science, working with laparoscopic surgeons, have developed a new method of guided surgery that will permit experienced surgeons to guide surgeries in remote locations, such as battlefield hospitals.

“Laparoscopic surgery is a specialized field that requires a lot of practice,” noted Greg Carman, professor of mechanical and aerospace engineering. “To develop a way in which the best

surgeon in the world can assist with a surgery remotely holds the potential to revolutionize the field.”

Laparoscopic surgery is a minimally invasive procedure in which surgeons use a video camera to view the area in which they are working. The two-dimensional field of vision and limited range of movement make it a more difficult type of surgery.

The new telerobotics system developed by the UCLA Engineering researchers allows highly trained

surgeons to aid battlefield surgeons with laparoscopic procedures using video conferencing tools to provide live guidance.

“Our system replaces robotic surgery tools, which pose challenges associated with power supplies, ease of use, space constraints, and cost,” said mechanical engineering graduate student researcher Vasile “Lică” Nistor. “Using this new method, a highly qualified surgeon could provide guidance from a remote location to an on-site generalist at a much lower cost.”

Because of the considerable variation from operation to operation, it's critical to have an expert surgeon available who can offer guidance and advice in real time. A modified video conferencing system offers a way to present information to the on-site surgeon in a useful way that does not interrupt the surgery.

"We've found that because laparoscopic surgery is 2-D and not 3-D, it's analogous to playing video games," said computer science graduate student Brian Allen. "We'd like to find a way to use the graphic technologies that enhance video games to enhance the surgical procedure."

The system developed at UCLA also can be used to train residents and new surgeons in laparoscopic surgery.

"We have not radically altered the training process, and have modified tools that are routinely used by surgeons," said Allen. "Our system is affordable, easy to set up and use, and needs less space than current training methods."

"Our goal is to replicate airline training, providing a high quality virtual environment and realistic simulations," explained Nistor. "Right now, the medical industry is about 20-30 years behind the airlines, and we'd like to provide a system that can quantify a trainee's skill level."

To create practice simulations for medical residents, the team has developed a program to track the movement of the surgical tools that have been modified with a set of seamlessly integrated motion tracking sensors. The sensors measure rotation, position of the instruments, and other movement. By tracking both the expert and the novice, they can see where someone learning might have difficulties, or need more training during the simulations.

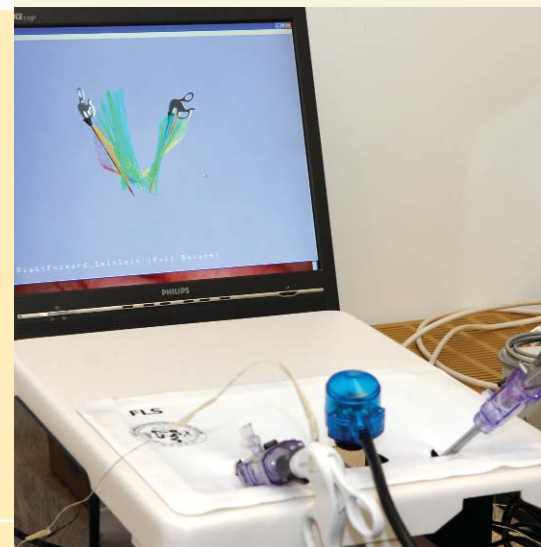
"We have been working closely with UCLA surgeon Dr. Erik Dutson, an expert in laparoscopic surgery," said computer science professor Petros Faloutsos. "By recording his movements, we have an expert benchmark that we can use for training."

The system tracks motion over time, showing both movement and steadiness in the hand that is not in use.

"It's very difficult to not move the off-hand," said Allen, "but critical since a wrong movement can accidentally cause a cut in the surrounding tissue out of sight of the camera, creating a chance of infection."

To counter what is statistically the major cause of failure for this type of surgery, the group has added a kinesthetic force feedback component to the system that will help constrain accidental movement outside areas designated by an expert surgeon. A surgeon would feel resistance if he or she accidentally moved their off-hand into a critical area, for instance, the liver to one side of a gall bladder.

The guided laparoscopic surgery project is funded by the U.S. Army's Telemedicine and Advanced Technologies Research Center. The UCLA Engineering researchers are collaborating with members of UCLA's Center for Advanced Surgical and Interventional Technology (CASIT). The facility includes a da Vinci surgical robotic surgery system, a human patient simulator, and laparoscopic surgical simulators and tools.



A guided surgery demo station at the CASIT facility.

**"To develop a way in which
the best surgeon in the world
can assist with a surgery
remotely holds the potential
to revolutionize the field."**

Greg Carman

UCLA Engineering Faculty Garner 2007 National Science Foundation Early Career Development Awards

By Melissa Abraham



NSF CAREER Award recipients Jeff Eldredge (l) and Jacob Schmidt.

With prestigious awards from the National Science Foundation (NSF), two UCLA Engineering faculty members are tackling issues ranging from the creation of highly sensitive biomolecular sensors to using the physics behind aquatic movement to inspire human engineered systems.

The two researchers have earned NSF's 2007 Faculty Early Career Development (CAREER) award, the NSF's most prestigious junior faculty award, which recognizes a young researcher's dual commitment to scholarship and education. Bioengineering professor Jacob Schmidt will investigate "Membrane Platform Technologies for Channel Protein Science and Sensing." Mechanical and aerospace engineering professor Jeff Eldredge will look at "Numerical Investigations of Biological and Bio-inspired Locomotion." Together, the two UCLA Engineering researchers will garner more than \$800,000 in funding, to be awarded over the next five years.

"We are extraordinarily pleased to have our exceptional young faculty

recognized by the National Science Foundation," said Vijay K. Dhir, dean of the School. "We take great pride in having talented scholars who are conducting research in critical areas as part of our School."

Schmidt's work focuses on developing stable and long-lasting sensors based on measurements of single molecules of channel proteins. Channel proteins, in their natural form, inhabit cell membranes in living organisms. The proteins are so small that sensors employing them can detect the presence of single molecules bound to them.

"We are extraordinarily pleased to have our exceptional young faculty recognized by the National Science Foundation"

Dean Vijay K. Dhir

But because the membranes housing them are nanometers in size, they can be fragile and difficult to produce in the laboratory. Schmidt's group is focusing on creating new platforms for the creation and stabilization of these membranes, enabling the sensor technology. His research may lead to the development of better ways to screen drugs, detect biomolecules, or rapidly sequence DNA.

Eldredge's research investigates how to observe and understand the fundamental physics of most forms of biological movement in fluids to construct human engineered systems that operate with similar functionality.

His work addresses the need for an accurate and efficient computational tool for simulating flows produced by

bodies with constantly moving and changing surfaces. This tool will be used to study the role of flexibility in natural forms of locomotion – such as insect flight and fish swimming. It is hoped that a better understanding of movement in nature will lead to energy-efficient vehicles with enhanced maneuvering capabilities.

The CAREER award also contains a strong education component. UCLA Engineering students will be able to broaden their field of study by participating in both of these cutting-edge interdisciplinary research projects.

The two 2007 CAREER awards follow five awards garnered by faculty in 2006 – three from the computer science department, and one each from the chemical and biomolecular engineering and civil and environmental engineering departments.

To learn more about Jacob Schmidt, visit <http://www.bioeng.ucla.edu/facultyresearch/facultyprofiles/schmidt.html>.

For more on Jeff Eldredge, visit <http://www.mae.ucla.edu/academics/faculty/eldredge.htm>

UCLA Engineering Professor Asad Abidi Elected to the Prestigious National Academy of Engineering

By Melissa Abraham



Asad Abidi

UCLA Engineering professor Asad Abidi has been elected into the National Academy of Engineering (NAE), the highest professional lifetime distinction accorded to an American engineer.

Honored for his contributions to the development of integrated circuits for wireless communication circuits in metal-oxide-semiconductor (CMOS) technology used to fabricate micro-processors and digital signal processors, Abidi is now among a select 2,217 members nationwide, along with 188 foreign associates.

Academy membership honors those who have made outstanding contributions to engineering research, practice, or education. Established in 1964, the NAE shares responsibility with the National Academy of Sciences to advise the federal government on questions of policy in science and technology.

Said Abidi, “I feel the key importance of my election into the Academy is that it highlights the groundbreaking work my colleagues at UCLA electrical engineering and I have undertaken over the last

two decades in CMOS Radios. It is this research that has really helped to define a new industry, and that is my greatest reward. Every mass-produced wireless communication device today is in CMOS.”

The UCLA Henry Samueli School of Engineering and Applied Science is the home of CMOS Radio technology, which originated in the school’s research laboratories in the mid-1990s.

Abidi has been an electrical engineering faculty member at the UCLA Henry Samueli School of Engineering and Applied Science since 1985, where he, in collaboration with other engineering colleagues, led the way in research and creation of the field of study and research now known as integrated circuits and systems.

“The work I conducted with my colleagues has always had the overarching theme of industry impact. We did not try to keep the work under wraps. We strove to innovate so that we could share the knowledge with the rest of the world. I’m proud to have been part of this philosophy of research.”

Abidi’s research career has focused on research in CMOS RF design, high-speed analog integrated circuit design, data conversion, and other techniques of analog signal processing. His work has led to new architectures in modern wireless devices, and a new way of designing the circuits that enable them.

Prior to his tenure with the School, Abidi worked at Bell Laboratories, Murray Hill, NJ, as a member of the technical staff in the Advanced LSI Development Laboratory. He has received a number of awards and honors throughout his career, including the

1988 TRW (now Northrup Grumman) Award for Innovative Teaching, and the 1997 Institute of Electrical and Electronics Engineers (IEEE) Donald G. Fink Award, presented for the most outstanding survey, review, or tutorial paper published in the IEEE transactions, journals, magazines, or in the proceedings during a given year. Abidi earned his B.Sc. with Honors degree from Imperial College, London, U.K., and an M.S. and Ph.D. in electrical engineering from the University of California, Berkeley.

The mission of NAE is to promote the technological welfare of the nation by gathering the knowledge and insights of eminent members of the engineering profession. The NAE is the portal for all engineering activities at the National Academies, which along with the NAE, include the National Academy of Sciences, the Institute of Medicine, and the National Research Council.

“The work I conducted
with my colleagues has
always had the overarching
theme of industry impact.”

Anita Borg Institute for Women and Technology Selects UCLA Engineering's Deborah Estrin for 2007 "Women of Vision" Award



The Anita Borg Institute for Women and Technology has selected computer science professor Deborah Estrin from the UCLA Henry Samueli School of Engineering and Applied Science as a recipient of the 2007 "Women of Vision" Award.

Established in 2004 in memory of the late Dr. Anita Borg, The Anita Borg Awards honor outstanding leaders who embrace Borg's lasting vision to

increase the positive impact of technology on women. Each year, the "Women of Vision" award honors three women who have made significant contributions to technology in one of three categories: innovation, leadership and social impact. One winner is selected for each category.

Estrin is the recipient of the "Innovation" award, which recognizes women who have contributed significantly to technology innovation.

Estrin is Founding Director of UCLA Engineering's NSF-funded Center for Embedded Networked Sensing (CENS). She holds the Jon Postel Chair in Computer Networks in the computer science department and has a joint appointment in electrical engineering.

Estrin's work focuses on the application of spatially and temporally dense embedded sensors to environmental

monitoring. Most recently this work includes participatory-sensing systems, based on automated, programmable, and adaptive collection of environmental, physiological, and social parameters at the personal and community level. These systems seek to leverage the installed base of image and acoustic sensors that we all carry around in our pockets or on our belts—cell phones.

In 1987, Estrin received the National Science Foundation, Presidential Young Investigator Award for her research in network interconnection and security. In 2006, Estrin was selected as the first recipient of the ACM Athena Award recognizing women in research. She is a fellow of the Association for Computing Machinery (ACM), the American Association for the Advancement of Science (AAAS) and the Institute of Electrical and Electronics Engineers (IEEE).

UCLA Engineering's Eddie Kohler Awarded Prestigious Sloan Fellowship



Eddie Kohler, assistant professor of computer science at the UCLA Henry Samueli School of Engineering and Applied Science and an innovator in the field of computer software, is among this year's 118 national winners of prestigious Sloan Research Fellowships from the

Alfred P. Sloan Foundation. Sloan Fellows are engaged in research at the frontiers of physics, chemistry, computational and evolutionary molecular biology, computer science, economics, mathematics, and neuroscience.

The new Sloan Research Fellows were selected from among hundreds of highly qualified scientists in the early stages of their careers on the basis of their exceptional promise to contribute to the advancement of knowledge. In the 52 years that the Alfred P. Sloan Foundation has been awarding research fellowships, 35 former Sloan Fellows have received Nobel Prizes.

The focus of Kohler's research at UCLA Engineering has been making computer

systems, including operating systems and sensor networks, both more powerful and easier to understand. For example, the Asbestos project, a collaboration involving UCLA, MIT, and Stanford, is an operating system that keeps sensitive information from leaking out to unauthorized users even in the presence of software failure.

Kohler has been a faculty member at UCLA Engineering since January 2004, and is also a Microsoft Research New Faculty Fellow for 2006-07.

The Sloan Fellowships are intended to enhance the careers of the very best young faculty members in specified fields of science. The award is for \$45,000 over a two-year period.

New Accelerator Technique Doubles Particle Energy in Just One Meter

Imagine a car that accelerates from zero to sixty in 250 feet, and then rockets to 120 miles per hour in just one more inch.

That's essentially what a collaboration of accelerator physicists has accomplished, using electrons for their racecars and plasma for the afterburners. Because electrons already travel at near light's speed in an accelerator, the physicists actually doubled the energy of the electrons, not their speed.

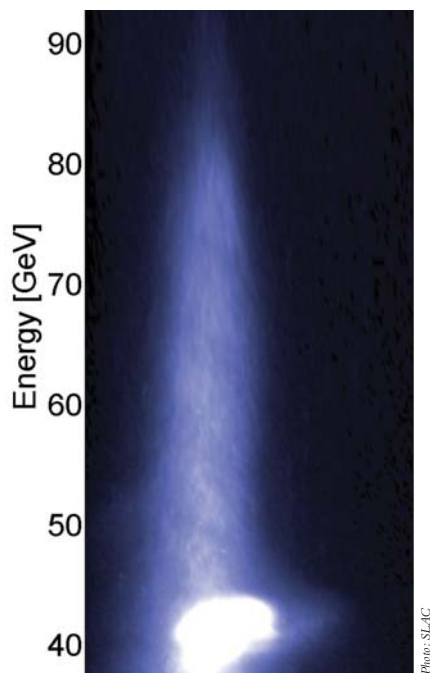
The researchers—from the Department of Energy's Stanford Linear Accelerator Center (SLAC), the UCLA Henry Samueli School of Engineering and Applied Science, and the University of Southern California Viterbi School of Engineering—published their work in the February 15 issue of *Nature*.

The achievement demonstrates a technology that may drive the future of accelerator design. To reach the high energies required to answer the new set of mysteries confronting particle physics—such as dark energy and the origin of mass—the newest accelerators are immensely bigger, and consequently more expensive, than their predecessors. Very high-energy particle beams will be needed to detect the very heavy and very short-lived particles that have eluded scientists so far.

The recent advance is the culmination of almost a decade work, led by SLAC Professor Robert Siemann, UCLA Electrical Engineering Professor Chan Joshi, and USC Engineering Professor Thomas Katsouleas.

"Physicists use particle accelerators to answer some of the most profound questions about the nature of the universe," said UCLA Engineering's Joshi. "I am hopeful that plasma acceleration will enable us to continue the rich tradition of discovery."

While still in early development stages, the research shows that acceleration



The blue streak in this photograph shows the dramatic gain in energy made by some of the electrons in a bunch after passing through plasma (ionized gas). The white spot shows the electrons in the bunch that generated the plasma to propel the other electrons to double their energy, to 85 billion electron volts (GeV). The electrons can be photographed because they emit blue light as they pass through air.

using plasma, or ionized gas, can dramatically boost the energy of particles in a short distance.

"The scale is pretty remarkable," said SLAC physicist Mark Hogan. "You need an airplane to take a picture of the two-mile linear accelerator here. Yet in a space shorter than the span of your arms, we doubled the electrons' energy to the highest ever made here. I hope in the long term it leads to extending the capabilities of existing and upcoming machines at modest costs."

The electrons first traveled two miles through the linear accelerator at SLAC, gaining 42 billion electron volts (or GeV) of energy. Then they passed through a 33-inch long (84-centimeter) plasma chamber and picked up another 42 GeV of energy. Like an afterburner

on a jet engine, the plasma provides extra thrust. The plasma chamber is filled with lithium gas. As the electron bunch passes through the lithium, the front of the bunch creates plasma. This plasma leaves a wake that flows to the back of the bunch and shoves it forward, giving electrons in the back more energy.

The experiment created one of the biggest acceleration gradients ever achieved. The gradient is a measure of how quickly particles amass energy. In this case, the electrons hurtling through the plasma chamber gained 3,000 times more energy per meter than usual in the accelerator.

"We are all heartened that we are continuing to climb the plasma acceleration learning curve," said USC Engineering Professor Patric Muggli.

A current experimental limitation is that most of the electrons in a bunch lose their energy to the plasma.

"We take energy out of one part of the beam and put it into another part," Hogan said.

During the last two years, the team has improved the plasma acceleration gradient by a factor of 200. One of the next steps is to attempt a two-bunch system, where the first bunch provides all the energy to the trailing bunch. In a full-scale plasma accelerator, physicists would use those second bunches to create high-energy particle collisions in their detectors.

"We hope that someday these breakthroughs will make future generations of accelerators feasible and affordable," said SLAC Deputy Director Persis Drell. "It's wonderful to see the tremendous progress in understanding the underlying physics for fundamentally new methods of accelerating particles."

The research was funded by the Department of Energy and the National Science Foundation.

UCLA Engineering Celebrates Accomplishments at Annual Awards Dinner

By Melissa Abraham



Glenn Gentry

Alumnus of the Year Linda Katehi and UCLA Engineering Dean Vijay K. Dhir.

The UCLA Henry Samueli School of Engineering and Applied Science celebrated the accomplishments of alumni, students, and faculty at this year's annual awards dinner, held on Friday, November 3, at the Beverly Wilshire-Four Seasons Hotel ballroom.

With nearly 450 colleagues and friends in attendance, awards were presented to 13 individuals, including provost and vice chancellor for academic affairs at the University of Illinois at Urbana-Champaign, Linda Katehi, honored as the 2006 Alumnus of the Year.

KNBC 4 reporter and engineering alumnus Patrick Healy, along with UCLA Engineering Dean Vijay K. Dhir, emceed the event.

"We're proud of the work our faculty and students do. The work we do today makes a difference in the world tomorrow," Dhir told the crowd. "In the past, they used to say the sun never set on the British Empire. I say that the sun

is always shining on UCLA Engineering, through its exceptional alumni living and working all over the world."

The evening's big honor was given to Katehi, Alumnus of the Year, for distinguishing herself in both academia and in integrated circuits and systems.

"Linda Katehi's work has been described as visionary, pioneering, and innovative," said Dhir in his introduction. "She is a truly extraordinary researcher and educator."

Katehi, provost and vice chancellor for academic affairs at the University of Illinois at Urbana-Champaign, thanked the school for honoring her achievements and talked of her journey to the United States to attend school early in her career.

A humble Katehi said she was simply an average student who had an extraordinary mentor during her time at UCLA. Her successes at UCLA, she said, led her on to even greater things.

Dwight Streit, vice president of electronics technology at Northrup Grumman and Ronald Sugar, chairman and chief executive officer of Northrup Grumman took the stage together to present the 2006 Northrup Grumman Excellence in Teaching Award to computer science assistant professor John Cho and civil and environmental engineering assistant professor Steven Margulis. The award honors junior faculty who demonstrate a commitment to high teaching standards, reflected in the positive course evaluation scores from students, as well as the professor's contributions to the curriculum.

Electrical engineering professor Behzad Razavi received the 2006 Lockheed

Martin Excellence in Teaching Award from Lockheed's Aeronautical Engineering Director Larry Pellett. The award was given to Razavi for dedication to his students; a vigorous commitment to high academic standards; and his many contributions to electrical engineering education.

James Plummer (BS '66), dean of the Stanford School of Engineering, received the Alumni Achievement in Academia Award from Associate Dean Steve Jacobsen for his many contributions to engineering education. Plummer was honored for his major contributions to the field of silicon devices and technology, including the integration of CMOS logic and high voltage lateral DMOS devices on a single chip, the development of silicon process modeling standards, and designing nanoscale silicon devices for logic and memory.

Associate Dean Greg Pottie introduced the Lifetime Contribution Award, which he presented to computer science Professor Emeritus Gerald Estrin. Dean Boelter recruited Estrin in 1956 to develop a computer engineering research program. Estrin was honored for leading substantial research activities in computer architectures, parallel processing, computer instrumentation and computer networks, and importantly, for laying the groundwork for the development of what is now the department of Computer Science.

Last year's winner of the 2005 Professional Achievement Award, Jeff Lawrence, founder, president and CEO of Clivia Systems (BS '79), this year presented the 2006 award to the founders of Blizzard Entertainment: Allen Adham (BS'90), Michael Morhaime (BS '90), and Frank Pearce (BS '90). The three were honored for

founding Blizzard Entertainment (originally Silicon & Synapse) in 1991, just a year after they received their bachelor degrees from UCLA Engineering. The company has since become one of the most successful game development studios in the world.

Asad Madni, president of the Engineering Alumni Association, presented the Distinguished Young Alumnus Award to Ani Garabedian (BS '99) with a heartfelt introduction. He cited Garabedian's exceptional technical skills, as well as an extraordinary drive to give back to UCLA. She currently serves as chair of the UCLA Society of Women Engineers Alumnae Advisory Committee, a member of the electrical engineering alumni advisory board, and is active in the UCLA Alumni Association.

Friend of the school Edward K. Rice himself presented this year's Edward K. Rice Outstanding Student honors, which recognize excellence both in and outside the classroom: 2006 Outstanding Undergraduate Student, Baley Akemi

Fong, 2006 Outstanding Master's student, Christine Lee, and 2006 Outstanding Doctoral Student, Alireza Mehrnia.

The evening also included a video showcasing innovative faculty research and new developments over the past year, featuring mechanical and aerospace engineering professor Greg Carman and his work with thin film nitinol heart valves for children, research on beach sand bacteria conducted by civil and environmental engineering professor Jennifer Jay, and electrical engineering professor Abeer Alwan's efforts to develop a computer speech program for kids whose native language is not English.

The film shared innovative new work by computer science professor Majid Sarrafzadeh on computerized medical treatment devices, and focused on two new interdisciplinary research centers headquartered at the School, the Western Institute of Nanoelectronics and the NIH Nanomedicine Center for Cell Control.



Update

Construction

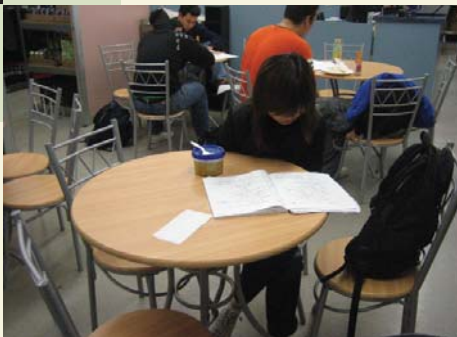
This year has been one of unprecedented momentum for the UCLA Henry Samueli School of Engineering and Applied Science, which expects to complete a new \$56 million engineering building to expand its research and administrative space. The new 60,000 square foot structure, located on Portola Way, will boast five floors of cutting-edge laboratories, seminar rooms, and a number of unique common spaces.

Engineering Senior Gift



The UCLA Engineering Class of 2006 raised \$4,600 to spend on their class gift – new upgrades to the SEAS Café. Located across from the Hollander Student Lounge on the fifth floor of Boelter Hall, SEAS Café, with a variety of low cost take away meals, snacks and drinks, is a favorite place for many Engineering students.

Using the gifts they received, the UCLA Engineering Class of 2006 put a fresh coat of paint on the walls and purchased new, more functional furniture, making the Café an even more desirable place to stop and have a quick bite or cup of coffee. The students, faculty and staff of the UCLA Henry Samueli School of Engineering and Applied Science will benefit from these upgrades for years to come.



Be on the look out for the Engineering Class of 2007 gift – a digital information kiosk for the fifth floor entrance to Boelter Hall!

If you'd like more information about the 2007 Engineering Senior Gift, or if you'd like to make a contribution, please call Grace Coopman, director of Alumni Relations, at (310) 794-5442.

Engineering Earthquake Safety for Hospitals

By Mike Gaetani, with Melissa Abraham



Wallace's team performs a test of both horizontal and vertical loads on a reinforced concrete wall panel.

Though California's hospitals may provide cutting-edge medical care to patients, many of California's hospital buildings are themselves ailing.

A large number of hospitals throughout the state were constructed prior to 1973, the watershed year in which significant new building code provisions were introduced based on lessons learned from the 1971 San Fernando earthquake. Preliminary screenings performed by structural engineers of older California hospitals exposed approximately 1,000 acute care facilities that do not currently meet life-safety protection expectations.

In an effort to develop and implement innovative engineering approaches to the seismic rehabilitation of hospitals, civil and environmental engineering professor John Wallace and his research group are working closely with KPFF Consulting Engineers, hospital owners and the California Office of Statewide Health Planning and Development to

integrate their research into a viable strategy for reducing both the costs and the uncertainty associated with predicting how these aging buildings will react in an earthquake.

Assessments of the expected behavior of these buildings, as well as recommended approaches for upgrading them to meet either minimum or strict performance targets typically are conducted using guidelines established in FEMA reports. The information, however, is based mainly on research conducted prior to 1995, and proves limited in scope due to a lack of available information regarding the expected load versus deformation behavior of typical structural building components — beams, columns, walls, floors, and foundations. And full-scale application of the guidelines tends to produce costly, disruptive rehabilitations that require staged construction over a long period of time.

Wallace's project team aims to make the process less cumbersome by coupling sophisticated computer modeling with

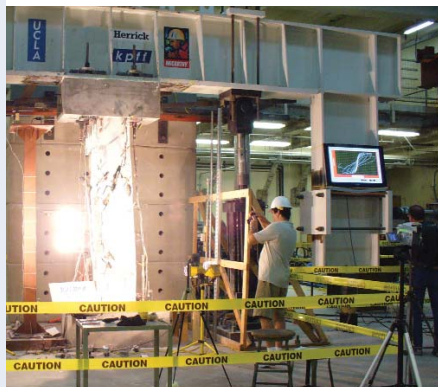
results obtained from building-specific test programs conducted in the UCLA Structural/Earthquake Engineering Research Laboratory, located in the basement of UCLA Engineering's Boelter Hall.

The laboratory, constructed in 2004, includes a 40-foot by 60-foot strong floor, five feet thick, and large reaction blocks with equipment for simulating earthquake loading on components. During the tests, forces, displacements, and strains are measured to capture the response of the component (e.g., column, beam-to-column connection) to a full range of simulated earthquake actions, from low-level shaking all the way up to the "Big One" and beyond.

The simulations are performed by large-capacity hydraulic actuators that push and pull the test specimen back and forth to produce forces and deformations that would be expected during an actual earthquake. The data then are translated into physical relationships that researchers use for computer modeling of the entire building. The models offer the project team yet further insight and a wide range of options to study as they prepare to develop the final design.

Though California's hospitals may provide cutting-edge medical care to patients, many of California's hospital buildings are themselves ailing.

To date, the project team, which includes former PhD students Dr. Kutay Orakcal, Dr. Leonardo Massone, and current MS student Sarah Taylor Lange, and engineers at the Los Angeles and Irvine offices of KPFF Consulting Engineers – including John Gavan (MS 1991), Aaron Reynolds MS (1994), Ayse Kulahci (MS 1999), Peter Sarkis (MS 1997), and Mostafa Sobaih, has completed four test programs, two on reinforced concrete wall segments, one on columns, and one on beam-to-column connections for three different hospital structures in southern California. Several more testing programs are in the planning stages.



Testing a concrete wall panel.

Test results so far have confirmed that intrusive, costly rehabilitation measures produced with existing FEMA guidelines are not always required, and have led to the formulation of more economical seismic rehabilitation strategies.

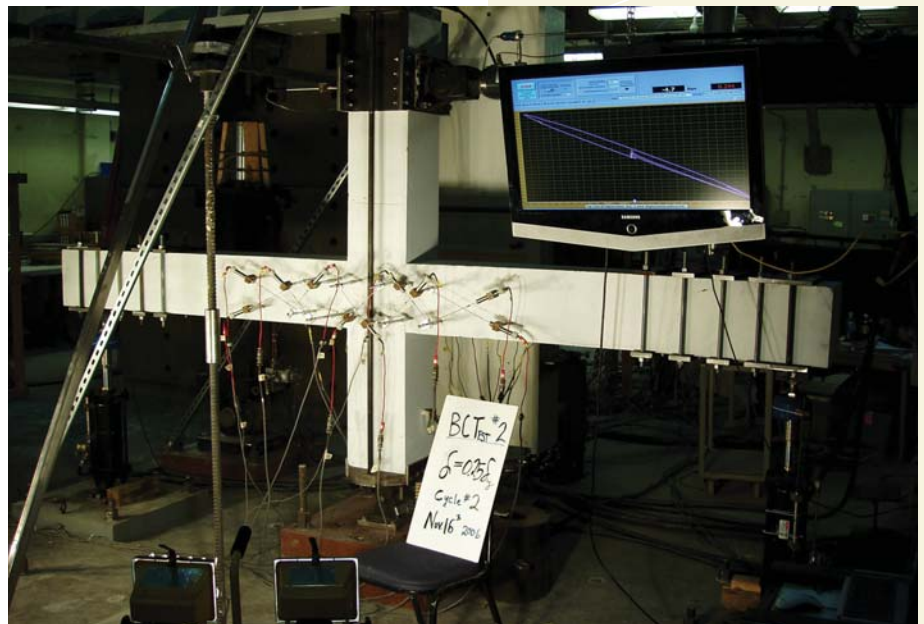
Costs typically can be lowered by using fewer materials at fewer locations (less disruptive) throughout the building and, more specifically, reducing foundation work in the face of high costs associated with digging under a structure to add new foundations.

In the case of one hospital building, the new rehabilitation approach eliminated the need to cut back an adjacent building by two feet over several floors; the conventional approach would have entailed making space for new perimeter concrete walls.

Preliminary screenings
performed by structural engineers
of older California hospitals
exposed approximately 1,000
acute care facilities that do not
currently meet life-safety
protection expectations.

Though the cost of each test program usually runs between \$100,000 and \$200,000 and the added costs associated with the state-of-the-art computer modeling can reach \$0.5 to \$1.0 million per building, these costs are minimal compared with the tens of millions of dollars in estimated savings that already have been realized by one of the participating hospitals.

The group already is working on additional test programs and detailed computer modeling studies.



Wallace's project aims to make seismic testing easier by coupling sophisticated computer modeling with results obtained from building-specific test programs.



Rajeev Madhavan, CEO,
Magma Design Automation

Why does Magma Design Automation choose to recruit engineering graduates from UCLA?

Magma is one of the fastest growing public companies in the electronic design automation (EDA) field. UCLA has one of the best EDA research programs worldwide, led by computer science professors Jason Cong and Majid Sarrafzadeh. Several other faculty members, such as computer science professor Miodrag Potkonjak and electrical engineering professor Lei He are also very active in the field. So, it is very natural that Magma comes to UCLA Engineering to recruit talent.



What do you see as the strengths of UCLA's graduates in engineering and computer science?

UCLA graduates have a broad education in electronic design automation (EDA), and are also very strong in algorithm design and optimization, which is very important in developing high-quality EDA tools. To give you some examples, we have someone from UCLA with a PhD in field programmable gate array (FPGA) logic synthesis. An FPGA logic synthesis is a semiconductor device containing programmable logic components and programmable interconnects. Now she is leading a large-scale effort in design for manufacturing. Also, we recently hired someone from UCLA with a PhD in global placement. But now he is making good contributions to detailed routing. It shows how versatile and adaptive UCLA Engineering graduates are inside of Magma.

How do employees who are UCLA alumni compare to your other employees?

UCLA graduates are certainly among the best.

Are any UCLA engineering graduates in key leadership positions at Magma? If so, what qualities do they share that make them suited for such roles?

We have had several UCLA graduates at VP level or director level leadership positions in research and development. They established themselves as excellent individual contributors, and easily won the respect from the team as qualified leaders.

How many graduates from UCLA Engineering currently work at Magma?

I don't have the exact numbers, but I think it is well over 10 PhDs and possibly some MS graduates as well. We are very impressed by the team.

What types of positions have these graduates been hired to fill?

We usually are interested in MS or PhD graduates who have EDA research experience. They typically start with research and development positions but may move up the ladder to provide technical or management leadership. This is quite likely in a company as fast-growing and dynamic as Magma.

What other aspects of Magma's relationship with UCLA are important to the company?

We are interested in building a long-term relationship with UCLA Engineering to help each other to excel. We have been a member of the UCLA Computer Science Industrial Affiliate Program for over three years now, and we have funded research programs in the computer science department led by Professor Cong on a number of innovative EDA research topics. We also have contributed Magma design automation tools for research at UCLA and I am glad to see that they are being well utilized.

DracUCLA Possesses UCLA Students

UCLA Engineering Student Team Competes at RoboGames

By Marianne So, American Society of Mechanical Engineers, Senior Advisor

Break time!” bellows Anatoly, in UCLA’s Machine Shop. It’s at that moment when your heart stops and your breath catches in your throat. You sigh heavily as you slow down the mill, walk into the fresh air, and grab a soda with the team and you realize DracUCLA has you tightly gripped under its spell, but you love what you are doing.

Last year, the UCLA chapter of the American Society of Mechanical Engineers teamed up with UCLA Robotics to create a 120-pound combat robot for the 2006 International RoboGames. Our entry, DracUCLA, battled three other robots, including the eventual winner in its class.

For the team’s first year back at the competition, our goal was to enter competition with a fighting chance. “We won one, lost two, battled against the first place winner, Stevie, and otherwise destroyed the Destroyer before being eliminated!” lauds Anna Davitian.

One eye gleams as DracUCLA whirs to life and a steel cylinder spins up to 60 mph. The teeth welded to the formidable drum are intended to catch onto any opponent, stopping the drum in mid-spin and throwing all of the kinetic energy into destroying our competitor.

“We learned a lot from competing with this robot,” says UCLA Battlebots project leader Jeff O’Donohue. “I think that with the brilliant minds that we have working on improving this robot and building another, there is no reason we shouldn’t be a favorite to win every competition we attend.”

What possesses us to create these types of machines?



ASME students work on their combat robot.

“Building is soothing,” explains O’Donohue, “I’ll design, run into one problem, solve it and I’m on top of the world, then hit a huge roadblock and it’s all I can obsess about, and then I solve it! That’s what possesses me!”

“It’s like having children,” philosophizes David Meisenholder, “every species wants to procreate.”

“It’s learning,” reflects Ryan Fix, “and the challenge of doing something you haven’t done before.”

“It’s the people,” states Rob Glidden, “and making something tangible.”

“It’s practice for the apocalypse. When it comes you’ll want me around; I’ll know what to do,” jokes Steven Snyder.

I think it’s finding out what effect our actions have on the world around us. DracUCLA is our outlet to see where we can make a mark in the world; even

during construction we alter a part and look for the response.

We work from concepts to design to hardware: that’s what all of our careers will entail. The machining experience drives our theory into practice and provides a gauge for what can be done. The team spirit teaches us communication, and the budget holds us accountable – a bad product is embarrassing.

Our creation generates the same questions as any other engineering project, from building bridges to the space shuttle: What is its actual performance? What are the problems? Are we ready yet? As we work on design and construction, we don’t know for certain but we apply our theories to get closer to a definite answer, and finally we make a team decision to take the remaining, minimal risk, and launch.

Engineering Graduate Students Cultivating Entrepreneurial Talent at UCLA

By Marlys Amundson



A recent EGSA event held at the Engineering IV building patio.

The UCLA Engineering Graduate Student Association (EGSA) offers a range of social activities for its members, and also is expanding its programs to better serve students interested in starting their own company or broadening their network of contacts.

Explained Patrick Sislian, vice president internal of EGSA, “We have purely social activities, like bowling or paint ball, designed to get graduate students out of the labs and meet their peers, but we also have held seminars with the Tech Coast Angels to cultivate a culture of entrepreneurship and socials with other graduate students on campus to broaden our students’ networks.”

The Tech Coast Angels are among the largest angel networks in the U.S. and a primary source of startup funding in Southern California.

During winter quarter, EGSA plans to host socials with representatives from Qualcomm (on February 7) and Microsoft (on March 7). Both events

will be held on the Engineering IV patio from 5:00 pm to 7:00 pm. More than 500 graduate students attended the social held in October 2006.

The EGSA arranged for engineering graduate students to sit in on screening sessions with the Tech Coast Angels (TCA) last year, and have expanded that program this year. The seminar series held in fall quarter offered interested students a broad overview of angel and venture capital funding, as well as detailed information on pursuing venture funding, effective ways to pitch, and tips for successful business plans.

“We know not everyone in EGSA is interested in entrepreneurship programs,” noted Sislian. “So our plan, which is still in the very early stages, is to spin-off that aspect into a sub-organization that would work with faculty, UCLA’s Office of Intellectual Property Administration, and others to increase the start-up rate at UCLA,” said Sislian.

“Through all of our activities, especially our socials, we want to help UCLA

engineering students get to know as many people as possible, and to help them increase their networks. Last quarter we invited students from Public Health to attend one of our socials, and plan to invite Anderson students this year,” added Sislian.

The TCA seminar series and other entrepreneurship programs are hosted in conjunction with UCLA Anderson Entrepreneur Association and the UCLA Society of Post Doctoral Scholars.

For additional information on EGSA activities, please visit
<http://www.egsa.seas.ucla.edu>

New Endowments to Benefit Students

By Kristi Kraemer-Batacan

Undergraduate students in the UCLA Henry Samueli School of Engineering and Applied Science not only excel in the classroom, but are making important contributions in the laboratory and through extracurricular activities, as well.

Thanks to the generosity of alumni, parents, and families, our students will be able to spend more time on engineering projects, and less time worrying about paying their UCLA fees.

The Jonathan David Wolfe Memorial Endowed Undergraduate Scholarship in Mechanical and Aerospace Engineering established by the Wolfe family honors Jonathan Wolfe, a three-time mechanical and aerospace engineering alumnus (BS '94, MS '94, PhD '01).

"His life was closely intertwined with UCLA – he was a part of the School for nearly half of his life," recalled his mother, Elaine Wolfe. "After he graduated, he worked in Professor Jason Speyer's lab as a researcher. He loved UCLA – and he really loved learning new things. We hope the scholarship will help students to pursue their dreams and continue despite any financial difficulty."

The Wolfe scholarship will support junior or senior-level undergraduate students majoring in aerospace engineering with a minimum GPA of at least 3.5.

"During his treatment for cancer, working in the School gave him a sense of normalcy and we were grateful to the department for keeping him busy," said father Kenneth Wolfe. "Establishing the scholarship in his memory is a way for us to give back."

Dr. Adrienne Lavine, chair of the Mechanical and Aerospace Engineering Department explained, "Jonathan's close



Jonathan David Wolfe

connection to our department makes this gift all the more meaningful."

Established by Mark (MS '92, PhD '95) and Sharon (BA '91) Berman, The Berman Family Undergraduate Scholarship will support an electrical engineering junior with minimum 3.0 GPA.

The Berman's are both graduates and ardent supporters of UCLA. Mark felt his graduate school experience was really fantastic – the courses were challenging, the professors insightful, and classmates always provided a great environment of teamwork and competition.

After finishing his degree, Mark was able to use the knowledge and experience in subsequent work as a chip designer at Broadcom Corporation. The value of the education and contacts of their UCLA experience has motivated them to make this contribution to UCLA Engineering.

When asked what difference he hopes the establishment of The Berman Family Undergraduate Scholarship will make, Berman said, "The scholarship that we are endowing at the UCLA Engineering school will hopefully motivate some future applicants to attend UCLA when they might otherwise not have the means to do so. We hope that the larger the base of available

scholarship funds, the more exceptional students will be able to attend UCLA, which in turn will increase the quality of the educational experience. Engineering scholarships are not so different from Athletic scholarships: they both serve to allow the school to open its doors to more well-qualified students, who turn around and reward the school with higher achievements. This is a spiral that is worth investing in."

Lloyd Polentz (MS '57) made his scholarship gift to UCLA Engineering to the school's first dean, Llewellyn M.K. Boelter. "He helped me obtain my BS degree (at UC Berkeley) and also my MS degree (here at UCLA Engineering). Without his encouragement and support I doubt that I'd have obtained either." Lloyd admired Boelter's philosophy that mechanical engineering is really an application of the fundamental principles, as opposed to the "handbook engineering" practiced by so many graduate engineers. He recalls having his thesis proposal rejected by one professor who told him it was a bad topic because it had never been done before. This was a complete contrast to Boelter's philosophy, and made him appreciate Boelter even more.

It is Lloyd's hope that this scholarship will help some students in their efforts to graduate, and also to appreciate Boelter's philosophy.

UCLA Engineering appreciates all of the generous donors who have established new endowments to support our students as part of the Enhancing Engineering Excellence Initiative. These scholarships and fellowships enable our students to achieve their dreams.

For more information about funding a scholarship, please contact Molly Ann Mroczynski at (310) 206-0681 or mollyann@support.ucla.edu.

Making a Difference in Darfur

UCLA Engineering Alumnus Manages International Cook Stove Project

By Marlys Amundson



Brian Y. Tachibana (BS '03, mechanical engineering) has spent nearly three months in Khartoum, Sudan's capital, helping to develop fuel-efficient cooking stoves for the internally displaced people living in the refugee camps. As project engineer for an international volunteer collaborative effort, Tachibana is responsible for on-site production of the cook stoves.

"I feel very fortunate that I have the freedom, both financially and personally, to participate in a project like this, an extremely worthwhile cause," he said. "My first responsibility was to oversee the manufacturing and distribution of 50 metal cook stoves, which are currently being used and evaluated by some of the displaced people."

The Darfur conflict, an ongoing armed conflict in the Darfur region of western Sudan, has led to the deaths of more than 400,000 people, and more than 2.2 million people have been forced from their homes and now live in refugee camps.

These camps, scattered across Darfur, are in areas that have limited wood available for fuel. This shortage requires women and children in the camps to go farther and farther from camp to find wood for cooking, putting them at increased danger of attack.

Nearly all of the Darfur refugees cook on three-stone fires, which require twice

as much firewood as the new metal stoves, according to the Lawrence Berkeley National Lab researchers. The more efficient metal stoves, which use the same fuel, pots, and cooking methods used by those in the camps, would reduce the amount of fuel needed, and also help ensure that refugee families would have less need to trade or sell limited food rations to purchase wood for fuel.

Feedback from those using the stoves in the camps will allow the team to address any technical or usability issues before moving forward with production of 5,000 stoves early next year.

"I live and work in CHF International's compound, so my work day tends to run from when I wake up to when I go to sleep," explained Tachibana. "When I first arrived, my days were almost completely filled with hunting down materials and information, identifying appropriate workshops, coordinating manufacturing activities, etc. Evenings were spent processing the information, exchanging details with the team, and planning for the next day."

Following distribution of the first 50 stoves in the camps, Tachibana's focus has shifted to working on program details and managing the team's activities in Darfur.

"In the U.S. you can usually answer a question by hopping on Google, shooting off an e-mail, or placing a phone call," Tachibana said. "Khartoum is still a place where good, old-fashioned legwork reigns supreme. Persistence is also important. On more than one occasion I've been told that certain things can't be done or certain things aren't available just to realize I was asking the wrong person or the wrong question."

Ken P. Chow, engineering project manager for Engineers Without Borders - San Francisco Professionals, noted,

"Brian's been doing a super job for the project. Everyone from our project leader - Ashok Gadgil - to the CHF-Sudan country director has been very impressed with him. The progress of the project has been exceptional once he arrived in Sudan."

Although the project takes most of Tachibana's time, he has found time for fun, as well. "NGO employees seem to be a pretty hard working bunch, but I have found myself involved in some unexpected leisure activities, including Salsa lessons from a Sudanese instructor who lived in Cuba, happy hours at the U.S. Embassy's Recreational Facility, and 'lawn' tennis on dirt courts."

UC Berkeley Professor Ashok Gadgil and Christina Galitsky, a principal research associate at Lawrence Berkeley National Lab, were the driving forces behind the project. The cook stove's design was further improved in a class taught by Gadgil, one similar to UCLA's mechanical project design course (162B). Engineers Without Borders - San Francisco later reworked the design for manufacturability in Sudan.

"This project fits into my vision for my engineering career," reflected Tachibana. "As much as I can control it, I'd like to continue working on projects that I have a personal connection to or that I feel are helping the world. I've noticed that I tend to draw the deepest satisfaction from situations like that."

The Darfur cook stoves project is sponsored by CHF International (<http://www.chfhq.org/>). Lawrence Berkeley National Lab and Engineers Without Borders-San Francisco Professionals are providing engineering and fundraising support in the States.

For more about the stoves and the project, please visit
<http://darfurstoves.lbl.gov/>.

UCLA Engineering Family: A Very Special Legacy

By Kristi Kraemer-Batacan



Caitlin Gomez '06

Family Legacy is a term that is often used on college campuses to describe generation after generation of alumni from the same family. It is not a term often heard here at UCLA, because family status is not a criteria used in the admissions process. This makes the notion of family legacy at UCLA Engineering an even more rare, and special, occurrence.

Earl Butcher '52 was one of the first to graduate with a BS in Engineering from UCLA. When graduating high school in 1947, UCLA was appealing because it was close to home, it was affordable, and a close friend was going to attend. Not knowing what to study, he asked his teachers who recommended engineering since it combined his aptitude for science and math. He studied civil and mechanical engineering at UCLA.

Soon after graduation, he met his wife-to-be, Beverly, a student nurse at L.A. County General Hospital. Little did they know when an engineer friend of Earl from UCLA fixed up a blind date, they would marry, start a family, and a tradition at UCLA Engineering. Beverly later studied at UCLA and

obtained her teaching credential. They had three daughters and eventually grandchildren, including Ryan Bennett '04.

Shortly after graduation and marriage, Earl joined the Navy as an officer in the Civil Engineer Corps. He went on to work as an industrial engineer in private industry and aerospace. He finished his career as an engineering manager in the US Postal Service.

He does not feel anything he did influenced Ryan to apply to UCLA Engineering or even be an engineer. Ryan tells a different story.

When Ryan applied to colleges, he realized that it's difficult to know a lot about a place until you get there. While Earl was never overtly pushing UCLA, Ryan had a great deal of respect for his grandfather, and knew he spoke highly of his time at UCLA Engineering. This quickly moved UCLA Engineering to the top of his short list of possible schools. When he received his admissions letter, he felt proud he could carry on the tradition of his grandfather.

Ryan now works as an engineer for Verizon, and was recently promoted to a management position in the network engineering group. He feels his UCLA Engineering education helped him get there. He and his wife just welcomed their first daughter into the world, and Ryan thinks it would be nice if she, or anyone in his family, continued the UCLA Engineering tradition started by him and his grandfather.

Dave Gomez '78, MS '82 is proud to have attended UCLA Engineering for both his undergraduate and graduate degrees. A true UCLA couple – his wife Ruth received her doctorate degree in Public Health from UCLA – Dave and Ruth tried hard not to influence their daughter, Caitlin's, college decision.

Dave didn't even try and influence her choice of major, allowing Caitlin to explore many different interests just as he had explored his many interests outside engineering, including alpaca farming and running a private vineyard. In fact, Caitlin thought she was so "bored" with what her dad did at ATK Missile Systems, she had no intention of ever becoming an engineer.

As Caitlin Gomez '06 approached the end of high school and started thinking about what she wanted to do with her life, she realized she had a real passion for working on the space station. This realization steered her in the direction of UCLA Engineering. It was one of her top two schools, along with Cal Tech, and when she got into both schools she knew she had a decision to make. After visiting UCLA and Cal Tech, she felt UCLA's more social atmosphere was a better fit for her personality, and UCLA honored her achievements by offering her a Regents Scholarship. Much to the delight of her parents, she accepted the offer of admissions from UCLA Engineering.

She started her studies as an Aerospace Engineering major, but part way through, she realized that what her dad did was actually interesting. She switched to Electrical Engineering, her dad's major. Caitlin and Dave both tell stories of how nice it was as she neared the end of her undergraduate career, that they were able to discuss concepts and share ideas that related to engineering. Caitlin likes that she knows what her dad is talking about now!

UCLA Engineering is proud to celebrate Earl Butcher '52 and Ryan Bennett '04 and Dave '78, MS '82, and Caitlin Gomez '06, along with all the other families of Bruin Engineers!

1950s

Arnold Reisman BA '55 MS '57, PhD '63 has recently published a book, *Turkey's Modernization: Refugees from Nazism and Atatürk's Vision*. He also authored the article "Harvard: Albert Einstein's Disappointment" for the *History News Network* in January.

1960s

John Cosgrove ME '67 coauthored "Should experts also be private investigators?" in the September 22, 2006 issue of *The Forensic Examiner*.

1970s

Vinton G. Cerf MS '70, PhD '72 spoke at Educause 2006 in October on "Uncovering the Science in Computer Science: Challenges for the 21st Century."

Simon S. Lam MS '70, PhD '74, has been inducted into the National Academy of Engineering for contributions to computer network protocols and network security services.

Richard Little BS '70 has joined NWP Services Corporation as vice president and chief financial officer.

Michael Schradle MS '70 has been appointed chief financial officer of Photon Dynamics in San Jose.

Akhil Tripathi MS '70 is senior vice president and chief information officer of Harleysville Insurance in Harleysville, Penn.

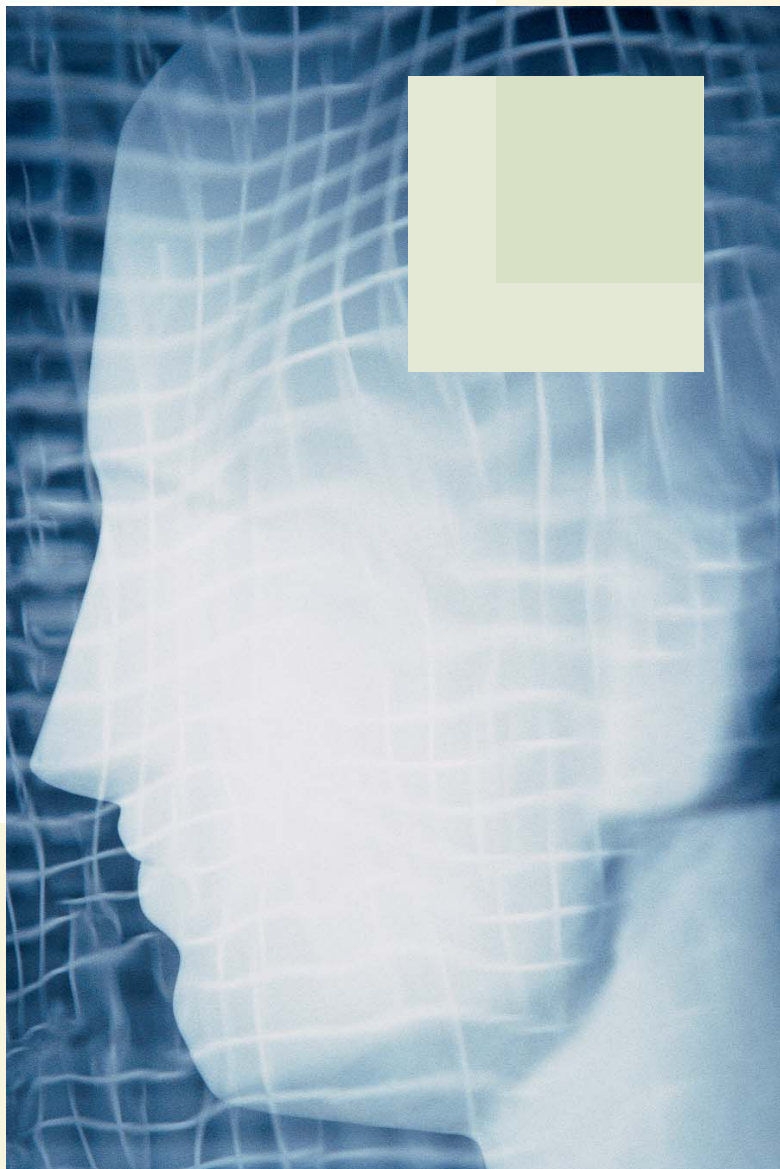
William R. Goodin MS '71, PhD '75, ME '82 has been inaugurated as an Eminent Engineer of Tau Beta Pi, the engineering honor society.

Rafael de Ory Cristelly MS '73 has been named vice president of International Business for Colubris Networks.

Alan Chow MS '76 has been appointed to the newly created position of chief technology officer at NCR Corporation.

Neil A. Shaw BS '77, MS '77 has been honored by the Institute of Electrical and Electronic Engineers (IEEE) by elevation to IEEE Senior Member grade. Mr. Shaw is a principal with Menlo Scientific Acoustics, Inc., an acoustic and presentation system design firm in Topanga, Calif.

Wayne G. Leiss MS '79 has been selected as chief information officer for the U.S. Department of the Treasury's Office of Thrift Supervision.



1980s

Steve Bowie BS '81 with his wife Julie just opened Metropolis Books, the first new bookstore (in eons), in Downtown Los Angeles at 440 South Main Street. www.metropolisbooksla.com

Nancy Glover BS '84 was one of the candidates for Maine House District 48 this past November.

Jane Kucera MS '84 authored "Understand reverse osmosis as a vital water treatment: normalizing plant data reveals true condition of membrane systems" in the November 1, 2006 issue of *Hydrocarbon Processing*.

John H. Scott MS '84 serves as chief of the Energy Conversion Branch at NASA's Lyndon B. Johnson Space Center. He is also an occasional speaker and published author on fuel cell technology and "The Hydrogen Economy." John, his wife Marya S. Laupa-Scott (DDS '87), daughter Emily (9), and triplets Olivia, John, and Michael (3) are all at home in Houston.

Timothy J. Frei BS '85, MS '87 has been appointed to vice president of ISR Business Development at Northrop Grumman Corporation.

Doug Walters BS '90 has accepted the appointment of senior sanitary engineer at the City of Los Angeles' Wastewater Program.

1990s

Prasad Bhaarat Ram MS '90, PhD '93 has been appointed to head engineering and site operations at Google Inc.'s R&D centre in Bangalore, India.

Augusto Sasso BS '94 is the owner of Cynergy Cycles in Santa Monica, Calif. which was awarded the BRAINy award, "Best New Shop," and recognized as one of the Top 100 retailers by *Bicycle Retailer and Industry News* at the Bicycle Leadership Conference in San Diego in February.

A. Marm Kilpatrick BS '95 had his paper, "Predicting the global spread of H5N1 avian influenza," published in the December 19, 2006 issue of *PNAS*. Because of his findings, he was interviewed on NPR and ABC News, and was featured in a *New York Times* article, "Scientists Criticize Bird Flu Search," in the December 4, 2006 issue.

Lizhi Sun MS '97, PhD '98 has been appointed as vice chair of the Civil and Environmental Engineering Department at UC Irvine.

2000s

Javier Hernandez BS '02 recently joined Bestor Engineers Inc. of Monterey as an assistant engineer.

Craig Hashi BS '03 won in the graduate category of the 2006 Collegiate Inventors Competition for a tissue-engineered vascular graft.

Dean Ho MS '03, PhD '05 is an assistant professor jointly between the Departments of Biomedical and Mechanical Engineering at Northwestern University.

Share your personal and professional milestones with classmates and friends!

Send us your news by e-mail (gcoopman@support.ucla.edu) or online at <http://www.engineer.ucla.edu/alumni/alumnews.html>.

Boelter Society

We are pleased to honor the alumni, friends, parents, students, and corporate and foundation partners whose generosity is helping ensure the School's continued excellence for many years to come.

This Honor Roll gratefully acknowledges gifts made to the UCLA Henry Samueli School of Engineering and Applied Science from July 1, 2005 to June 30, 2006.

Limitations of space allow us to acknowledge only those individuals who made unrestricted gifts to the School of \$100 or more, but we would like to thank all of our donors for their commitment to the School and its programs.

We made every effort to ensure the completeness and accuracy of this Honor Roll. If you discover an error or omission, please call our office at (310) 206-0678 to report the correction.

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Dr. Charles P. Reames '80, '82, '85 and
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“Attending UCLA and majoring in computer science is the reason I’m at Microsoft today. UCLA Engineering did more than teach me the technical skills I use every day; it allowed me to interact with my generation’s leaders. Through the engineering student groups, I was able to connect with other people who are passionate about technology. It’s the least I can do to give back to the environment that got me where I am today.”

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*"I give to UCLA Engineering
 because there is a need, and
 I enjoy serving in ways I can.
 Both as a school and a community,
 UCLA Engineering has given
 me so many experiences and
 friendships, and this is my way
 to say thank you."*

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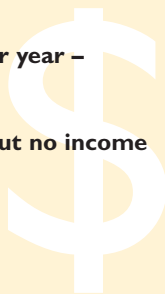
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Between now and the end of 2007, individuals who are 70 years of age and older who have either a traditional IRA or Roth IRA will be able to contribute at least part of their IRA to charity without paying the income tax.

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WHAT STEPS NEED TO BE TAKEN?

You must notify the institution where the IRA is managed and administered well before the December 31 deadline.

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For more information about ways to take advantage of new giving opportunities, please call the UCLA Office of Gift Planning at (800) 737-UCLA.

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