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USC Engineer

A Journal for Alumni & Friends

Bold Biomedical Endeavors: The New ERC

NSF Awards Another Engineering Research Center

Spanish 101

Engineering Students Explore Europe

Aggressive Recruiting:

26 New Faces Among the Faculty

Cultivating the Future

Mary & Mark Stevens

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Fall/Winter 2003

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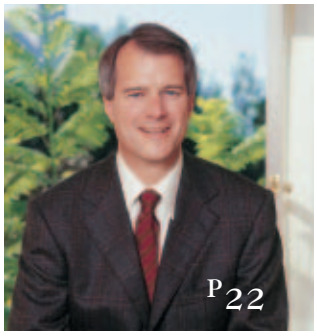

departments

Engineering students are in danger of spending so much time solving problems in class and fulfilling mandatory requirements that they can miss learning about the real joys that an engineering career offers. The American Institute of Aeronautics and Astronautics contest shows them a side of engineering that closely resembles what real working engineers do.

Cover and Stevens photos by Michelle A. H. Smith, new faculty photo by Max S. Gerber

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Sunny Days

These are sunny days for the USC School of Engineering.

Our School has just received its second National Science Foundation Engineering Research Center (ERC), making us only the fourth engineering school to have two active concurrent ERCs, and the only California school ever to be awarded two of these prestigious centers.

During the past two years, at a time when many other institutions were downsizing or in a holding pattern, we have recruited 26 new tenure-track faculty. We placed a special emphasis on women and minority candidates making 15 offers, five of which were accepted.

Last fall's undergraduate freshman class was the brightest in the history of our School, and the quality of this fall's freshman is just as high. And of course, *U.S. News & World Report* has ranked our graduate engineering program solidly in the nation's top 10 at number 8.

The most gratifying aspect of this success is that so many people share in it. That only makes it sweeter.

Securing the new ERC was a huge joint effort between our School and the Keck School of Medicine. This accomplishment was the result of close collaboration between myself and Keck's dean, Stephen J. Ryan. The new director of the BioMimetic MicroElectronics Systems (BMES) ERC is Mark Humayun, who is both a professor of ophthalmology at Keck, and a professor of biomedical engineering in our School. The deputy director is Gerald Loeb, a professor of biomedical engineering.

Designing and building implantable microelectronic devices is as much a medical as an engineering challenge, requiring creativity from both physicians and engineers.

Engineers from Caltech and UC-Santa Cruz are also important participants in the BMES. Our faculty is one of the finest in the world, but that doesn't mean they are the best in every single area of engineering. We don't hesitate to work with others.

More and more, research has become a collaborative endeavor. Working together, researchers make more impressive leaps than any of them could accomplish alone. Often the advances are in new territory and are not part of any traditional discipline. Encouraging interdisciplinary research is nothing new. However, it is a reflection of Engineering's and USC's interdisciplinary successes that NSF chose us for this new and highly interdisciplinary ERC.

Recruiting new faculty for today's collaborative research environment is itself an exercise in partnership. I worked together with Joseph Aoun, dean of the College of Letters, Arts and Sciences, to bring one of the world's premier supercomputing research groups to USC. Rajiv Kalia, Aichiro Nakano and Priya Vashista. The principals of that group, all have joint faculty appointments in the College and our School. I doubt that either Joseph or I could have accomplished this alone. I doubt that our School would have 26 new faculty without the commitment of our current faculty in identifying candidates and helping persuade them to come here.

We are in the process of transforming our undergraduate curriculum to prepare young engineers for the newly collaborative engineering world. We are making it easier for undergraduates to have minors or another major outside of engineering.

I believe our School is poised to make the jump into the nation's elite engineering schools. About the time you receive this magazine, I will be announcing a new seven-year fundraising initiative to secure the resources we will need to succeed. Because of our recent successes, our fundraising goals will be very ambitious.

Mark Stevens (BSEE '81, BAECON '81, MSCENG '84) and Daniel Epstein (BSISE '62), two USC trustees and members of our Board of Councilors have agreed to chair this effort, and it will take all of us working together to succeed. Our entire Board of Councilors, our faculty and our staff will be involved. We want all of you — friends, alumni and industry partners — to be involved too.

When we raise these resources, and when the USC School of Engineering joins that elite group of the very best engineering schools, the success will belong to all of us.

If we work together, I am confident that we will succeed.

C. L. Max Nikias
Dean
School of Engineering

Nikias photo by Max S. Gerber

EDITOR'S NOTE

The dictionary defines the word "destination" as: *the place to which one is going or directed; or the ultimate purpose for which something is created or intended.*

On November 21st, the School of Engineering will launch a new fundraising initiative. The initiative has been themed "Destination: The Future". A metaphor of travel is used to imply a sense of the School's movement and forward direction.

The dictionary defines the act of "traveling" as: *to go from one place to another; or to advance or proceed.*

A "journey" metaphor is frequently used when describing a goal-oriented mission. The new fundraising initiative will be a unique journey with a very specific end in mind. A specific destination. As the definition states, it will help to move the School of Engineering *"from one place to another".*

The School is already moving, advancing, and proceeding. With every story and profile in this magazine, the forward momentum is clear. That the School of Engineering is shaping, cultivating and manufacturing the future is undeniable.

All good voyages depend on the right travel companions. Our alumni, friends, parents and corporate partners have always been that for us. Now more than ever before, your support and knowledge of the road will be indispensable.

The word destination comes from the word destiny. The dictionary defines "destiny" as: *a predetermined course of events considered as something beyond human power or control.* It is within our power to predict that the School of Engineering is destined for great things. However, as we set the course for this journey, we cannot control exactly what will occur along the way. The only certainty is that the future will unfold and our destination will creep ever closer. We hope as it does, you have come along with us, and helped to make the journey and the ultimate destination well worth the ride.

Annette Blain
Director, Alumni Relations

USC SCHOOL OF ENGINEERING

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Letters to the editor and comments are welcome. Please send them to: USC Engineer, Alumni Relations Office, Olin Hall 300, Los Angeles, California 90089-1454, or email them to uscengineer@usc.edu

STRAIGHT & *to the* POINT

IMSC's Fastrack is a Blockbuster (And makes them too)

A software program from the Integrated Media Systems Center (IMSC) is responsible for the magic in many of this year's movie blockbusters.

Fastrack has helped a local Academy Award-winning special effects studio drastically reduce production time for films including *"X-Men 2," "Daredevil"* and *"Dr. Seuss' 'The Cat in the Hat.'"*

"Special effects involve superimposing something synthetic onto something real," says Fastrack co-creator Ulrich Neumann, director of IMSC and a computer scientist who holds the Charles Lee Powell Chair in Engineering. "The difficult part is to get the motion exact so the objects move correctly relative to each other."

Fastrack masters just that.

The software tracks motion between each frame of film, carefully marrying "real" objects, such as an actor, with computer-generated special effects, such as a supersonic jet, a flying car or a raging river.

The tool enables effects artists to process roughly 40 percent of movie shots without having to provide extensive human input.

"This is a huge productivity leap for us," says Eugene Vendrovsky, principal graphics scientist at Los Angeles-based Rhythm & Hues, which bought the right to use the IMSC technology last year, named it Fastrack and continually modifies it for use in complex special effects scenes.

"We are almost twice as productive thanks to Fastrack," Vendrovsky says, adding that the technology "is capable of tracking hundreds of features from one frame to another in only a few seconds on a standard personal computer."

Neumann and IMSC assistant professor Suya You developed their tracking technology with cinema and training applications in mind. The researchers used a set of mathematical algorithms to determine which features in a scene provide the best frame of reference for a computer to track.

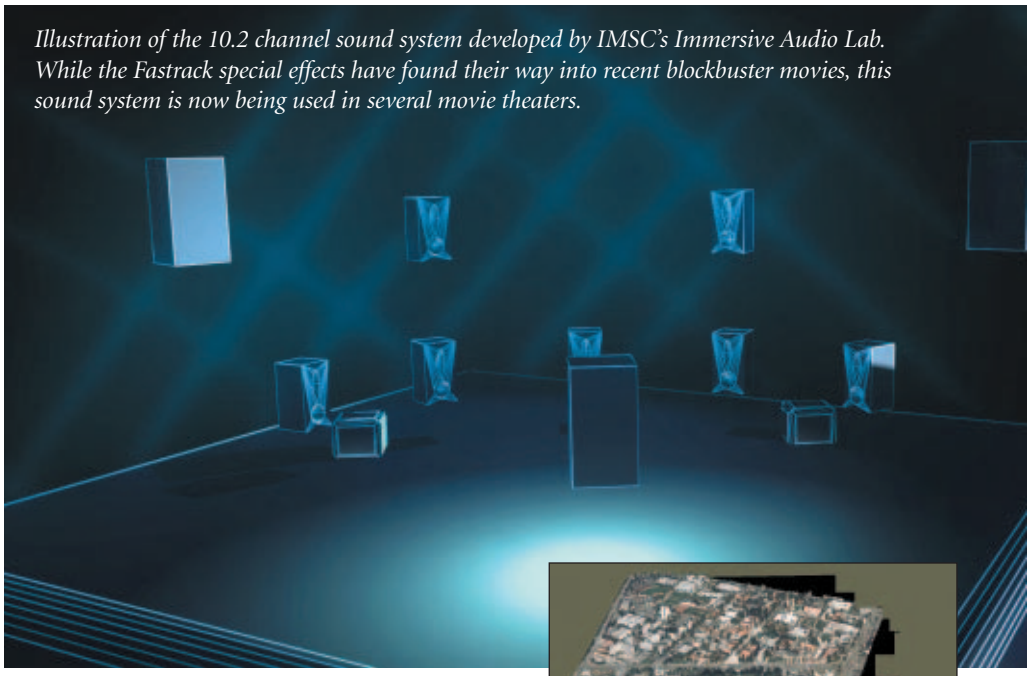
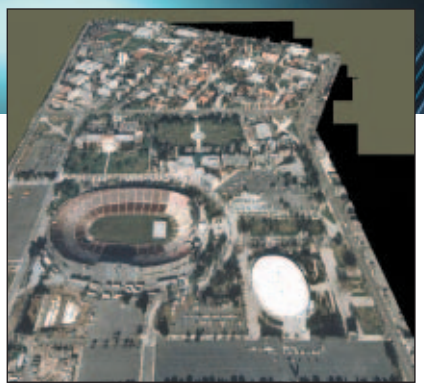


Illustration of the 10.2 channel sound system developed by IMSC's Immersive Audio Lab. While the Fastrack special effects have found their way into recent blockbuster movies, this sound system is now being used in several movie theaters.



Right: USC's University Park Campus. In order to convert the imagery into an Augmented Virtual Environment, the researchers wed the scans to ground-based, global positioning system (GPS)-correlated video of the same structures.

If the frame of reference moves, even digital processes can be difficult and time-consuming. For example, in *X-Men 2,* a camera pans around aircraft flying through numerous tornadoes, all in front of the backdrop of a sunset. The camera view of the digital tornadoes has to match exactly with the imagery of the aircraft and the pilot's motions in the filmed world.

Following the first step in any given scene — the filming of live sets and objects, such as a street with people — Fastrack goes to work, analyzing the film and tracking camera motion and staging, which saves production time early in the process.

Effects artists then create necessary digital elements, such as swirling tornadoes, animate them and add any other required special effects. In the final step, tools combine the film

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Modeling the Unthinkable

by Yigal Arens and Paul Rosenbloom

Yigal Arens and Paul Rosenbloom

Two years after 9/11, the nature of the resources available to response personnel has not changed. It could have. It should have. It still can.

While no society can afford to have a prepared, orchestrated response for every conceivable disaster, information technology now allows us to build infrastructure and develop general capabilities that will be useful in responding to any threat or catastrophe—a foundation upon which an effective response can be constructed quickly. "Preparing for the unexpected" may seem like an oxymoron, but it is both possible and prudent—indeed, necessary in an interconnected world where complexity continually introduces unexpected consequences.

Information Technology is, of course only a piece in the preparation, but it is an important one. At USC we have created a Center for Research on Unexpected Events, where we are trying to clarify what contributions IT can make, and preparing to create some of these pieces.

Our work is guided by what we learned at a conference we organized last year in New York, in which IT experts, engineers and social scientists from across the country, from universities, government, and industry gathered to consider what might contribute to improving our responses not just to terrorist attack, but also to conventional hazards like earthquakes, floods, hurricanes, or firestorms like the ones that consumed Southern California in October.

We do have something to offer, we think. Advances in information technology now make it possible to meld massive amounts of information from numerous sources, including real time sensors and previously created databases, into highly detailed and flexible models that can describe a city in real time. These "virtual cities" will give decision makers dealing with an emergency a living real-time image of a multilayered urban structure so that they can instantly see what is threatened, what resources are available, and how best to deal with the threats. They will also support the ability to run extremely flexible and powerful "'what-if"' simulations to evaluate proposed response procedures, discover potential weaknesses, and act as test beds for training.

The technology required for virtual cities would not be cheap, but it would be useful even if no emergency occurred, particularly in such areas as urban planning, policymaking, social science research, and education.

IT can also help in another virtual area—the creation of "virtual organizations". Almost by definition major unforeseen catastrophes are dealt with by teams who come together partly by chance and circumstance, often after the regular chain of command and responsible bodies have been seriously disrupted by the catastrophe itself. On 9/11, for example, the offices of one of the key area organizations charged with emergency response—the Port Authority of New York and New Jersey—were destroyed in the attack. Virtual organizations take advantage of new communication and collaboration technologies along with models of the situation and decision-making processes to facilitate such ad hoc, emergency coalitions of responders.

Even short of full-scale implementation of these ideas, development of key component technologies will be valuable in itself.

- **Encyclopedic digital collections:** Response agencies must have much better information of all kinds—and instant access to it. A first priority should be to create a digital collection of information about geography, environment, resources, establishments, buildings, computational facilities and potential response personnel, together with software systems that have the ability to search out answers to pertinent questions. The knowledge need not, and surely will not be centralized in one location. Privacy issues will arise in creation of this collection and these must be dealt with—but much useful work can be done right away without compromising privacy.
- **Rapidly deployable sensors and effectors:** From micro-sensors to earth-observing satellites, from simple actuators to autonomous robots. Instantly deployable, self-configuring versions of these must be created. Devices capable of detecting motion, heat, light/images, sound, pressure, the presence of metal, and much more, already exist. There is research on developing micro-scale "machines" and reconfigurable robots. We also need to be able to quickly deploy such sensors and effectors and to enable them to autonomously network among themselves and communicate with controllers outside the crisis zone. The units would be able to gather data and function autonomously, convey first-hand information to emergency managers who could issue additional commands remotely, facilitate search and rescue, and work in teams with human responders.
- **A pervasive, secure communications infrastructure:** Data, computers and networks must be rendered secure from eavesdropping and sabotage and made less susceptible to disruptions and loss of connectivity. A concerted effort to develop new methods to protect computer systems from intrusion and sabotage and enable recovery from such disruptions will ensure that emergency response teams can operate in safety, free from surveillance and malicious interference. New security initiatives must cover wired and wireless networking and communication, for both speech and data. New technology is needed that will allow networks to be easily and quickly deployed, enabling networks to self-configure and self-repair.
- **Self-Teaching Features:** These systems can't be accessible only to experts. Ordinary people in emergency situations have to be able to use them, and use them easily, under stress. Training in the skills necessary to use systems must be embedded in the systems themselves and provided when the need arises.

And finally while the research initiatives contemplated here might be crisis-driven, they could be brought to bear on a wide range of problems endemic to government and society in general. No one foresaw the explosion of media, art, electronic commerce and education that resulted from the creation of the communication infrastructure of the Internet. The new research, technology and infrastructure we're proposing are aimed at improving our ability to respond to unexpected disasters. But they can also help us improve the way we address everyday social and government problems.

Yigal Arens and Paul Rosenbloom are faculty of the USC School of Engineering working at the USC Information Sciences Institute. More details are available at the CRUE website, at *http://www.isi.edu/crue/*.

Simple, Elegant and Powerful…And "Made at USC"

One of the most far-reaching inventions of our age — the Internet's Domain Name System (DNS) — was born 20 years ago this past June at the School of Engineering's Information Sciences Institute (ISI).

Paul Mockapetris invented the system as part of his collaboration with Internet pioneer, the late Jon Postel. Postel asked Mockapetris to create a distributed index of the Internet, then a fledgling community of only a few thousand computers.

Mockapetris devised a system - the now ubiquitous ".com", ".edu", ".gov" structure that automatically directed name lookup requests where they were supposed to go, creating a distributed database that could be managed locally, but accessed from anywhere.

Like many an elegant tool, its simplicity was its virtue. Thanks to ISI, the Internet was able to expand without growth pains from about 1,000 sites at the birth of DNS, to an estimated four billion-plus currently.

"Once you got your organization connected to the network, you could have as many computers on it as you wanted, and you could name them yourself," Mockapetris said.

DNS is an essential component of the Internet infrastructure. All Internet users depend on DNS every time they enter an Internet address into their web browser or send an email message, because the system translates words into the numbers needed to locate Internet resources. The whole structure of the Internet and the vast volume of commerce it now carries rest on the DNS protocol developed by Mockapetris, and the architecture created by Postel.

Their design was also prescient, and perhaps a bit fortunate in its foresight. It produced a decentralized Internet, a strong factor in the Internet's ubiquity and a defining characteristic of its culture. Studies have shown that the current web, despite its decentralized and seemingly unstructured nature, has achieved a remarkable degree of order resulting from the independent linking actions of individuals with vastly different backgrounds, cultures, and goals.

Mockapetris is now chief scientist and chairman of the board at IP (Internet Protocol) address software vendor Nominum; Postel worked at ISI until his untimely death in 1998.

Joseph D. Touch, who is currently the director of ISI's Postel Center named in the Internet's pioneer's honor, hosted a gathering of computer scientists on June 23 to mark the 20th anniversary of DNS. Mockapetris, who is also a visiting scholar at the Postel Center, was among those attending.

Paul Mockapetris: The Man behind DNS

The man who invented the Internet's Domain Name System (DNS) launched his celebrated career at the USC School of Engineering's Information Sciences Institute in 1978, during the heady early days of Internet exploration and evolution. Paul Mockapetris first came to ISI when he was a graduate student at UC Irvine, working on a thesis dealing with high speed computer networking. "One of the great things about ISI," he says, "is how many different research areas go on simultaneously: AI, systems, networking, integrated circuits, e-commerce — not to mention the even wider spectrum of projects where ISI folks collaborate with others on campus and in the worldwide research community."

Over the last 30 years, ISI has emerged as one of the world's leading research centers in the fields of computer science and information technology. Mockapetris underscores its central role in developing the Internet as a highly efficient communications tool. "A lot of people think the Internet was invented in Silicon Valley or somewhere else," he says, "but the fact is that USC/ISI was one of the primary places that created the Internet. In my case, soon after I finished my PhD thesis, Jon Postel came into my office and suggested that I look into building a replacement technology for the host table that was the "phone book" of the Internet. The host table was a few hundred machine names and their associated addresses — a single file smaller than a typical digital photo or music file we use today," he notes.

"It seemed to me that the opportunity was to build a technology that was a lot more like a distributed database, one that could be used worldwide with distributed management, and for a virtually unlimited set of applications. This was a pretty radical idea at the time. The DNS system I designed was probably quite different from what Jon had expected, and certainly different from the other proposals at the time. But I coded the first root server and started running it at ISI, and Jon convinced the ARPA sponsors and the folks at SRI to run other copies, and the great experiment began."

In 1995, Mockapetris left academia to lead a series of start-up companies that brought high-speed Internet access to homes and developed new Internet technologies and infrastructures. Today, he is chief scientist and chairman of the board of Nominum, a pioneering provider of IP address infrastructure software for enterprises that require reliable address management for their mission critical networks.

Nonetheless, a quarter century after joining USC's Information Sciences Institute, Mockapetris decided to bring his career full circle by rejoining the ISI last March as a visiting scholar in the Postel Center for Experimental Networking. "I'm working on technology for expanding the DNS to tens of billions of data items," he explains. "But I'm still in awe of the Internet foundation that was created at ISI, and grateful for my small part in that."

Extra! Extra! Read All About It!

The USC School of Engineering projects and faculty continue to generate headlines and here are some of the highlights…

Shortly after the last issue of ***USC Engineer*** went to press, **LEONARD ADLEMAN**, professor of computer science and molecular biology, was honored by the Association of Computing Machinery as a co-recipient of the Turing Prize, often called the Nobel Prize of computing. The April 14 issue of the ***New York Times*** carried a story on the award. Then on the weekend of August 18, a long ***Associated Press*** feature on the birth of DNA computing focused largely on Adleman's groundbreaking work. That story was picked up by ***CNN***, the ***New York Times*** and many others.

Nuclear safety expert **NAJM MESHKATI** was interviewed at length by Canada's ***Discovery Channel*** for a story that ran on and around April 26, the anniversary of the catastrophic Chernobyl nuclear accident. The ***Los Angeles Times*** did a story on May 5 about civil engineering researcher **JOSE BORRERO'S** study of the tsunami risk to Southern California. Then the August 18 issue of the ***Economist*** had a story about his civil engineering colleague, **COSTAS SYNOLAKIS** and the impact of his digital tools on the study of tsunamis.

MIT's Technology Review May 28 issue included a major story on the "brain-machine interface" that drew heavily from biomedical engineer **TED BERGER'S** project. Fellow biomedical engineer **VASILIS MARMARELIS** and graduate student **WALID SOUSSOU** were also quoted in the article, which included several USC research photos. Transportation engineer **JAMES MOORE** took aim at the newly opened Metro Rail Gold Line, and L.A. rail transportation in general, in an op-ed article published August 6 in the ***Los Angeles Times***.

For much of the summer, ISI's struggle with rapid language translation drew much media attention. ***Wired.com*** weighed in first on June 10, with an article describing a DARPA-funded exercise to see how quickly computer scientists could gear up to translate Hindi. That story featured **FRANZ JOSEF OCH** at ISI. By July 15, the ***Indian Express*** was describing the action with a story on ISI's **EDUARD HOVY**. A story on the project in the August 10 issue of ***EW Woman*** focused on graduate student **LIAN ZHOU**. A July 31 story in the ***New York Times*** covered the entire issue of machine language translation with much of its attention on ISI's **KEVIN KNIGHT.**

The June 10 ***InfoWorld*** named ISI grid computing guru **CARL KESSELMAN** (MSEE '84) and colleagues at Argonne National Laboratory to its list of 2003 Innovators. The July 15 ***New York Times*** ran a major story on the grid computing revolution, once again featuring Kesselman and colleagues. On June 16, ***Business 2.0*** named **PAUL RONNEY'S** tiny fuel cells as one of the "Six Technologies That Will Change the World. The June 16 issue of ***LA Weekly*** took a look at **BEHROKH KOSHNEVIS'** quest to vastly scale up rapid prototyping technology and use it to create machines that would build houses in 24 hours or less.

The 20th anniversary of the invention of the Internet's Domain Name System (DNS) at ISI, making dot-com part of our language, was big news in the tech and some mainstream media. The ***Boston Globe***, ***New York Post***, ***Wired.com*** and a host of radio and television stations, including ***KNX***, ***KFWB***, ***KPCC*** and ***KCBS-TV*** marked the occasion with stories. Among those making news were **HERB SCHORR** and **BOB BRADEN** at ISI, as well as the former ISI researcher who helped invent the DNS, **PAUL MOCKAPETRIS**, who is the chairman of Nominium and a visiting scholar at ISI this year.

Public television station ***KCET-TV's Life & Times*** profiled ISI's **LEWIS JOHNSON** on July 31 in a story that covered his research to humanize computers as well as his second career as a singer. **WEI MIN SHEN** and **PETER WILL** and their shape-shifting robots were stars in a news article in ***Science*** magazine on August 13. The massive power outage that struck New York and much of the East and Midwest brought the media to interview electrical engineer and power grid expert **T.C. CHENG**. He was on ***National Public Radio***, the ***Lehr Newshour on PBS***, ***CBS*** and other outlets.

IMSC Director **ULRICH NEUMANN** told the ***New York Times*** on July 18 that new electronic devices were transforming video much the same way that the Walkman had transformed music. The memo of understanding signed by USC and ChevronTexaco on August 29 resulted in stories in the ***Contra Costa Times***, ***L. A. Business Journal***, ***WashingtonPost.com*** and others. On September 4, the ***New York Times*** ran a long story about IMSC's groundbreaking research creating virtual humans. The entire story focused on IMSC, and Director **ULRICH NEUMANN** was quoted extensively.

School of Engineering Hires "Retention Czar"

Maura Jenkins, a materials scientist who recently completed her PhD at Stanford began working in the fall semester as retention coordinator for the USC School of Engineering.

While a graduate student, she worked in Stanford's Undergraduate Advising Center where she counseled students on issues including major selection, graduate school and academic probation as well as developing residential-based advising programs. She also helped recruit under-represented students into the school and coordinated several summer diversity programs for the center. She was also the graduate student coordinator for the Society of Women Engineers at Stanford.

"Maura will be primarily involved in further developing the Freshmen Academy program, revamping the peer tutoring program, identifying and working with at-risk students and collecting analyzing and standardizing some of our retention data," says Louise Yates, associate dean for admissions. "She will be assisting with the development of a centrally coordinated advisement system and ultimately will help us to develop a women in engineering program."

ENGINEERING'S WIN-WIN SITUATION

The Center for Engineering Diversity

The USC School of Engineering established the Center for Engineering Diversity nearly three decades ago to enhance the recruitment, retention and graduation of African American, Hispanic and Native American students pursing engineering and computer science degrees.

"Let's face it, engineering is a tough discipline," says Louise Yates, associate dean for admissions and student affairs. "We need to find ways to attract a diverse student body to USC, and at the same time engage these students and build their commitment to engineering. We work towards doing that with *all* of our students."

As reported in the Spring/Summer 2003 issue of *USC Engineer*, the School's Undergraduate Curriculum Revision Task Force made a number of recommendations to reinvigorate the undergraduate engineering experience, including the creation freshmen "academies". These are cohorts of students who study, meet and bond together throughout the year.

The first two academies were launched this fall as a pilot project. They build upon earlier successful programs such as those developed by the Center for Engineering Diversity to foster a sense of community among new freshmen. It's an excellent example of how the School's commitment to attracting and retaining the best and brightest students can work.

The School begins working with under-represented students well before they report for their first college class. Grants from the State of California enable engineering's MESA (Math, Engineering and Science Achievement) pre-college program to promote exciting and fun science and math programs in local schools, from third grade through high school.

"This important program helps urban schools formulate their math and science instruction," says Yates. "It also provides teacher training and after-school programs designed to bring math and science alive for young students, and prepares high school students for college-level courses in these areas."

Photo by Max S. Gerber

Once at USC, under-represented engineering students can take advantage of the Center for Engineering Diversity's wide-ranging programs. "We offer academic, career and personal counseling, designed to meet each student's individual interests and needs," says Janene White, the center's director. "We also work with industry partners to offer professional development workshops that help to prepare students academically, professionally and personally for success."

One of the center's core programs is the two-week residential Summer Bridge Program for incoming freshmen. "Students come from all across the country, and it's the first time most of them have been on their own," says White. "They meet the center's staff and the faculty, and take part in academic and time-management workshops and team-building exercises. We make sure they also learn about all the academic counseling and advisement services available at the School and USC as a whole."

Perhaps most importantly, students in the Summer Bridge Program build relationships with each other and with upperclassmen who participate in the center's programs. "The most successful and happy engineering undergraduates are the ones who make teamwork and group study a central part of their academic lives," says White. "Summer Bridge encourages students to bond with each other and with the center's staff as part of their studies. They know that no matter what the issue, they can talk to us like family."

"The most successful and happy engineering undergraduates are the ones who make teamwork and group study a central part of their academic lives," says White. "Summer Bridge encourages students to bond with each other and with the center's staff as part of their studies.

Left to right: students Kechy Eke, computer science; Felipe Murillo, mechanical engineering; Robyn Jackson, aerospace engineering; and Director Janene White

Leah Turner, a junior majoring in civil engineering, recalls her experience of the 2001 Summer Bridge Program with enthusiasm: "It was one of the best things I could have done. By the time I arrived for the fall term, I'd already made friends with kids who were in my classes, and I knew my way around campus. That confidence really gave me a leg up on my studies," she says.

Throughout the year, the center's students

continued on page 21

SCHOOL OF ENGINEERING NAMES FOUR TO ENDOWED CHAIRS AND PROFESSORSHIPS

Dean C. L. Max Nikias has announced the appointment of four faculty members to endowed chairs and professorships.

"The collective research conducted by our faculty continues to push USC Engineering into the ranks of the elite engineering schools in the country," says Nikias. "I am pleased to have the resources to reward these very worthy members of our faculty."

Aristides Requicha, professor of computer science, will hold the Gordon Marshall Chair in Engineering. Requicha directs the Center for Molecular Robotics and is the principal investigator in a project to develop nanoscale robots to monitor ocean microorganisms.

"His research into nanotechnology, microsensor networks, as well as nanorobotics has brought considerable attention to these areas both in the United States and abroad," says Nikias.

Theodore Berger, professor of biomedical engineering, has been appointed to the David Packard Chair in Engineering. Berger has been directing a long-term project to develop an implantable computer chip that would communicate directly with neural tissue.

"Ted Berger has long been a leader in the field of neural engineering," says Nikias. "With the burgeoning effort in the School's biotechnology initiative, I anticipate he will assume an even greater leadership role."

The Fred H. Cole Professorship in Engineering will be held by Robert Scholtz, professor of electrical engineering systems. A faculty member for 40 years, the much-honored Scholtz began the first university research program in ultra-wideband radio, a promising technology with applications in wireless networks, security systems and consumer electronics.

About his work, Nikias says, "Bob Scholtz has created and mentored a credible and successful research effort in both spread spectrum communications and ultra-wideband radio that reaches far beyond the boundaries of our campus."

Terence Langdon, professor of aerospace and mechanical engineering, materials science and earth sciences, will hold the William E. Leonhard Professorship in Engineering. Langdon is one of the most cited materials science researchers in the world, and his work on superplasticity of metals has important commercial applications.

"Terry Langdon has created an international presence for himself as a Fellow of the Royal Academy of Engineering, and through his significant research effort in materials science which reaches across both oceans," says Nikias.

Before making the appointments, Nikias convened a committee of the School's faculty who currently hold endowed chairs and solicited their opinions. Prior to the appointments, all four of the chairs and professorships were unoccupied.

IMSC's Fastrack is a Blockbuster *continued from page 5*

and computer elements and transfer the scene from digital data onto film.

"You create a lot of image layers and superimpose them later," says Neumann. "The layers can be real people and objects in a studio or synthetic, digital graphics, but they are all interwoven in the final image."

Until the advent of computer graphics technology in the 1980s, a team of animators had to draw many effects onto the film one frame at a time — much like cartoonists — or shoot miniature models frame by frame.

Computer programs have since enabled machines to take over many of the hand-drawn tasks. For example, Fastrack completes the initial, difficult matching, processing each frame in seconds. A person then performs final edits and adjustments to turn the film into a finished product.

"Someone starts the software, looks over the results and cleans up the shot," Vendrovsky describes, "in a process that now takes a couple of hours instead of couple of days."

Despite similar software on the market, Fastrack tops the competition with its efficiency and self-assessment capabilities, Neumann explains.

"Many programs out there can do the job but they're interactive, requiring effects artists to track the progress themselves," he says. "This consumes people and time, and that's costly.

"Fastrack is unique in that it's designed to be quick, yet careful, and is able to self-assess which features are being tracked well and which aren't," Neumann adds. "In the end, this saves a lot of production time."

IMSC is the sole Engineering Research Center funded by the National Science Foundation for Internet and multimedia technologies. Its technologies have applications in entertainment, security, communications and education, and include 10.2 channel sound systems for movie theaters and 3D surveillance technology for airport security.

"The research at IMSC brings engineering, art, mathematics, psychology and computer science together," says Mary Harper, the NSF program officer who oversees support of the center and its research, education and industrial collaboration programs. "The breakthroughs coming out of IMSC affect everyday life."

For more information on IMSC, go to: http://imsc.usc.edu.

Semper Fi *ISI Software Adopted by Marines*

The Office of Naval Research has signed a $5.74 million contract to expand the use of software for coordinating air operations and maintenance. A team led by the School of Engineering's Information Sciences Institute (ISI) developed the software for all Marine Corps' tactical aircraft.

"The software helps the military coordinate the many activities involved in preparing for combat, and combat itself, in ways that reduce risk, increase likelihood of mission success and best support the commander's intent," says Robert Neches, ISI's prime contractor for the system.

ISI collaborated with Vanderbilt University's Institute for Software Integrated Systems (ISIS) and others to create the system, which rapidly performs complex scheduling functions that previously required hours of work by highly trained officers.

Harrier Jet squadron

The system has been evaluated in operational use by squadrons of Harrier jets, both land- and carrier-based, since August 2002, including units participating in Operation Iraqi Freedom.

The new three-year contract will create versions of the system tailored to all aircraft types used by the Marine Corps' 90 tactical air squadrons, and will elevate its use up the command chain by adding tools for commanders of air combat elements within Marine expeditionary brigades.

The contract includes an agreement to supply versions of the system to Lockheed Martin Aeronautics Company for use in demonstrations of its Autonomic Logistics Information System, which is being developed to support the new Joint Strike Fighter aircraft.

More than $3.3 million of the contract funding will go to ISI, with the rest distributed among Vanderbilt/ ISIS and other contractors, including IDEA Services, LLC of Oakland, Maryland, and Lloyd Lamont Design Inc., of Herndon, Virginia.

The Comprehensive Analytic Real-Time Execution for Joint Operations effort funded under this contract integrates Autonomous Negotiating Teamware (ANT), and intelligent information management technology previously developed for the Harrier attack squadrons. The metaphor ANT uses is one of human negotiation that rapidly explores tradeoffs and reformulates requirements to balance the considerations of many different stakeholders. Repeated tests of the ANT system by Marine Aircraft Group 13, both at its headquarters in Yuma, Arizona, and aboard aircraft carriers, led to highly positive evaluations by senior officers.

"This follow-on contract is a great vote of confidence in our system," says Neches, who is an associate professor in the department of computer science. "We believe it will have civilian applications as well."

FOUR PLUS ONE PROGRAM

It is now possible for undergraduates to get an engineering masters degree from USC in just one year, saving a semester's tuition and time.

Just ask Patty Porto. Last summer, she received her undergraduate degree in electrical engineering with an emphasis in computer architecture, and now she's well on her way to a masters in electrical engineering. She will graduate this summer, having received both degrees in just five years.

Porto is benefiting from the School of Engineering's new 4+1 program. It allows students to begin their graduate work in their senior year, while also counting one 400-level course for both their bachelors and masters degrees.

"After going through four rough years to earn a bachelors, it's quite appealing to think of obtaining a second degree in just one short year," says Porto. "And my undergraduate courses directly prepared me for the graduate courses."

The program requires some careful planning on the part of students. "During my last semester as an undergraduate, I was taking two classes for my master's, two for my undergraduate degree, and one that I was double crediting for both," says Porto. "I was also the president of the Society of Hispanic Professional Engineers at the time, so it was quite a hectic semester."

But from a professional standpoint, the program is a smart move. "More and more students are seeing that a bachelors degree is not enough," says Louise Yates, engineering's associate dean for admissions and student affairs. "They've got to get the masters. They like the opportunity to go straight through, so they make room in their senior year to throw grad courses in there."

This program might seem particularly appealing now, given the less-than-sunny job market. "Some students want to wait out the economy," says Yates. "Getting a masters degree can be a good back-up plan." And when they eventually do face the job market, they'll already have an advanced degree on their resume.

The 4+1 program also allows students to build on relationships they formed as undergraduates. "I have had four years to get to know some of the faculty that I will still be working within the masters program," says Porto.

Other schools—including University of Pennsylvania, Stanford, and Carnegie Mellon—are implementing similar programs. In the future, Dean Nikias would like to expand the 4+1 program to make it available to undergraduates from the natural sciences.

student works

Board of Councilors Gains Strength

Dean C. L. Max Nikias has made nine important additions to the Board.

John Deininger has forty-seven years of business experience and is still active as director and equity investor in eight private manufacturing companies. He has invested in and served as CEO and president of Union City Body Company, an $80 million manufacture of step-delivery vans which was successfully brought out of bankruptcy. Prior to this, as corporate executive vice president of Illinois Tool Works, Deininger managed and revitalized seven Midwest companies and all of ITW's Far East Businesses. As president and chief operating officer at Signode Industries, he led its $550 million LBO, reducing debt by 50% in four years without any asset divestitures before selling the entire company to Illinois Tool Works. Deininger excels in operational optimization through alignment of management and investor goals. He received his degree from Bradley University in 1954 and worked toward an MBA at University of Chicago.

Ed Glasgow is currently technical vice president for the advanced development programs organization within Lockheed Martin Aeronautics Company. Previously, he was vice president of engineering and advanced programs for the Lockheed Martin Skunk Works. Glasgow received both bachelors and masters degrees in mechanical engineering from Purdue University and Stanford University, respectively; and was awarded an MBA degree from the University of Southern California in 1970. He is a fellow of the SAE, associate fellow of the AIAA, and a registered professional engineer in the state of California. He was selected Inventor of the Year for the Skunk Works in 1994.

Kenton Gregory (BSCHE '76) is founder, vascular project scientist, and director of the Oregon Medical Laser Center at Providence St. Vincent Medical Center. He has an extensive resume in the field of cardiology and is an expert and inventor in the field of elastin and cardiovascular laser welding technologies. Gregory is the principle inventor of the tissue engineered vascular graft based on elastin matrices. He is a practicing interventional cardiologist, holds 18 patents in the field of biotechnology with many published articles and book chapters in this field. Gregory is a professor of biomedical engineering at the Oregon Graduate Institute, and assistant professor of medicine and cardiology at Oregon Health and Science University. He received his medical degree in 1980 from USC.

Jen-Hsun Huang co-founded NVIDIA Corporation in April 1993 and has served as its president, chief executive officer and a member of the Board of Directors since its inception. Under his leadership, the company has reached a run-rate of approximately $2 billion and has become one of the largest fabless semiconductor companies in the world. NVIDIA has received numerous business and technology awards during Huang's tenure, including *Fortune's* Fastest Growing Companies, *Wired* Magazine's Top 40 and Stanford Business School's Entrepreneurial Company of the Year. Huang was also the recipient of the

FACULTY HONORS & AWARDS

The department of Materials Science & Engineering is the little department that could.

The Institute for Scientific Information, an organization that measures the impact of faculty's research, has put Professors **Terry Langdon**, **Anupam Madhukar** and **Florian Mansfeld** on the worldwide list (that at present contains 214 faculty) of highly-cited researchers in materials science. There is no faculty from UCLA on this list, one from UC Irvine and three from Caltech.

Although the smallest department in the School, it is highly influential in the materials science academic arena. Not only are the department faculty members astonishingly productive in the number of papers they publish, but those papers are cited by an amazing number of other materials science researchers in their publications.

As of mid-September 2003, Langdon had been cited 2,128 times on 89 papers published between 1997 and 2001. Madhukar had 874 citations for 40 papers published during the same period. Professor Florian Mansfeld had 244 citations on 47 papers. Professor **Steve Nutt** was cited 79 times for nine papers and Associate Professor **Ed Goo** had 32 citations on seven papers.

"Obviously, a very small department such as ours can have a major impact on its field," says Mansfeld, who is chair of the department. "Our 10 faculty with joint appointments also write papers dealing with materials science, which makes the number of published papers and citations even more impressive."

Alan Willner, professor of electrical engineering, will receive the 2003 IEEE Lasers & Electro-Optics Society (LEOS) Distinguished Service Award. Of 12 previous recipients, four are members of the National Academy of Engineering, all are IEEE Fellows and nine are past presidents of LEOS, which has approximately 7,000 members.

Willner also received the Eddy Award for the Best Contributed Technical Article from Pennwell Publications. In addition, the students in his research group had 15 technical papers accepted for presentation to the 2003 Conference on Optical Fiber Communications, the largest number ever presented by any single academic research group in the 19-year history of the conference. Willner has given two plenary presentations, the first at the IEEE Lasers and Electro-Optics Society Summer

School of Engineering 2002 Engineering Management Award. Huang holds a bachelor's and master's degree in electrical engineering from Oregon State University and Stanford University, respectively.

Fariborz Maseeh is a worldwide-recognized expert in the field of micro-electro-mechanical systems (MEMS). He founded IntelliSense in 1991 with the vision of reducing the time and expense of creating next-generation MEMS devices. Under his leadership, IntelliSense successfully launched the first custom design, development and manufacturing MEMS operation. Maseeh has over sixty scientific publications in business strategy, fabrication technologies, design and software for MEMs, and has authored a number of patents. He serves on the board of several technology firms and non-profit organizations. Maseeh received a doctoral of science degree from Massachusetts Institute of Technology in June 1990.

Donald Paul is vice president and chief technology officer for ChevronTexaco Corporation. Prior to the merger, he was vice president, technology and environmental affairs, for Chevron Corp., a position he had held since 1996. Paul is responsible for coordinating the work of Chevron's research and technology companies and accelerating the development and application of competitive technology throughout the company's worldwide activities. He joined Chevron in 1975 as a research geophysicist. He is a graduate of the Massachusetts Institute of Technology, with a bachelors degree in applied mathematics, a masters degree in geology and a doctorate in geophysics.

John F. Shea (BS Engr. '49) is the president and chairman of the board of J.F. Shea Heavy Construction, Shea Homes, Shea Properties, Shata Electric and Reed Manufacturing. He is a past president and current member of the Beavers USC Associates, as well as being a trustee for numerous foundations. Shea also holds the honors of Knight of Malta and Knight Commander of St. Gregory. Some of his accolades include the Beavers Management Award, the Moles Management Award, and the Cardinals Award.

Parviz Tayebati is the chairman and chief executive officer of AZNA Corporation, which he co-founded in June 2002. Until March 2002, he was vice president of business development for the component division at Nortel Networks Optical Components. During the same period, he was responsible for the development of CoreTek, a company he founded and ran as CEO until it was acquired by Nortel Networks in March 2000. Tayebati received a bachelors of science degree with first class honors from the University of Birmingham, England in 1982, followed by a masters degree from the University Cambridge UK in theoretical physics. He received a doctorate in Physics from USC in 1989.

William Wiesmann had a 21-year military career that culminated with his serving as the director for combat casualty care at the U.S. Army Medical Research and Material Command. Wiesmann is the president of the BioSTAR Group, a consortium of biotechnology companies focused on advanced technology, medical R&D and independent consulting. He is a co-founder and president of a hemorrhage control technology company, HemCon Inc., and a co-founder of Tissue Genesis Inc., a vascular biology company. His interests include both clinical and laboratory biomedical research. Wiesmann received his medical degree from Washington University.

FACULTY HONORS & AWARDS

Topical Meeting on Polarization Mode Dispersion in Vancouver; and the second at the 7th Opto-Electronics and Communications Conference in Pacifico Yokohama, Japan.

Urbashi Mitra, associate professor of electrical engineering, has been selected to participate in the National Academy of Engineering's ninth annual Frontiers of Engineering symposium.

Michael Crowley, a senior lecturer in computer science, received the 2003 Northrop Grumman Excellence in Teaching Award.

Robert Scholtz, professor of electrical engineering, has won the Schelkunoff Award for his paper, *"An Evaluation of the Ultra-wideband Propagation Channel,"* which appeared in the May 2002 issue of the IEEE Transactions on Antennas and Propagation.

At the annual meeting of the Society of Engineering Science held at the University of Michigan in Ann Arbor in October, **Tony Maxworthy**, the Smith International professor of mechanical engineering, received the G.I.Taylor Medal. He was honored by a dedicated, two-day symposium that highlighted his contributions to fluid dynamics. The medal is named for Sir Geoffrey Taylor, a famous practitioner of the science and art of fluid dynamics of the 20th century.

A paper by **Keith Chugg**, associate professor of electrical engineering, and doctoral candidate **Mingrui Zhu** has been selected to receive the 2003 Fred W. Ellersick Award for best paper in the unclassified program at the IEEE Military Communications (MILCOM '03) conference. The award is presented by the IEEE's Communications Society.

Carl Kesselman, (MSEE '84) research associate professor of computer science and director of the Center for Grid Technologies at the Information Sciences Institute (ISI) has been named an ISI Fellow. He is only the fourth recipient of the title since it was instituted in 1999. Kesselman has been instrumental in advancing grid computing technology that allows for distributed computation and coordinated problem solving in dynamic, multi-institutional virtual organizations. The Globus Toolkit, developed by Kesselman and his partner Ian Foster at Argonne National Laboratory, has become the standard for grid computing and has received strong support from IBM, Hewlett-Packard and Oracle.

Proteus: Changing Shape and Granting Wishes

Funded by Microsoft, computer scientists at the USC School of Engineering have developed a powerful and versatile new suite of web service tools for science and commerce. And they have named their creation for a Greek sea god who could change shape into any form and grant any wish.

"We think Proteus will do for professional and institutional users, such as scientists and IT business specialists, what sophisticated web products like Google do for individuals," says Shahram Ghandeharizadeh. He is an associate professor of computer science and co-leader of the large team that has been developing the application for more than a year. The group plans to have a prototype ready in November.

Proteus will be a Window-resident utility that will accept instructions in the widely-used SQL programming language.

"Rather than having the individual human user interact with a web site's software in real time," co-leader Craig Knoblock explains, "a user query creates special, dedicated software that will go out, negotiate with web resource provider's software, and get what the user needs."

Ghandeharizadeh says it will employ "side doors" to web sites, web service access points that Microsoft and other large information technology (IT) concerns have built into software in anticipation of Web service utilities like Proteus.

"Web services" is an emerging concept in information technologies in which web resources are queried by special applications. Web services are sometimes called application-to-application communication as opposed to the more familiar human-to-web-site interaction found in search engines.

Team Proteus: left to right: Runfang Zhou, Snehal Thakkar, Ching-Chien Chan, Min Cai, Jose-Luis Ambite-Molina, Craig Knoblock, Shahram Ghandeharizadeh, Dongchul Choi, Esam Alwagait, Christos Papadopoulos, Cyrus Shahabi.

"Rather than having the individual human user interact with a web site's software in real time," co-leader Craig Knoblock explains, "a user query creates special, dedicated software that will go out, negotiate with web resource provider's software, and get what the user needs."

For example, an individual who wants to find an aerial photo of a building at a given address must take a series of distinct and separate steps to accomplish their goal. First they must find an appropriate web site. Next, they enter a query into that site's interface. Finally, they might use that information to go to other sites, eventually finding the needed photo.

Proteus would flexibly automate processes like this. It would locate and then automatically pull web information from many sources into custom-desired configurations and would aid many high-level scientific and commercial applications, say its developers.

The new software is not aimed at consumers, according to Knoblock, a senior project leader at USC's Information Sciences Institute. Rather, users are more likely to be scientists and business computer professionals who need wholesale, automatic access to information in bulk.

The researchers presented a paper entitled "Proteus: A System for Dynamically Composing and Intelligently Executing Web Services," at the first international conference on Web services, held in Las Vegas in June.

Besides Ghandeharizadeh and Knoblock, the Proteus team includes Christos Papadopoulos and Cyrus Shahabi, both assistant professors of computer science, and ISI computer scientist Jose-Luis Ambite-Molina, along with six graduate students.

A Tango for Two... in Two Places

Dennis Thurmond and Elaine Chew play the tango via the internet between Powell and Ramo Halls.

It takes two to tango, but now they don't have to be together. USC's Integrated Media Systems Center (IMSC) showed two musicians in different locations how to use the Internet to play their tango.

Elaine Chew, assistant professor of industrial and systems engineering, and Dennis Thurmond, lecturer of keyboard studies, played an adaptation of Astor Piazolla's (1921-1992) "Le Grand Tango" over the Internet for a small group in IMSC's Powell Hall theater.

Their demonstration was an early realization of an interactive Internet performance, and the musicians themselves compensated for Internet delay. The fast-paced tango was filled with syncopations (off-beats), posing both engineering and musical challenges.

Thurmond played the accordion in front of the audience in Powell, while Chew appeared on a large screen, playing the piano in Ramo Hall, a quarter mile away. To coordinate their playing, Thurmond watched her on the screen, and Chew watched him on a monitor. Since Chew needed to listen to both the sound of Thurmond's accordion and the sound of her own piano playing, she used a single earphone, allowing her to hear the piano with one ear and the accordion with the other.

"By the time I heard the reaction to an action that I had initiated," Chew said, "many more notes had already been played. So I had to craft a musical interpretation and hold a steady pulse while keeping an ear out for delayed cues of possible ensemble issues at Powell."

She said that Thurmond had to anticipate her every move to make sure that the piece was synchronized to create a coherent performance. And, she pointed out, "a little creative license was taken once or twice" in the eight-minute performance "to ensure that all ends were met."

The occasion was a demonstration for a National Science Foundation (NSF) site visit team touring IMSC in June as part of the center's annual evaluation. IMSC is NSF's engineering research center for multimedia and Internet research.

The demonstration was part of IMSC's Distributed Immersive Performance (DIP) project, aimed at developing the technology for a concert with the conductor, musicians and audience in different physical locations, delivered in real-time over the Internet. Other phases of the five-year project will be a concert by a trio and then a concert involving a full orchestra.

"Playing together over the Internet is one of the hardest problems to solve," according to Roger Zimmermann, research assistant professor of computer science and co-director of the project.

He pointed out that the main concern is reducing the delay in the delivery of both audio and video to a tolerable level for each musician as he or she tries to follow the conductor and play along with the other musicians.

When a conductor is included in a later phase, the researchers will strive for three goals: ensuring that concurrent, synchronized video of the conductor is transmitted to all players; synchronized video and audio are transmitted among the players; and delayed, synchronized video and audio are transmitted to the audience.

The researchers are taking an unique approach. They consider the entire end-to-end process of acquisition, transmission and rendering as an integrated system that will be jointly optimized rather than presented as a set of individual pieces of technology.

They consider the entire end-to-end process of acquisition, transmission and rendering as an integrated system that will be jointly optimized rather than presented as a set of individual pieces of technology.

In addition to investigating transmission delay, they will conduct research on numerous other issues, including data loss management; network error correction; precision timing (using highly accurate Global Positioning System (GPS) clocks); distributed event recording and recall; and evaluation of musician coordination.

Alexander (Sandy) Sawchuk, professor of electrical engineering and the other co-director of the project, says the project is a test bed for cross-disciplinary investigation into psycho-acoustical, neurological and artistic issues. He explains that the project is the first step in meeting the overall goal of IMSC's entertainment vision project- to create seamless distributed environments for highly realistic interaction among people in entertainment, online games, simulations, teleconferencing, social gatherings, performance events and sports.

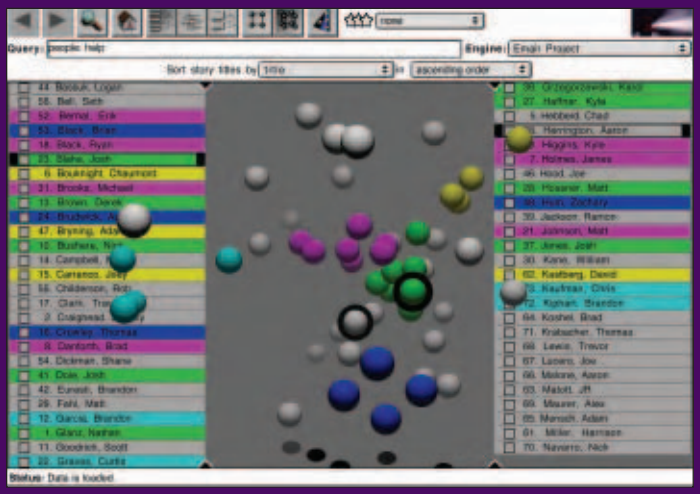
Mapping the E-mail Labyrinth

Researchers at the USC School of Engineering have created a new tool for organizing and visualizing collections of electronic mail. It is designed to help legal researchers, historians, archivists, and others faced with challenges in dealing with large email archives.

For examples, consider the following problems:

- A large corporation receives a subpoena for all email messages on a specific question. Traditional keyword searches return an enormous volume of mail that must be scanned by lawyers and paralegals for applicability. In the same way, the recipients of the subpoenaed data must analyze it. Can this process be sped up and made more efficient?
- A historian is analyzing the history of a government decision using an email archive. Reading all the text gives a great deal of information about the decision, but only careful notes can keep track of such events as shifts over time in the distribution of information, and even then subtle changes are hard to catch. Can software help?
- A library receives a donation of a famous scientist's e-mail correspondence. Besides a simple listing of titles, addresses, and dates, is there a way that the information in the archive can be made more immediately useful and comprehensible to users?

On July 30 at the Association for Computing Machinery Special Interest Group conference on Information Retrieval in Toronto, Anton Leuski at the School's Information Sciences Institute (ISI) demonstrated a system designed to address such problems. Called "eArchivarius," Leuski's system uses sophisticated search software developed for Internet search engines like Google, to detect important relationships between messages and people by taking advantage of inherent clues that exist in email collections. It then automatically creates a vivid and intuitive visual interface, using spheres grouped in space to represent the relationships it discovers.



Inside the Labyrinth. Lighthouse software tools designed by Anton Leuski enable senders email messages to be visualized as spheres in space, grouped by numbers of messages exchanged between each other to show relationships. The same kinds of visualizations can be used to group the messages themselves by content and to show other relations.

Who's in the loop? Visualization shows relationships between correspondents.

One experimental exercise analyzed exchanges of e-mail among Reagan administration national security officials. The visualization immediately showed some recipients close to the center with their most frequent correspondents packed into a tight cluster. It was clear that others were literally out of the loop because they are far out on the periphery.

The spheres can also be arranged to show other factors and the resulting configuration shows existing communities of people who converse on the same topic and the relationships among those communities. It is possible to generate a list of all the people with whom a selected person exchanged e-mail with a time-graphed record that shows when the exchanges took place.

"For a historian trying to understand the process by which a decision was made over a course of months, this kind of access will be extremely valuable," says Leuski, a research associate at ISI.

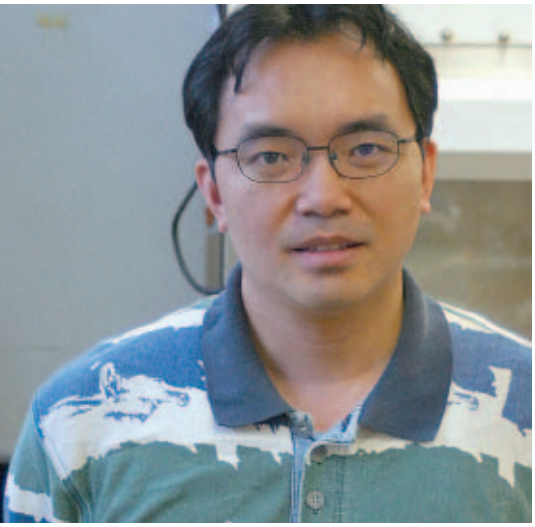
The same interface can instantly return and display individual pieces of mail in the form of hypertext pages with links to the people who sent and received the email, as well as links to similar email messages.

"What we have in effect is a four dimensional display, with color added to the three spatial dimensions," says Douglas Oard, an associate professor of computer science from University of Maryland's College of Information Studies and its Institute for Advanced Computer Studies. Oard is working at ISI during a sabbatical year.

Leuski and Oard have demonstrated the ability to find interesting patterns in collections as small as a few hundred e-mails, and the techniques they have developed are now being applied to thousands of emails sent and received by a single individual over 18 years. The next challenge will be scaling up the process to millions of e-mails involving thousands of people.

"E-mail has become a major element of modern life and the raw material of history," says Oard. "We believe that eArchivarius offers a way into the email labyrinth for researchers of all kinds."

BLOODWORK *C.-A. Peng's Quest for a Synthetic Blood*



C.-A. Peng, professor of chemical engineering

Blood is precious. Modern healthcare relies keenly on donated blood to treat patients with severe losses, such as those who have suffered trauma or undergone surgery. Dialysis patients require vast amounts of blood on a regular basis, and an emergency situation—from a large-scale accident to a terrorist attack—can quickly strain an entire region's blood supply.

Given our considerable and constant reliance on usable blood, the push to find a safe replacement—something that our bodies will accept as a substitute—takes on particular immediacy.

Meet C.-A. Peng, professor of chemical engineering at the School of Engineering who stands at the forefront of researchers seeking to develop a blood substitute. For the past four years he has been advancing this work, and lately has made significant progress.

"This research is nothing new," says Peng. "The quest for a blood substitute goes back several decades. A hemoglobin-based blood substitute produced by one company in Massachusetts has already been approved for use in South Africa."

Researchers have also shown that perfluorocarbon (PFC) liquid can effectively dissolve oxygen. The PFCs are structurally similar to hydrocarbons, but with fluorines replacing all or most of the hydrogen atoms. They are thermally stable and metabolically inert, thanks to their strong carbon-fluorine bonds. This means they can be stored effectively and safely transported under a wide range of conditions.

But there's still much work to be done. Because PFC cannot mingle with blood plasma, creating a viable artificial blood based on PFC is tricky. As Peng explains, "if you're going to put this substitute in the body intravenously, you need to make an emulsion. You have to add a surfactant to make it mixable with water."

To illustrate the role of the surfactant, he uses this analogy: "After you eat, your dishes have oil on them. If you just wash them in tap water, they won't get clean because oil is not mixable with water. You need to add dishwashing liquid." The detergent (i.e., the surfactant) decreases the surface tension between the oil and water and disperses the grease in the water for easy removal.

Blood also has a short shelf life and is unstable at ambient temperatures. Artificial blood can solve these problems, and C.-A. Peng's research group is edging ever closer to fulfilling the quest.

However, artificial blood presents other problems. The human body does not welcome strangers. Its mononuclear phagocyte system swallows up and ultimately removes the intravenously administered colloidal PFC emulsions from the blood's circulation. This keeps the oxygen from reaching cells.

Also, the artificial blood produces some negative side effects, such as flu-like symptoms and a condition that involves a blood platelet deficiency. Peng and other researchers believe this happens when the human body's cleansing system overwhelms and removes the PFC emulsions.

To lessen the uptake—and subsequent removal—of PFC emulsions from the blood stream, Peng's group has synthesized a variety of fluoroalkylated polyethylene glycols (PEGs) to act as the surfactant and prepare PFC emulsions. Artificial blood treated in this manner has proven significantly more resistant to the body's natural efforts to remove it.

Recently, Peng's group has gone a step further. He and his team have purified a mouse protein called CD47, which is recombinant and soluble. They examined its ability to reduce the ingestion of colloidal PFC emulsions by a rodent's macrophages. The results showed that a soluble CD47 protein is able to significantly counteract the ingestion of PFC emulsions by phagocytes.

Peng hopes that the CD47-associated, biomimetic PFC emulsions produced in his laboratories will last longer in a person's circulation, while alleviating the negative side effects.

So far in the United States, artificial blood has only been used on dogs; the Food and Drug Administration has not yet approved its use on humans.

The potential benefits of Peng's research extend well beyond offsetting a possible shortage in our supply. When transfused, human blood has a very small but real risk of carrying life-threatening infections, such as HIV, hepatitis B and C, or even mad cow disease. Blood also has a short shelf life and is unstable at ambient temperatures. Artificial blood can solve these problems, and C.-A. Peng's research group is edging ever closer to fulfilling the quest.

AI EXPERT JEFF RICKEL DEAD AT 40

Computer scientist Jeff Rickel, a "rising star" in the field of artificial intelligence, or AI, died July 6, of complications from cancer. He was 40 years old.

"Jeff's research on interactive virtual humans was highly influential, and earned recognition and respect around the world," said W. Lewis Johnson, director of the USC Center

Jeff Rickel

for Advanced Research in Technology for Education at the USC Information Sciences Institute (ISI).

"His work combined techniques from artificial intelligence, computer graphics, and computational linguistics, to create interactive animated characters, or virtual humans, that are among the most advanced in the world today," Johnson added.

"Jeff was a rising star," said Norman Badler, director of the Center for Human Modeling and Simulation at the University of Pennsylvania. "He was one of the leaders in a community of researchers connecting AI techniques to computer graphics human models — so-called 'embodied agents.' His work was seminal and he will be sorely missed."

Rickel was a project leader in the Intelligent Systems division of ISI and a research assistant professor at the USC School of Engineering department of computer science. He specialized in the design of robotic "intelligent agents" designed to serve as instructors for humans.

Perhaps his most striking and best-known work was his contribution to the "Mission Rehearsal Exercise" created by the USC Institute for Creative Technologies.

In this project, artificial intelligence software actors created by Rickel portray villagers and military personnel in a war-torn Bosnian village and interact with a human trainee in real time in a virtual environment.

Articles about this project appeared in numerous publications including the *New York Times.*

Elisabeth Andre, a project leader at the German Research Center for Artificial Intelligence praised Rickel's work on the Mission Rehearsal Exercise. "Creating agents that can take on different roles is a major accomplishment which has been influential for later work on interactive storytelling."

> "HIS WORK COMBINED TECHNIQUES FROM ARTIFICIAL INTELLIGENCE, COMPUTER GRAPHICS, AND COMPUTATIONAL LINGUISTICS, TO CREATE INTERACTIVE ANIMATED CHARACTERS, OR VIRTUAL HUMANS, THAT ARE AMONG THE MOST ADVANCED IN THE WORLD TODAY"

Other Rickel projects included a web based "Virtual Factory" teaching system for training, and an electronic tutoring system that he was developing for the Mitsubishi Corporation.

"Jeff Rickel's work was important because he was able to synthesize insights from a variety of fields and integrate them into a vision of the future," said Justine Cassell, director of the Gesture and Narrative Language Research Group at MIT's Media Laboratory.

"Jeff's work had exceptional integrity. If he said or wrote something, then one knew that he had read all of the other research about the topic in the field, researched his own contribution thoroughly, tested it extensively, and written it with clarity."

"But," said Cassell, "there was something else about Jeff that was exceptional: he made you want to be in the same field with him. He had such generosity of spirit, such genuine interest in seeing the field move forward, and such a lack of pettiness or competition, that I always wanted to get his feedback on my work, wanted to present papers in his presence, looked forward to seeing him at conferences."

"Perhaps Jeff's greatest influence was on his colleagues and students," said Johnson. "He was a great collaborator, and carried out much of his best work as part of multidisciplinary teams. He cared greatly for his students, and inspired their love and admiration."

"Jeff Rickel was very kind to all the staff, not just the engineers and the bigwigs," said ISI receptionist Elizabeth Stergiou. "He always had a smile on his face and never ever forgot to say 'hello!'"

Rickel was born March 11, 1963, in Madison, Wisconsin. His higher education was in Texas, with degrees in computer science including a BS from Texas A&M, an MS from the University of Texas, Dallas; and a Ph.D. from the University of Texas, Austin in 1995.

He came to USC's Information Sciences Institute in 1995, directly from Austin.

Rickel was a resident of Rancho Palos Verdes. He is survived by his wife, Lynn, and daughter Chelsea.

A memorial service was held Thursday July 10 and USC/ISI has established The Jeff Rickel Memorial Library Fund for the purchase of books on artificial intelligence. Donation checks should be payable to USC, and sent along with a letter indicating that the donation is intended for the "Jeff Rickel Memorial Library Fund," to:

Kathy Kurinsky
USC/ISI, 4676 Admiralty Way
Marina del Rey, CA 90292

High-Flying Engineers

The members of the USC team who made the trip to the competition in Maryland last April pose with their aircraft. Kneeling in front of plane from left to right are Jerry Chen, Billy Kaplan, Cristina Nichitean, George Sechrist, Wyatt Sadler(pilot) and Mark Page (industrial advisor). Kneeling behind the plane are: Jeremy Milne and Andres Figueroa. Standing from left to right: Stephan deMartimprey, Tasha Drew, Nathan Palmer(partially hidden), Stephanie Hunt, Stephane Gallet, Shannon Moriarity, Tim Schoen, Jason Randy, Tyler Golightly, Michael Mace, Jennifer Tsakoumakis, Jake Evert, Lester Kang, and Tai Merzel.

The USC engineering team is known as one of the toughest competitors in the international Design/Build/Fly competition of the American Institute of Aeronautics and Astronautics (AIAA). In the last six years, USC has finished first (1998), second (2002), third (1999), and fourth (2003).

"Design/Build/Fly," supported by Cessna and the Office of Naval Research, is intended to promote aerospace engineering and aircraft development in undergraduate educational programs. The program has worked well for both the School and the program's sponsors.

Engineering students are in danger of spending so much time solving problems in class and fulfilling mandatory requirements that they can miss learning about the real joys that an engineering career offers. The AIAA contest shows them a side of engineering that closely resembles what real working engineers do. Working in teams, the student engineers do exactly what the name of the contest implies. They design an aircraft, build their design and compete against other schools.

"Our team is composed primarily of undergraduate engineering students, but other USC students majoring in biology, business and other disciplines have also participated," says Ron Blackwelder, professor of the aerospace and mechanical engineering, who advises the students. He is assisted by two industry advisors, Mark Page of Swift Engineering and Wyatt Sadler of AeroVironment Corp. "The only requirements are an interest in aircraft, a desire to design and build and a love of competition."

The School's team begins designing the competition plane during the fall semester. Freshman and sophomores receive lectures to familiarize them with basic aerodynamics during the early part of the semester while the juniors and seniors are busy with the conceptual and preliminary design. By the end of the semester all students on the team are participating in the design phase. At a preliminary design review, the team presents its ideas to a panel of aeronautical engineers from industry.

In the fall, the students also practice their in-flight control skills with last year's plane, which also serves as a test bed for new ideas. But every year the rules and test objectives in the contest change, so that every student team has to come up with a completely new design.

For 2003, the students not only had to create an airplane, but the entire plane had to be stored in a box measuring two feet by four feet by one foot. In the competition, the team was timed on how rapidly they could assemble their plane. After passing a rigorous safety inspection, the plane had to complete two of three specified flight missions: Communications Repeater, Sensor Deployment and Missile Radome Decoy. The latter mission required the plane to have a radome (a dome-like structure protecting an antenna or other electronics) attached to the aircraft, greatly increasing its drag. The plane needed to complete four continuous laps for the mission so it had a high difficulty factor.

All of the aircraft are powered by electric motors with batteries and there is no limit on the number of motors that they can have. However, the total weight of the batteries is limited to five pounds. This requirement, paired with the short stretch allowed for take-off, makes energy management an extremely important consideration. To save weight and increase performance, the students use composite materials when they start building the plane in the spring semester

Groups of two to four students work on separate components such as the wings, control surfaces, deployment system, power plant, etc. The radio-controlled planes are designed and built for cargo hauling and handling. Small groups test sub-components for the plane, such as the deployment system.

The total score for each team is comprised of the flight performance of their best two flights, the score on a written report documenting their aircraft design and selection, and a "Rated Aircraft Cost" representing the complexity and manufacturing costs of their design. USC's 2003 plane, named 'SCyRaider,' had the fourth best flying score and the team produced the second best written report.

Blackwelder says, "our teams have always been strong. They have repeatedly defeated other outstanding teams, including those from MIT, University of Texas, University of Illinois, UCLA, and the military academies."

****http://www.aae.uiuc.edu/aiaadbf/*

The 2002-03 Team

Aerospace Engineers
Tim Bentley/Senior (SR)
George Cano/SR
Jake Evert/Graduate (GR)
Andres Figueroa/Junior (JR)
Heidi Fuqua/Freshman (FR)
Stephane Gallet/JR
Jackie Gurany/FR
Jonathan Hartley/JR
Stephanie Hunt/Sophomore (SO)
Lester Kang/SR
Billy Kaplan/SO
John McArthur/SR
Tai Merzel/JR
Jon Mills/JR
Jeremy Milne/FR
Shannon Moriarty/SO
Cristina Nichitean/JR
Nerses Ohanyan/FR
Doris Pease/SR
Arvin Shajanian/FR
Christopher Shelner/FR
Michael Tamashiro/SR
P.J. Winter/JR
Mechanical Engineers
Stephan DeMartimprey/JR
Ray Duran/FR
Cory Edwards/JR
Tyler Golightly/JR
Sergio Ibarra/SO
Amanda Lim/JR
Michael Mace/JR
Dan Montgomery/JR
Stephanie Parker/FR
James Parle/JR
Jason Randy/JR
Tim Schoen/JR
Jennifer Tsakoumakis/SO
Electrical Engineers
Carlos Florencio/SO
Ryan Gross/SO
Jill Swain/SO
Other Engineers
Nick Danziger/UNDC/FR
George Sechrist/ISE/SR

High Performance Collaborations *M.C. Gill Center for Composite Technologies*

Question: What is lighter, stronger, less expensive and more heat resistant than wood or metal?

Answer: Composite materials.

Composite materials are used for a host of everyday products ranging from aircraft baggage compartments, pickup truck beds, bullet proof-vests, wall panels, fishing rods, surf boards, satellites and lately, electric power lines.

"We are constantly looking for new technologies to improve fibers, polymers, resins and foams, and new ways to combine them to meet ever-higher performance expectations," says Steven Nutt, director of the M.C. Gill Center for Composite Technologies. Nutt is also a professor of materials science and holder of the M.C. Gill Chair in Composite Materials. "We're trying to exploit the unique advantages of composite materials and incorporate them into useful structural elements."

The goal of the Gill Center is to address problems associated with the design, manufacture and behavior of composite materials and to train students in composite technology. The Gill Center acts as a catalyst for industrial investment and focuses on problems related to the development of new high-performance composite materials. Nutt strives to forge close relations with industry, particularly in Southern California, as exemplified by a project that has recently been in the news.

The Gill Center is working with Composite Technology Corporation (CTC) of Irvine, California, on lightweight Aluminum Conductor Composite Core (ACCC) cables. CTC is commercializing the cables, which will allow transmission of up to twice the amount of electric power as conventional power lines. The huge power outage that turned off the lights for more than 50 million people in the Northeast and the Midwest last August is stark evidence that the nation's power grid is in trouble.

"Electrical power production has been growing faster than the capacity of the power grid. Deregulation is adding to the problem because we're sending power across greater distances," says Nutt. "We need to upgrade the power grid. The steel-reinforced cables that are standard today have changed very little in the past hundred years."

The ACCC power cables were initially created by CTC. The Gill Center is testing and analyzing prototypes in preparation for full-scale manufacturing. The new cable consists of a lightweight core of carbon- and glass-fiber composite surrounded by aluminum wires through which the electricity flows. Conventional power lines are made of aluminum wires wrapped around a core of steel strands.

Nutt is not shy about offering solutions to vexing problems. He was recently in the news when he suggested reinforcing the problematic polyurethane foam insulation on the space shuttle with fiber reinforcement.

Steel has provided the strength to support power lines, but it does not conduct electricity very well. The fiber cable cores are lighter and stronger than steel ones. That allows more aluminum to be used in the cables, which means they can transmit more electricity.

"If you can increase the amount of power that you can transmit in the system by replacing the cables, then you don't have to build as many new towers," explains Nutt. "Not only are new towers expensive to build, but land acquisition and environmental concerns have become a much greater problem in recent years."

The ACCC cables can operate safely at higher temperatures than conventional power lines and they are also no larger in diameter. The size of the cables is important because wind, rain and ice places enormous pressure on power lines. The composite lines can be handled and transported much like conventional cables, which will facilitate replacing existing steel cable.

The Gill Center currently has more than a dozen active projects supported by regional industry and federal agencies. These projects involve postdoctoral fellows, graduate students and undergraduates. In addition to power lines, projects include synthesis of high-performance composite foams, sandwich structure dynamics, self-rigidized composites, high-temperature composite behavior, laser machining of composites, polymer nanocomposites, metallic foam synthesis, acoustic sandwich panels and deformation of nanocrystalline metals.

Nutt is not shy about offering solutions to vexing problems. He was recently in the news when he suggested reinforcing the problematic polyurethane foam insulation on the space shuttle with fiber reinforcement.

"The foam in the shuttle has been purely for insulation and has about half the density we normally use for structural foams. A small amount of fiber, about three to five percent, can increase the strength significantly," he says. The National Aeronautics and Space Administration is interested in his suggestion and has asked him to explore his concept for possible use on future shuttle missions.

Ultra-light fiber-reinforced foams are polymer materials that are intentionally porous. Man-made foams are in many ways modeled after wood, which is a cellular form of the polymer cellulose. Wood has exceptional performance characteristics and most plastic foams don't come close to matching its performance. So while wood remains a widely used structural material, most foams are made primarily for insulation and packaging.

continued on next page

High Performance Collaborations

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However, the best plastic foams are the core materials for sandwich structures which typically consist of a low-density, thick foam material sandwiched between two face sheets of high-strength composite.

The Gill Center invented a new process to synthesize composite foams from expandable microspheres. The microspheres and long fibers are mixed together and then heated until the mixture expands into composite foam. The Gill Center's research indicates that the properties of the fiber-reinforced foam match or surpass the properties of leading commercial foams, such as cellular polyvinyl chloride, or PVC. Materials like PVC foam are widely used in transportation vehicles, ships, and wind energy structures.

The Gill Center was originally funded by a $7 million gift from Merwyn C. "M.C." Gill (BCHE '37) a Pasadena industrialist. M.C. Gill started out making composite wall panels in his garage in 1945 and his company is now the world's largest manufacturer of baggage compartment liners for passenger and freight aircraft. Among the many projects at the Gill Center is a collaboration with the M.C. Gill Corporation to develop fiber-reinforced phenolic foam.

"These efforts recently led to a technological breakthrough that resulted in composite phenolic foam with superior mechanical performance and fire resistant properties," explains Nutt.

The pioneering work overcame significant challenges to achieve uniform fiber dispersion in a highly viscous mixture. When the glass fibers are properly oriented inside the foam matrix, the resulting composite foam is substantially tougher then conventional phenolic foam. The new material demonstrates the concept of performance enhancement through fiber reinforcement of foams.

The technology is being patented, and will be commercialized by the Gill Corporation for use in commercial aircraft.

"High performance is a buzzword here, but we aren't just pushing for higher and higher performance," says Nutt. "We really want to see new composite materials become a success in the marketplace. So we try to find collaborations to make that occur."

Find more information about the MCGF Composite Center at http://www.usc.edu/dept/materials_science/ccr/.

ENGINEERING'S WIN-WIN SITUATION

continued from page 9

can receive supplemental instruction in challenging courses such as introductory computer science and electrical engineering. They are encouraged to take advantage of professional development programs offered through the Society of Hispanic Professional Engineers, the National Society of Black Engineers and the Society of Women Engineers, which have chapters that operate under the center's aegis.

Students also have ample opportunities to meet and work with industry professionals. The "Shadow an Engineer" program during spring break enables students to work alongside an engineering professional for a day, providing real-life insight into specific fields of engineering. Annual events such as a corporate luncheon, "Evening with Industry" and the end-of-year awards banquet encourage informal and relaxed interactions between students and industry representatives.

The center's Industry Advisory Board (IAB) plays a leadership role in providing professional development opportunities. Company representatives help students develop important career skills such as writing effective cover letters and preparing for job interviews. They also provide leads for internships and corporate networking opportunities where students can develop their academic, leadership, teamwork and social skills. IAB members include Boeing, Conexant, Exxon Mobil, Hewlett-Packard, Intel, Lockheed Martin, Northrop Grumman, Qualcomm and Raytheon.

"Creating opportunities for students to develop personal relationships with industry mentors is a wonderful way for students to see beyond the rigors of their calculus and physics courses," says White. "Our students get to know individual companies early in their academic careers, which helps them pinpoint their professional interests."

While the Center for Engineering Diversity has developed successful corporate partnerships across a wide array of engineering disciplines, White is eager to expand the range of contacts she can provide to center participants. "Students tell me they want a chance to explore engineering careers in construction, civil engineering, biotech and biomed," she says. "We would be delighted to discuss opportunities for corporate participation with Engineering alumni working in these and other fields."

"Today's students respond best to hands-on experience and personal involvement," says Yates. "The Center for Engineering Diversity has played a crucial role in bringing the field of engineering to life for students, and then

opening doors so that they can pursue successful, significant and satisfying careers," says Yates. "It's a win-win situation for everyone."

If you would like information on how your company can become involved with the Center for Engineering Diversity or its Industry Advisory Board, please contact Janene White at (213) 740-1999 or jrwhite@usc.edu. For more information about the center, visit www.usc.edu/dept/engineering/esa.

Photo by Max S. Gerber

Cultivating the Future

Mark Stevens

Dedicated Alumnus

Fundraiser and Venture Capitalist

But the Three Musketeers are Job One

by Bob Calverley

The most satisfying part of Mark Stevens' astonishing success is not the stellar list of high-tech companies that he has guided through the past decade's Silicon Valley economic tumult. It's not all of boards upon which he sits, including the USC Board of Trustees and the School of Engineering Board of Councilors. It is not a remarkable academic pedigree.

For Stevens, a general partner at Sequoia Capital, one of the nation's most successful venture capital firms, success is the colorful clutter of plastic toys that his twin six-year-olds, Sean and Scott, and 21-month-old Samantha have strewn around the yard of the Stevens family home in Atherton.

"They're the Three Musketeers. The kids are at that stage where life is a bowl full of cherries. We have a lot of fun together," he laughs. "The boys are just starting to ski. We got them on some of the blue runs — that's intermediate — when we went to Steamboat Springs last winter."

At age 43, life has never stopped being a bowl full of cherries for Mark Stevens. He does not waste more than six or seven hours a night on sleep. While he says that 95 percent of his waking hours go to Sequoia and his family, that still leaves time for Oakland Raiders season tickets, and keeping up with the Dodgers and the Lakers. "I watch too many games on television. I love college football and basketball," he admits. "Much to my wife's chagrin." Then he runs to stay in good enough shape to compete credibly in occasional 10 K races and he hasn't quite given up playing in a basketball league. Most important of all, there's the small life

Stevens has just signed on to co-chair an ambitious seven-year fundraising initiative for the USC School of Engineering.

and death matter of Trojan football. He rarely misses a game.

"Busy, busy, busy!" he says. "But I've always been well organized."

That would seem an understatement. Stevens' wife Mary says her husband makes a to-do list every day, prioritizes it and then lives by it. But his meticulous organization results in the Stevens family eating together four out of five nights a week, so she is a believer.

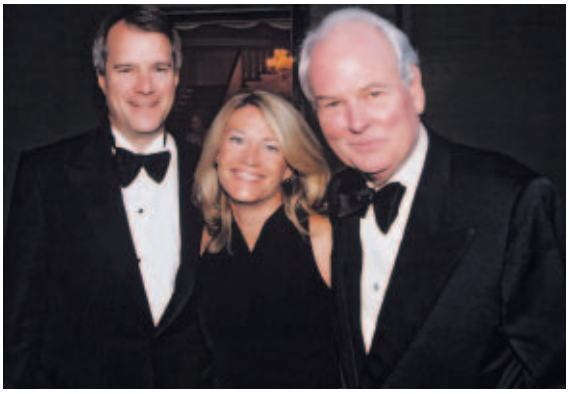
"He values his time more than anyone I have ever known," she says. "He says, 'you can't buy time. You can manufacture things, but you can't manufacture time.'"

There is still time for more. With San Diego real estate entrepreneur Daniel Epstein (BSISE '62), Stevens has just signed on to co-chair an ambitious seven-year fundraising initiative for the USC School of Engineering.

"When you really need to get a job done, it's best to ask someone who is busy. I've asked two of the most able people that I know," says Dean C. L. Max Nikias. "Mark is a very busy person. He's busy getting things done. He also understands our School, its strengths and its needs, and he cares very much about its future. So does Dan Epstein."

Epstein, like Stevens, is both a USC trustee and a member of the School's Board of Councilors.

"Both Mark and Dan epitomize what it means to be a Trojan. They have both enjoyed remarkable career success, but they have still found the time and energy to dedicate to USC and especially to the School of Engineering," says USC President Steven B. Sample.



Mark and Mary Stevens with USC Trustee and Keck Foundation Chairman, Robert Day.

Epstein says he found it impossible to say no to the dean, but he did have one request.

"Max's enthusiasm is infectious," he says. "But I told him that if I was going to get involved in this initiative, then Mark was going to have to be involved as well."

The dean holds up a faded page from an old appointment book — 4 p.m. Friday, May 31, 1995 — a crucial meeting for Nikias and for the School of Engineering. At the time, Nikias was an associate dean leading the effort to win an engineering research center in multimedia and the Internet from the National Science Foundation. This was the day he learned that Mark Stevens was someone upon whom he could depend. Nikias had spent the entire week in the Silicon Valley visiting high-tech companies and looking for support for the School's proposal.

"I was tired and almost canceled the meeting," remembers Nikias. "Mark was 35 years old then and very relaxed, wearing athletic shoes. We went over a lot of companies and he opened doors for us. That was a key factor in our getting the Integrated Media Systems Center."

The challenge now is to secure new resources for the USC School of Engineering at a time when the nation's and the state's economy is less than robust.

"We are a very good school now, but we need new funding to take the next steps to bring the school to the top two, three or four schools," says Epstein.

For Stevens, raising money for the School of Engineering is remarkably similar to what Sequoia does.

"At Sequoia, we like to say that we finance the future," he says. "We are very specialized money managers."

Roughly every three years, Sequoia raises a new fund and is currently managing about $2 billion in several funds. A major portion of those who invest – they're called limited partners -- are university endowment funds, including USC. While endowments put most of their money in stocks and bonds, these large funds allocate about five percent to the high-risk, high-return category of venture capital. Stevens and Sequoia invest these funds in start-up companies, most of which fail.

"Usually five or six out of ten investments fail. We get no money back, or maybe we get part of our money back," he explains. But some companies go public, or are acquired, and they become fantastic success stories. Then, Sequoia makes five, 10 or 20 times its investment. "It's like baseball. For every ten at bats, there are five strikeouts, two or three base hits or doubles, and one or two home runs. At Sequoia, we've been fortunate to have our share of home runs."

Sequoia helped start Apple Computer, Cisco, Yahoo and Google, which is currently preparing to go public. Stevens has been involved with Nvidia, Pixelworks, MP3.com and many others. He is Sequoia's semiconductor specialist. "I'm Mr. Chips at Sequoia."

While Stevens and the other partners at Sequoia clearly have to spend considerable time and mental effort in identifying promising companies with clever ideas, the fundraising part of the work is perhaps more important. In addition to raising money from limited partners, they help their companies raise money from other investors. They also help their companies go public, which is fundraising on an even grander scale.

"I'm always fundraising and I like doing it," says Stevens. "You need to be organized and at the same time creative."

Looking out across his yard to a vegetable garden in big planter boxes where he and his children are growing corn, pumpkins, basil,

Mark Stevens photo by Michelle A. H. Smith

Dean C.L. Max Nikias, President Steven B. Sample, Mark Stevens and Jay Kear (BSME '60) at an engineering dinner.

Mark Stevens at the 2002 Board of Councilors meeting for the Engineering school.

To Stevens, the USC School of Engineering is the eighth ranked company in a field of approximately 300 engineering schools. It is a company that needs an influx of capital to move further up, and it has a strong potential to successfully make such a move. It is not a company that is trying to move from the middle of the group closer to the front. It is already quite near the front and sees a chance to break into the front pack.

tarragon, squashes, zucchini, bush beans and tomatoes, Stevens spots an apt comparison.

"Some crops mature very quickly, but with others it takes years to develop into a fruit producing tree. Fundraising is like that. It is a cultivation business."

For alumni, he wants to appeal to the pride they have in their school and motivate them to give back. Presumably, they have gained knowledge and wisdom while at USC and used it to build a career.

For people in industry, the key is having the School do research in areas that will benefit their companies long-term. Companies depend on engineering schools for a steady stream of technically trained and creative employees, and for technical innovations that lead directly to profitable products.

"We will always need engineers — to build and rebuild our infrastructure, to help us determine how to make things bigger and better, or quicker and smaller as the case may be," says President Sample, who is also on the faculty of the School of Engineering. "Engineering and the research it fosters, helps make our daily lives better."

To Stevens, the USC School of Engineering is the eighth ranked company in a field of approximately 300 engineering schools. It is a company that needs an influx of capital to move further up, and it has a strong potential to successfully make such a move. It is not a company that is trying to move from the middle of the group closer to the front. It is already quite near the front and sees a chance to break into the front pack.

Stevens during his USC college days.

"This is a situation where we are seeking to turn better into best, not average into better," he says. "That's our theme."

When he travels around the Silicon Valley, Stevens' favorite statistic is that undergraduate freshman SAT scores at the USC School of Engineering are higher than at Berkeley or UCLA. That raises eyebrows, but it also gets to the core of the challenge. Most people don't know that the School is ranked as highly as it is, or that it has been a good school for a long time. Perceptions, however, are changing. Stevens has noticed that bright kids in the Silicon Valley are beginning to get interested in the USC School of Engineering. The idea that USC is a highly selective university like Stanford or Berkeley or Duke is taking hold. Stevens says that most California high-tech executives he meets already seem to be aware that the USC School of Engineering is very good.

He also sees an engineering school positioned for success because it has momentum and a plan for the future that touches on key areas of innovation. Stevens, and many others, believe that the world is on the cusp of three important technology revolutions. One is information technology, which is based on an electronics industry that is already quite mature, having been around for more than half a century. The next is biotechnology, which has emerged relatively recently. Finally, there is nanotechnology, which is just beginning to emerge and which is in some respects a combination of the first two. Since he

became dean two years ago, Nikias has announced initiatives in all three of these areas and has been recruiting new faculty for them. To date, he has added 26 tenure track faculty. (See New Faculty story on page 26)

"The nations that lead those industries are the nations that will dominate the 21st century," says Stevens. "We have to build up the School of Engineering so that it can be in a leadership position. Its position will then help it to develop students and research that address these three big industries. We have to go out and get top faculty. We have to attract the top undergraduate and graduate students. We have to identify niche research areas were we can be number one. All of these things take a lot of money."

Mark Stevens grew up in Culver City during the 60's and 70's when the Southern California aerospace industry was building Cold War machinery. It was a time of space shots, astronauts and sending men to the moon. His father was an engineer at Hughes Aircraft for 38 years. Like most engineers, the young Stevens started with an affinity for math and science, but he has never stopped being an intellectual gourmet.

"I've always been interested in everything, every academic subject," he says. "If you're in Hollywood, you grow up around the entertainment business. If you're in Texas, you grow up around the oil or the cattle business. I grew up around the aerospace business."

He chose USC because he thought the engineering school was good and the class sizes at the private university didn't seem as crowded as those in the public schools. And there was football. During the five fall semesters that Stevens attended USC, the Trojans won a national championship, went to three Rose Bowls and Marcus Allen and Charles White won Heisman trophies.

"Yes, those were the glory days," says Stevens who believes strongly that excellence in academics and athletics is not only possible, but highly desirable. "It helps socialize the greater university and makes the students, faculty and everyone in the community feel better. It was true 20 years ago and it's true today."

Stevens was 17 when he began classes at the School of Engineering in the fall of 1977 and did not turn 18 until his second semester. He chose chemical engineering until a vision of working on an oil platform in the middle of the Gulf of Mexico or the Middle East popped into his head. He switched to electrical engineering at the end of his freshman year. In his junior year he decided he would also major in economics and get two bachelor degrees.

"Today we encourage kids to get second majors or minors, but back then it was pretty weird," he says. Engineering students could easily spend the whole day in the quad area and never venture to other parts of the campus. Stevens enjoyed going over the College of Letters, Arts and Sciences for liberal arts classes, especially economics where he found that his math background provided an edge. By his senior year, Stevens was a member of Phi Kappa Psi fraternity, he was an officer in the engineering honor societies Eta Kappa Nu and Tau Beta Pi, and he was working half time for Hughes.

Dean Nikias, Niki Nikias and Mark Stevens

"I was a busy boy," he says. He graduated with his two degrees in four and a half years and immediately began working fulltime at Hughes. Within six months, he decided he didn't want to be an aerospace engineer for the rest of his life. So in July 1982, he went to work for Intel.

"I loved Intel. I was in field sales and that was right when the PC boom was happening," he says. But determined to "round himself off," Stevens left Intel in the fall of 1987 to seek an MBA from Harvard. He went to school full time, got his degree in June 1989 and immediately began working as an associate at Sequoia. Today, he is the only one in his Harvard class who still works for the same company that he did when he graduated.

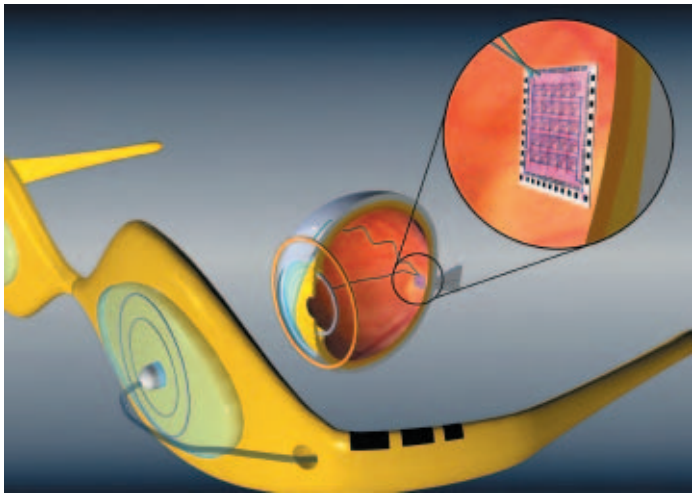
About six months after he started at Sequoia, a senior partner asked Stevens to work with a company called QuickLogic. Specifically, he was asked to help the three founders find their first office space. Stevens called a Silicon Valley commercial real estate company to begin working on the problem. The real estate company had to deliver a package of information to Stevens' office. Neither of the two real estate people in the office that day wanted to make the trip, so they played a round of Roshambo (rock, paper, scissors). The loser, Mary Mathews, was stuck with the drive across the Silicon Valley. But in the end there were no losers in this deal.

"We ended up doing a deal and the company got their office space. And tenants were treasured then because there was a glut of office space," says Mary Mathews who became Mary Stevens in October 1992. QuickLogic not only got their first real estate but also became a successful investment for Sequoia. A year after his marriage, Mark Stevens became a general partner at Sequoia. Mary Stevens left a real estate career that she truly loved only to discover that she loved being a stay-at-home mom even more. Now there are remodeling projects, a yard full of toys, children's pool parties, weekend jaunts with the Three Musketeers to the Santa Cruz Boardwalk or the beach house in Aptos.

"The boys are confused because all of their friends have Giants caps, but they know their Dad's a Dodgers fan. I give them a year or two before they're Giants fans too," says Mark Stevens.

And that's just fine with him. But USC Trojan fandom? That just might be non-negotiable.

USC ENGINEERING Secures Another Engineering Research Center



The intraocular retinal prosthesis consists of 16 electrodes arrayed on a 4-by-4 grid; these electrodes are stimulated by digitized images transmitted to the device from a camera mounted on a pair of glasses. The electrodes, in turn, stimulate the patient's remaining retinal neurons.

BMES TAKES AIM AT BLINDNESS, PARALYSIS AND MEMORY LOSS

by Bob Calverley

THE GOAL IS AUDACIOUS.

Make the blind see, the paralyzed walk and restore lost memories. The National Science Foundation has awarded USC its second Engineering Research Center (ERC), the result of a strong collaboration between the School of Engineering and the Keck School of Medicine, with participation from the University of California – Santa Cruz and Caltech.

The new Biomimetic MicroElectronic Systems (BMES) ERC will develop biologically inspired implantable microelectronic devices capable of direct communication with tissues to treat presently incurable human diseases such as blindness, paralysis and memory loss.

"We are only the fourth engineering school in the nation to have two concurrent, active ERCs (the others are MIT, Georgia Tech and University of Michigan) and we are the only California school that has ever won two of them," says Dean C. L. Max Nikias, adding: "And you aren't allowed to have more than two!"

USC's original ERC is the Integrated Media Systems Center (IMSC), the only ERC for multimedia and Internet research. The IMSC was awarded in 1996 and NSF recently renewed funding for its final five-year term. Before becoming dean, Nikias directed the IMSC and also led the effort to secure it. USC's IMSC proposal was judged by NSF to be the best of a total 117 that were submitted. The proposal for the BMES ranked first out of 79 and according to NSF was one the best proposals they have received in recent years.

"This is a very broad interdisciplinary endeavor," says Stephen J. Ryan, Dean of the Keck School of Medicine. "Not only was it a huge joint effort between the Keck School and Engineering, but Caltech and UC-Santa Cruz are contributing unique and significant expertise. We at the Keck School are especially proud of Mark Humayun, who will be directing the new ERC. His background as an M.D., a retinal surgeon and an engineer are illustrative of this entire collaboration."

The purpose of ERCs is to dramatically advance research on new technologies in areas that are deemed important to society. ERCs are not only expected to educate young engineers in the critical new technologies, but to rapidly commercialize the innovations so that society can reap the benefits quickly.

"We already have support from more than 30 companies," says Nikias. "With the Alfred Mann Institute's reach into Southern California's very active medical device industry, I am not surprised that NSF picked us as the ideal location for this new center."

"There is such a profound amount of knowledge on microelectronic devices here. We think we can all get together and do something collectively that we couldn't do individually," says Humayun.

The centers are also encouraged to have strong community outreach programs. When the editors of *Time* magazine and the Princeton Review chose USC as its "College of the Year" in 2000, they cited the university's bonds with local schools, community residents, police, businesses and community organizations, and noted that both the neighborhood and the university had benefited from USC's enlightened self-interest.

The BMES will leverage three of USC's hottest biomedical projects.

Humayun is leading a project at Keck's Doheny Retina Institute to develop an intraocular retinal prosthesis, which he helped invent. He and his team have already provided a semblance of sight to three patients employing a complex multi-step procedure.

First, an implantable chronic stimulator case, which holds all the electronics for the prosthesis, is placed behind the patient's ear and wires are run under the skin to the eye. Next, a delicate array with 16

electrodes arranged in a 4-by-4 grid is inserted into the eye itself and attached to the retina. When this receiver is in place, a sliver of silicone and platinum is implanted using a novel surgical approach and custom-built instrumentation.

The prosthesis works by taking over the job of cells damaged by degenerative eye diseases such as retinitis pigmentosa or macular degeneration. The electrodes in the array are stimulated by an incoming image and they, in turn, stimulate the patient's remaining retinal cells. The information travels via the optic nerve to the vision centers of the brain to create a representation of the image.

At first, the images were transmitted to the patients with a computer. Now, a tiny camera mounted on shaded glasses transmits a digital signal to the radio receiver mounted behind the ear. From there the signal goes to the device itself, where it "lights up" electrodes and stimulates remaining retinal neurons. Future generations of the prosthesis will have a greater number of electrodes and other refinements.

"The key," says Humayun, "is getting to understand the stimulation of the retina better. Right now, the amount of electrical energy it takes to activate the retina forces us to make a device that may not give fine perception."

Humayun's device is loosely based on the cochlear implant, which has restored hearing to more than 100,000 deaf patients. That device uses just six electrodes to replace the 30,000 nerve fibers in the auditory nerve.

Gerald Loeb, who like Humayun is a physician and a professor of biomedical engineering, helped develop the cochlear implant and is now conducting clinical trials of the BION, an injectable neuromuscular stimulator. Loeb will be the deputy director of the BMES ERC and his BION project is a centerpiece of the research agenda. The BION — short for bionic neuron — is the size of two grains of rice and is made in a cleanroom on the USC campus.

During the past three years, Loeb has injected approximately 32 BIONs into the paralyzed muscles of about 20 patients in the U.S., Canada and Italy to treat disorders ranging from stroke to arthritis to incontinence. The BIONs are able to re-animate paralyzed muscles through electrical stimulation. Each BION receives power and digital command data from an external RF (radio frequency) coil. The devices do not contain batteries that can run down and they are relatively inexpensive to produce. The next generation model currently under development will sense muscle length, limb acceleration and bioelectric potentials for better control of the electrical simulation.

"At USC we're concentrating on the actual testbeds of these devices, the actual applications of the devices and the assembly of the technologies into functional prosthetics," says Loeb. "One of the things we're trying to take advantage of is the very strong industry in Southern California in medical devices and diagnostics."

The BION, the retinal prosthesis and the cochlear implant, which inspired both, all work by stimulating nerve cells. Theodore Berger, professor of biomedical engineering and director of the School of Engineering's Center for Neural Engineering, heads a project to create a silicon chip implant that would take over the function of neurons that have been lost to disease or injury.

Specifically, Berger and his team are probing the secrets of the hippocampus, a cashew-shaped portion of the brain that plays a crucial role in learning and memory. With live slices taken from rat brains, his team has been painstakingly unraveling the hippocampus' electrical signals, mathematically modeling them and designing chips to mimic the function of those neurons. The team has made chips that could replace about 20 neurons and devices that would fill in for 10,000 neurons are in the design stage.

Meanwhile, other researchers on the team have designed, fabricated and tested an interface device consisting of intricate array of electrodes that is precisely shaped to conform to the unique cellular architecture of the hippocampus. The array has been connected to live rat hippocampal slices and is being used to stimulate and record electrophysiological activity.

Berger is still some distance from actually implanting one of his chips in a human. But he is planning primate tests and the idea of implanting a brain chip no longer seems as fanciful as it once did. Furthermore, his research mimicking the hippocampus' electrical activity and the interface technology would appear to be applicable to the retinal prosthesis and the BION projects.

"This is a very critical time for the convergence of all these disciplines, to be finally be able to cross the threshold and produce these kinds of medical devices," says Berger about the new ERC. "These are things that will reach out to the public and change their lives."

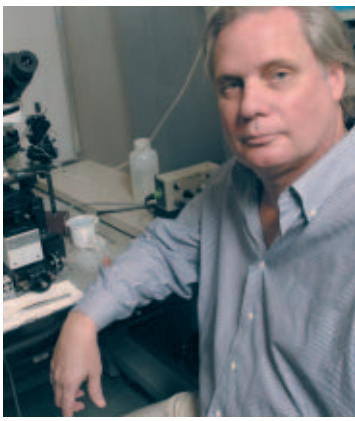
Nikias notes that the potential benefit to society from the BMES is not only improvements in the quality of life for many people, but there will be financial benefits as well.

"If we helped 20,000 blind patients over the next two decades, we could save about four billion dollars in the federal budget," he explains. "Newer generation BIONs could accelerate rehabilitation and reduce disability in the 590,000 stroke survivors, and the 11,000 new patients with spinal cord injuries we have each year."

Audacious goals they may be. But as ERC director Humayun puts it, "We want to make disruptive rather than incremental advances in technology." An aggressive objective the will undoubtedly yield bold results.

Mark Humayun

Gerald Loeb



Theodore Berger

Loeb photo by USC News Service, Berger photo by Max S. Gerber

Aggressive Recruiting:

26 New Faces Among The Faculty

by Carl Marziali

The School of Engineering has expanded considerably, having hired 26 tenure-track faculty over the past two years. While other colleges struggled with government cutbacks and shrinking endowments, USC Engineering forged ahead and experienced impressive growth.

The School's expansion since 2001 is unprecedented in its history and rare even among top universities in recent years. The School's strategic plan over the next 10 years is to increase the number of tenure-track faculty by 60, and Dean C. L. Max Nikias is nearly halfway there.

The expansion started out looking more like a contraction when Nikias took over as dean in July 2001. Facing some of the same problems as his counterparts all over the country, he declared a six-month budget freeze and began a massive reorganization of the School. The reorganization focused on reducing administration in the School and redirecting resources to faculty.

It worked. At the end of those six months, the School's reserves were healthy enough to provide start-up packages for several new hires. After rewarding existing faculty with a one-time salary adjustment and a year-end raise, averaging about nine percent in total, the School was off and hiring. Spectacular enrollment growth in graduate programs, particularly those available through the Distance Education Network (DEN), provided additional resources, as did ongoing fundraising efforts that have brought in $70 million since 2001.

"We've got the money to be extremely competitive, and securing top-tier faculty has been our priority," the dean says. "At a time when everybody else is facing the squeeze, either to stay at the size they are or to downsize, we are in a growth mode."

He predicts that by the next decade, the years 2001-03 will be recognized as a period when USC Engineering took another big jump forward. Department chairs agree they are seeing a significant increase in the quality of the faculty applicant pool.

Conversely, in his position as the final interviewer, Nikias talked to about 135 applicants, every one of whom mentioned USC's current eighth-place rank in the *U.S. News & World Report* survey of graduate engineering schools.

Not that a top-10 ranking in a magazine is all you need to attract the right researchers. School faculty talked up positions at conferences and other events in the engineering community. Nikias personally wrote to the top 30 faculty in each engineering discipline, as ranked by USC Engineering faculty, asking them to recommend promising candidates. And if the right candidate still did not materialize, the School simply waited.

"We don't have openings, and I don't allocate positions," Nikias says. "We identify critical areas where we want to recruit faculty and then I authorize searches in those areas. But if we don't find a truly top-notch person in that area…we may try again the following year."

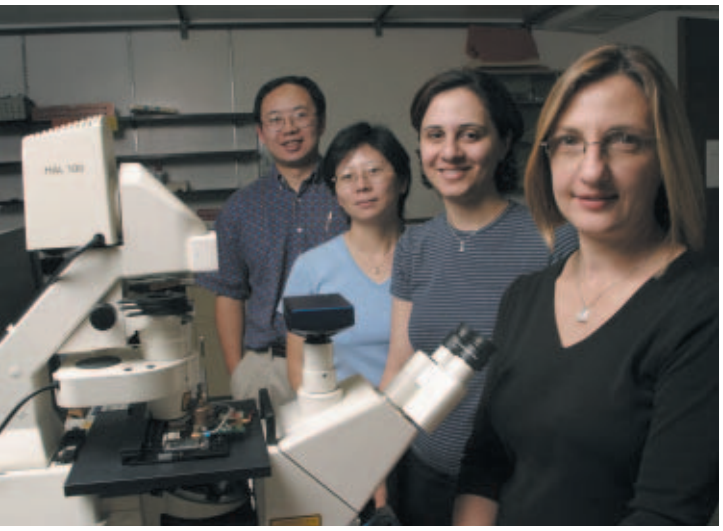
More important than how top faculty were hired is why. Simply put, faculty are the nutrients of the body academic. In a growing body, food provides the energy for expansion. As the body grows, it requires more nutrients, which in turn helps the body develop further, and so on to maturity.

Photos by Max S. Gerber

"We don't have openings, and I don't allocate positions," Nikias says. "We identify critical areas where we want to recruit faculty and then I authorize searches in those areas. But if we don't find a truly top-notch person in that area we may try again the following year."

Left (left to right); Bhaskar Krishnamachari; Konstantinos Psounis, Michael Kassner, Maria Yang, Hossien Hashemi

Below; Jennifer Swift, assistant professor.



In a growing academic body, top new faculty conduct important research, raising the School's reputation. As the School's reputation rises, higher quality students seek an opportunity to learn from the School's faculty. When they graduate, those students attract superior employment offers. As friends and alumni of the school notice the increase in quality, they in turn increase their support…as do granting agencies, foundations and corporations. As resources pour in, the School is able to attract more top faculty, thereby attracting more quality students, and so forth in an upward spiral of success.

When he became dean, Nikias focused his hiring on two major initiatives: information technology and biomedical technology. A $10 million gift from Daniel J. Epstein (BSISE '62), a USC trustee and member of the School's Board of Councilors, provided additional resources for the newly renamed Epstein Department of Industrial and Systems Engineering. The dean's latest focus will be the department of aerospace and mechanical engineering, which has a new chair this year.

Left (l to r): Qiyin Fang, Ph.D, Cedars-Sinai postdoc fellow, Biophotonics; Yinghua Sun, Ph.D student, Material Sciences; Sarah Salemi, graduate student, Physics; Laura Marcu, associate professor.

The School also made a special effort to locate candidates from under-represented groups, extending several offers to female and minority candidates. The candidates who accepted include four women and one male of Hispanic descent. But 15 offers were made to excellent women and minority candidates.

"We had five who accepted, thus our yield rate was 30 percent," the dean says. "We want to do better in the future."

The drive to hire more tenure-track faculty is only part of the School's expansion. For every tenure-eligible academic, the School has added two new research professors, adjuncts or lecturers.

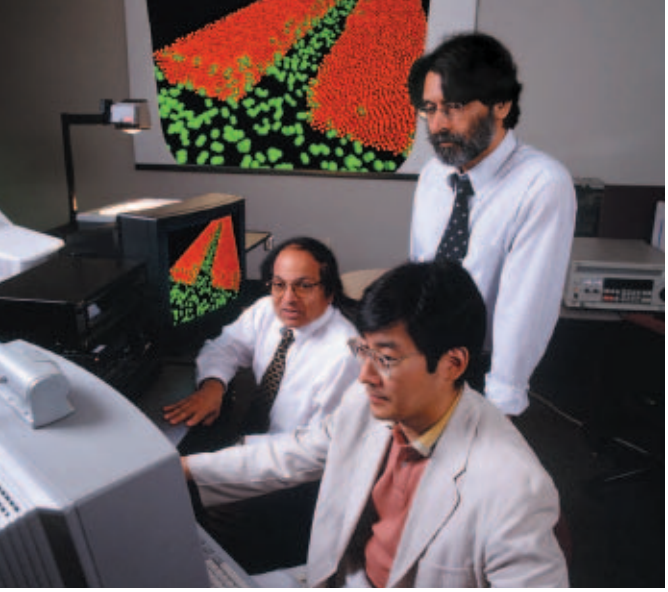
RESEARCH PROFESSORS

Paul Debevec is a research assistant professor who created the special effects technology used in the first Matrix movie. **Laura Marcu** is a research associate professor of biomedical engineering, working on molecular imaging. **Ann Chervenak**, a research assistant professor of computer science, is working on grid computing at the Information Sciences Institute. **Jennifer Swift** is a research assistant professor specializing in earthquake engineering in civil engineering.

Of the new tenure-track faculty, 11 are tenured professors. These senior faculty members have the following specialties:

INFORMATION TECHNOLOGY

Rajiv Kalia, **Aiichiro Nakano** and **Priya Vashista** together head one of the world's leading supercomputing groups, specializing in advanced computational simulations. Recruited jointly by USC Engineering and the College of Letters, Arts & Sciences, the researchers came to USC from Louisiana



Rajiv Kalia, Aiichiro Nakano and Priya Vashista

State University, which they had joined from Argonne National Laboratory. All three have joint appointments in the School and the College. The professors brought with them seven post-doctoral researchers, 10 graduate students and a systems manager. Though the research group has a 166-node supercomputer, it also plans to work with the 320-node supercomputer at the USC Center for High-Performance Computing and Communications. The group has developed software to visualize billions of atoms of material at once, allowing simulations of formerly nebulous processes. The main goal has been to achieve greater strength in ceramic materials and greater speed in electronic devices, but the research has wider applications in nanotechnology, materials, molecular biology, pharmacology and bioengineered systems.

"We put USC on the map in the area of high-performance computing. It's an expertise that as a university we didn't have," says Nikias.

Cauligi S. Raghavendra is a professor of electrical engineering, formerly with the Aerospace Corporation. He is also the new chair of Electrical Engineering – Systems. Raghavendra's current research focuses on wireless and sensor networks, energy-efficient algorithms and protocols and active networks. He is conducting pioneering work in the area of power-aware protocols for wireless communications.

Leana Golubchik is associate professor of computer science. Previously she was at the University of Maryland and Columbia University. Golubchik directs the Internet Multimedia Laboratory at USC and is an expert in Internet-based computing, multimedia systems and computer systems modeling and performance evaluation. She is a winner of the National Science Foundation Career Award, the IBM Doctoral Fellowship and the NSF Doctoral Fellowship. At USC, Golubchik designed the new masters program in computer science with a specialization in security, one of the nation's first. She will teach core courses in the program, offered remotely through DEN, starting this fall.

Ramesh Govindan, associate professor of computer science, is one of the world's leading authorities on communication networks. He developed several software systems, including Internet route flap dampening, E-BGP Route Server software and the Mercator Internet mapping tool, which are used in the Internet today. He is the director of USC's Embedded Networks Laboratory and co-principal investigator on the NSF-sponsored Center for Embedded Networked Sensing.

Sven Koenig is an associate professor of computer science, formerly at Georgia Tech. His research centers on ways to enable situated agents (such as robots or decision-support systems) to behave intelligently in their environments in real time, even when they have incomplete knowledge of their surroundings, imperfect abilities to manipulate their environment, limited perception or insufficient reasoning speed. Koenig is a winner of the NSF Career Award and an IBM Faculty Partnership Award.

Milind Tambe is an associate professor of computer science and has been the principal investigator or co-PI in research grants totaling $7 million. His research interests include multiagent systems, specifically multiagent teamwork, agent-human interactions and distributed negotiations. He won the 2002 Best Paper award at the International Joint Conference on Autonomous Agents and Multiagents and has been a trustee of the RoboCup Robot Soccer Federation.

BIOMEDICAL TECHNOLOGY

Norberto M. Grzywacz, professor of biomedical engineering, was formerly at the Smith-Kettlewell Eye Research Institute in San Francisco. His research involves combining experimental techniques with computational modeling to study visual perception and neural processing in the retina. A "key senior faculty," according to Nikias, Grzywacz heads the Visual Processing Laboratory and directs USC's new Center for Vision Science and Technology.

K. Kirk Shung, professor of biomedical engineering, has earned the nickname "Mr. Ultrasound" in 30 years of groundbreaking research in biomedical ultrasound technology. Internationally recognized as one of the top five researchers in the field, Shung came to the School from Penn State, bringing with him the Ultrasonic Transducer Research Center. UTRC is the nation's only center for the development of ultrasonic transducer/array technology for medical diagnostics. The first 30 MhZ transducer/array was created in Shung's laboratory. Shung also brings with him five graduate students, four research staff, an engineer and a technician.

AEROSPACE AND MECHANICAL ENGINEERING

Michael Kassner, professor of mechanical engineering and material sciences, is the new chair of the department of aerospace and mechanical engineering. He was formerly at Oregon State University and at Lawrence Livermore National Laboratory. Kassner is pursuing research on creep, fracture, fatigue and thermodynamics. His research is supported by grants from NSF, the Basic Energy Sciences of the Department of Energy and Lawrence Livermore National Laboratory. "Michael Kassner is truly a leader," says Nikias, adding that USC plans to hire additional faculty for AME in the near future.

Brun and Ordóñez photos by Max S. Gerber

ASSISTANT PROFESSORS

Todd Brun
Assistant Professor, Electrical Engineering – Systems
Quantum computing and quantum information theory
Ph.D. Physics '94, Caltech

Elaine Chew
Assistant Professor, Daniel J. Epstein Department of Industrial and Systems Engineering
Computational models for musical design
Ph.D. Operations Research '00, MIT

Hossein Hashemi
Assistant Professor, Electrical Engineering
Nanotechnology
Ph.D. Electrical Engineering '03, Caltech

Tzung Hsiai
Assistant Professor, Biomedical Engineering/ Cardiovascular Medicine
Diagnostic micro- and nano-sensors for fundamental cardiovascular research
Ph.D. Biomedical Engineering '01, UCLA; M.D. '93, University of Chicago

David Kempe
Assistant Professor, Computer Science
Randomized and graph algorithms and decentralized communication protocols
Ph.D. Computer Science '03, Cornell University

Bhaskar Krishnamachari
Assistant Professor, Electrical Engineering, Computer Science
Fundamental principles and the analysis and design of protocols for next-generation wireless sensor networks
Ph.D. Electrical Engineering '02, Cornell University

C. Ted Lee
Assistant Professor, Chemical Engineering
Responsive surfactant systems (systems tunable through manipulation of an external variable, allowing nano-level control of surfactant structure)
Ph.D. Chemical Engineering '00, University of Texas


Assistant Professors Todd Brun and Fernando Ordóñez

Krishna Nayak
Assistant Professor, Electrical Engineering
Rapid magnetic resonance imaging, medical image acquisition and reconstruction
Ph.D. Electrical Engineering '01, Stanford University

Michael Neely
Assistant Professor, Electrical Engineering
Analysis and control of data networks with applications to satellite and wireless systems
Ph.D. Electrical Engineering '03, MIT

Fernando Ordóñez
Assistant Professor, Daniel J. Epstein Department of Industrial and Systems Engineering
Optimization algorithms, high-performance computing, applications of optimization
Ph.D. Operations Research '02, MIT

Banu Özden
Assistant Professor, Computer Science
General systems, including operating systems, storage networking and systems, multimedia systems
Ph.D. Computer Engineering '95, University of Texas

Konstantinos Psounis
Assistant Professor, Electrical Engineering – Systems
Networking solutions based on probabilistic methods
Ph.D. Electrical Engineering '02, Stanford University

Pin Wang
Assistant Professor, Chemical Engineering
Biosynthetic methods for engineering novel proteins for applications in human health, specifically glycobiology, molecular medicine, tissue engineering, and gene delivery
Ph.D. Chemical Engineering '03, Caltech

Maria Yang
Assistant Professor, Daniel J. Epstein Department of Industrial and Systems Engineering
Information technology for facilitating the design and manufacturing process
Ph.D. Mechanical Engineering '00, Stanford University

Jesse Yen
Assistant Professor, Biomedical Engineering
Development of novel diagnostic ultrasound systems and ultrasonic/array transducers
Ph.D. Biomedical Engineering '03, Duke University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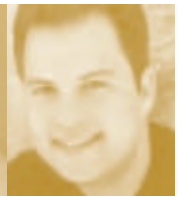
Neely


Chew


Ozden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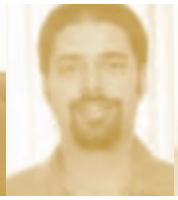

Fine


Tae-Seong

Spanish 101 Engineering Undergrads Explore Europe

by Christian Camozzi

The academic plates of engineering undergraduate students are truly full. Students juggle thermodynamics with calculus, and chemistry with computational methods, hoping to cram their required courses into a mere eight semesters. This leaves little room for free units-dessert. You might think there is no time for a semester abroad.

But you would be wrong. Engineering students can have their dessert and eat it too.

The School currently offers a summer overseas program, a chance for engineering students to venture abroad and still take courses that fulfill their academic requirements. This past summer, 22 students, three teachers, two administrators and one teacher's assistant trekked to Madrid, squeezing Spanish courses and museum trips into the students' already busy curriculum.

The program actually has a considerable history, having debuted in 1981 with a session in Madrid. It took an eight-year hiatus, then returned in 1989 and has been held every other year, alternating between London and Paris.

The program's academic offerings have expanded significantly. In 1981, it offered one class and an internship; in 2003, it expanded to four classes, including three upper-division courses in the engineering curriculum. These courses are taught by USC faculty and fulfill graduation requirements for the School's various engineering majors.

"This means students can participate in an abroad experience without pushing their graduation date back," says Krupa Savalia, a sophomore from West Orange, New Jersey, studying biomedical/biochemical engineering.

In the most recent session, the program saw the largest number of participants in its history, and the School now hopes to offer the program every year while expanding the list of overseas options. Next summer, students will again head to Paris. Rome remains on the program's radar screen as a future study destination.

To coordinate this program, the School partners with Accent International, an international education organization that works with more than 50 American colleges and universities. Accent helps organize study-abroad programs and provides reliable housing and computer facilities, as well as helpful advice and guidance for students.

This support is key, since the students' schedule can be intense. "Classes are extremely fast-paced," says senior Christine Keushguerian, an environmental engineering major. "The same amount of material taught in the 15-week semester is covered in just six weeks."

She adds, "The time constraint was a major challenge. When faced with the decision to finish a thermodynamics problem or view the collection of Salvador Dali's masterpieces at the Reina Sofia, which would you choose?"

However, the bond that students and faculty develop balances this intensity. Classes are small, and this past summer's participants made a number of excursions, including trips to Seville, Granada, Segovia and Cordova.

"You get to know people much better," says Geoff Shiflett, associate professor of aerospace and mechanical engineering, who has taught the thermodynamics course during the past three overseas sessions.

"I don't usually go out to lunch or ride a bus for six hours with students," adds Steve Bucher, who taught an advanced undergraduate writing class this past summer. "When you're on a bus for six hours at a time, it's hard not to bond."

This camaraderie energized program participants. "The students and teachers shared dinners, outings, overnight trips, excursions and the excitement of a foreign environment," Keushguerian says.

"We fought through the same language and custom barriers," adds Jason Chan, a junior majoring in mechanical engineering.

Back home in the United States, students reflected on their experience in Madrid, preparing papers for Bucher's writing class, a required course for engineers. Many students said they look at their field in a new light, and

"The same amount of material taught in the 15-week semester is covered in just six weeks."

each seems eager to develop into a global engineer, described by junior Ammar Chinoy as "an engineer that, culturally speaking, transcends geographical boundaries."

Chan, who plans to attend law school with his engineering degree, agrees. "With engineering being such a global profession, there is a great need for students to experience other cultures. As future engineers, we may need to coordinate tasks or projects with companies or clients based in other countries. Or we may find ourselves working for large international companies that need engineers who are able to work in different locations around the world."

An international student from Pakistan, Chinoy adds, "I realize the important role that cultural immersion plays in structuring a global engineer." He believes a study-abroad experience makes students "more versatile and universal in nature."

As he sees it, this change comes as students understand and adapt to cultural differences. "Adaptation essentially eliminates further culture shock," he says, "and results in the development of an able and truly global engineer."

Resoundingly, the returning students appreciate the value of their experience and the power of their broadened perspectives. They are quick to connect it to the professional work they will do in the future.

For many of the students, this was their first trip outside of the United States, and their time in Madrid made them more aware of their own cultural identities. Suddenly, they were foreigners.

"Living my whole life in a small suburb 12 miles away from USC, I have always had the luxury of going home whenever I pleased," says Keushguerian. "Being away from family and friends for a substantial period of time has given me a stronger sense of independence and responsibility."

But that does not mean she didn't face challenges along the way. "Studying abroad is all about the frustration of miscommunication," she admits. "It's about the need to play charades when buying nail polish remover and pointing at fruit you don't know the name of."

Chinoy, however, sees a payoff for all the frustration. "The program allows engineers to adapt to a different culture and become more open-minded, creative and well-rounded individuals."

He jokes about the stereotypes Americans have about Spanish culture. "When visiting Spain, you learn that the country has more to offer than bulls, flamenco, sangria and siestas."

But perhaps the main difference students discovered between American and Spanish culture had to do with energy conservation. As Chinoy explains, "Europe in general and Spain in particular, prioritize conservation in terms of reduced consumption. Spanish electrical, transport and telecommunication systems are all influenced by this quest for efficiency.

"The lack of air conditioning, time-controlled lights and smaller vehicles are all elements of Spanish culture that Americans are not entirely acquainted with."

Senior Jennifer McLean, an environmental engineering major, agrees: "The entire city of Madrid has been designed to save energy and increase efficiency wherever possible."

Chan adds, "The streets of America, especially Los Angeles, are a stark contrast to those of Madrid, and those of Europe as a whole. Large sedans and SUVs don't dominate Madrid's roads. Instead, highly fuel-efficient subcompacts seem to be the automobile of choice."

In recognizing these differences, students can see how their professional work as engineers will be culturally specific. They see the importance of being mindful of people's culture as they carry out their work. In a very real way, they understand that the concepts they learn will touch people's lives, and that their work is closely tied to the world around them.

After all, as Savalia put it, "Engineering affects everyone, no matter where they live, and is ultimately a means of serving humanity."

Christian Camozzi's article was based on stories written by program participants Jason Chan, Ammar Chinoy, Christine Keushguerian and Krupa Savalia for their engineering writing class.

"Throughout the six weeks, I was able to discuss aqueduct architecture with a native of Segovia, raise doubts about the supposed remains of Christopher Columbus at the cathedral in Seville, have an interesting conversation with a local professional about the aeronautical industry in Spain, and bargain with local vendors. Engineering today is not just based on science and mathematics. It is a much more diverse and well-rounded field that requires genuine cultural understanding."

Gustavo Buenrostro is in his third year majoring in aerospace engineering. His post-graduate plans include pursuing a masters degree in aerospace engineering at USC and working for a Los Angeles-based aerospace company.

"As an environmental engineering major, I found the attitude of Madrileños, and Europeans in general, toward efficiency and conservation to be very interesting. The entire city of Madrid has been designed to save energy and increase efficiency wherever it is possible. For example, lights in hallways and other common areas in buildings are set to timers so that lights are not left on to waste electricity."

Jennifer McLean is majoring in environmental engineering and is in her last year at USC.

Rock and Roll Engineering

Erik Johnson, assistant professor of civil engineering in the School of Engineering is a structural engineer, but his computer science skills played a crucial role in the success of a history-making experiment this past summer.

As scientists across the country looked on, an artificial earthquake shook a building that was, itself, only half-real.

Part of the structure was conventional steel: full-sized structural support columns sitting in laboratories at the University of Colorado and the University of Illinois at Urbana-Champaign. But a third support column — and the floor that rested on them, forming a typical one-story, modern steel-frame building — existed solely in software.

They were simulations, created by grid-linked machines at the National Center for Supercomputing Applications in Illinois and elsewhere. Physical stresses on the real columns, hundreds of miles apart, produced a set of digital signals that interacted with the virtual structure.

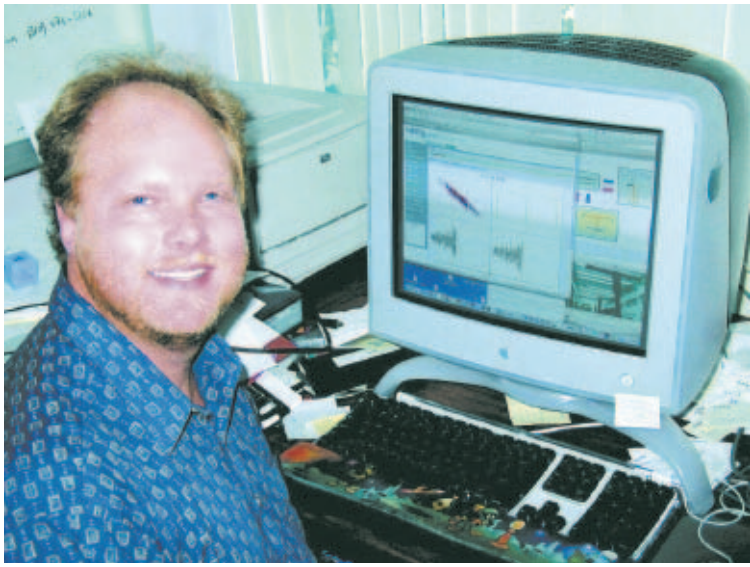
The result was a realistic representation of the effects of an earthquake, creating a profusion of real-time data — video images and records of stress and movement — that were distributed by high-bandwidth connections to researchers in dozens of locations from National Science Foundation (NSF) headquarters in Washington, D.C. to California.

"This represents a new way of conducting earthquake engineering experiments," says Carl Kesselman (MSEE '84), director of the Center for Grid Technologies at the School's Information Sciences Institute.

Kesselman's Grid center co-created the "middleware" that allowed the experiment to proceed across continental distances, through Java interfaces. But it was Johnson who bridged the gap between Java and the Matlab computer language used by engineers.

Johnson's software and the experiment functioned as designed.

"On a scale of 10, I would say it was a 9.5," says Johnson, adding that the project had gone almost completely as planned. The only glitch was a network outage that cut the five-hour experiment about 10 minutes short. Another experiment is planned early next year.



Erik Johnson

The exercise was the first full-scale, multi-site virtual temblor for NEESgrid, a resource that helps engineers examine the effects of earthquakes on structures. NEESgrid is a consortium of institutions that includes USC, the Argonne National Laboratory and the University of Michigan. It is part of the George E. Brown, Jr. Network for Earthquake Engineering Simulation project. In addition to the National Supercomputing Center, participants include the University of Illinois Mid-America Earthquake Center and the University of Illinois' civil engineering department.

"The goal is to create a collaborative research network by linking researchers and engineering testing facilities across the United States, and providing them with the latest computational tools," says Priscilla Nelson, who was NSF division director for civil and mechanical systems at the time NEESGrid was created in August 2001. "We expect this network to speed the simulations, experiments and data analysis that lead to better seismic design and hazard mitigation."

The exercise was the first full-scale, multi-site virtual temblor for NEESgrid, a resource that helps engineers examine the effects of earthquakes on structures. NEESgrid is a consortium of institutions that includes USC, the Argonne National Laboratory and the University of Michigan.

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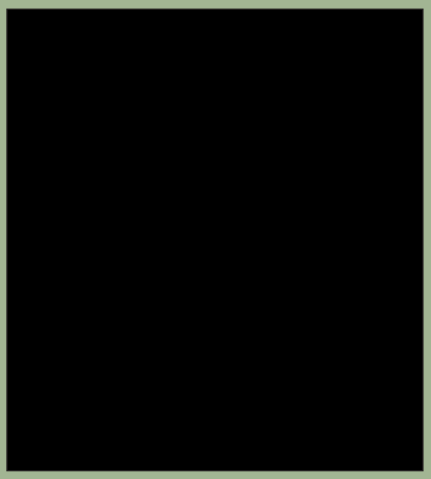

Rossiter L. White

The School of Engineering's David M. Wilson Associates Endowed Scholarship Fund has received a generous bequest of nearly $190,000 from the estate of the late Rossiter Lawrence White (BSCE '40).

Rossiter White, known as "Ross" to his friends and co-workers, was a licensed civil engineer and structural engineer who served in the Army Corps of Engineers during World War II. After leaving the service he began a lifelong career with the Power Division of the Los Angeles Department of Water & Power.

As a member of the DWP's Station Design Group, White designed the structural aspects of the county's electrical distribution systems. His largest project was the structural design of the powerhouse and surge chamber for the Castaic Hydroelectric Power Project, which was a major component of the California Water Project. He also notably worked on several large bridge projects in the Inland Empire.

White's fellow engineers at the DWP remember him as a "sharp, fast designer" and an "engineer's engineer" whose technical skills and professionalism earned the respect of all who worked with him. He was an avid reader who built an extensive book collection, and was also an adventurous worldwide traveler.

During his years at USC, White studied with legendary professor David M. Wilson, who mentored and assisted countless students from the 1930s through the 1950s, often drawing from his personal funds to aid students in need. In 1959, the University recognized Professor Wilson's untiring devotion to the School of Engineering and his civil engineering students by establishing the David M. Wilson Associates Endowed Scholarship Fund, which provides critical support to undergraduate students in civil/environmental engineering at USC.

It is fitting that Ross White, a man who himself served as mentor and "father figure" to many young people throughout his own career and life, would make a bequest that both honors a beloved professor, and supports undergraduate engineering students. Through this gift, new generations of civil and environmental engineering students will benefit from the generous spirit of these two Trojan engineers, each of whom helped pave a path to the future in their own unique way.

If you would like more information about the **David M. Wilson Associates Endowed Scholarship Fund** *or about making a bequest gift to the USC School of Engineering, please contact the Office of External Relations at 213/740-2502.*

f = ma

Bruce Matthews, BSISE '83

All American Student, All American Athlete, NFL Legend — He Knows the Formula for Success

Matthews in action on the field.

Bruce Matthews (BSISE '83) was known as the National Football League's "iron giant" and even the "bionic man" during an extraordinary 19-year career as an offensive lineman with the Tennessee Titans (formerly the Houston Oilers). Until he retired, he held the NFL's longest active streak for games played at 184 and the most consecutive starts at 181. He was selected for the Pro Bowl 11 consecutive seasons at two different positions (seven as guard and four as center). Only two other players, Reggie White (13) and Jerry Rice (12) have been named to more.

Bruce Matthews

While it's true that he's big — 6'5", 305 pounds — he was admired as much for brains as brawn.

"During my early years in pro football," he says, "I was all raw physical energy. But as I gained knowledge and experience, I could play smarter. This was a great help as I grew older and had less energy, in a profession where the typical NFL career lasts less than four years."

Matthews honed his athletic skills at USC, blocking for Heisman Trophy winners Charles White and Marcus Allen, and was selected for both the All-American and all-PAC-10 teams.

He was snapped up by the Houston Oilers during the first round of the NFL's 1983 draft, and went on to play in 296 games with the Oilers/Titans – more than any other offensive lineman in NFL history.

At USC, Matthews made a good impression on and off the field. "Bruce was a BMOC [Big Man on Campus], but you'd never know it from the way he behaved," says ISE Professor Jerry Fleisher, who recalls Matthews with great fondness. "He was very down-to-earth and modest. He took every engineering course on schedule, attended every class, and never asked for special treatment or time off as a football player — yet he still graduated in four years, as a strong B student. And he earned those Bs — he took all the difficult courses. I'm convinced he would have been an A student if he hadn't played football."

Matthews modestly downplays his academic prowess. "You know, I think playing football actually helped my grades," he says. My GPA was always higher in the Fall, during football season, because my schedule was so tight. I knew I didn't have weekends available to study, so I had to do it the first free moment I found during the week. In the Spring, there was more time to do things with friends, so I'd often find myself having to study at the last second. And since I can't stand losing, if I got a lousy grade, I had to work to get it up."

Matthews says USC was an easy choice for him. "They'd won a national championship, and I knew I wanted to play with the best players in the country. My older brother, Clay, Jr., had been an All-American linebacker at USC [who went on to play for the Cleveland Browns and Atlanta Falcons]. But it was my father who got me into engineering."

Clay Matthews, Sr., was a linebacker with the San Francisco 49ers during the 1950s. "Although I never saw my father play, I'd always been impressed by his standard of excellence," Matthews says. "Everything he did, he did with integrity. My dad had a degree in industrial engineering from Georgia Tech, and he always told me there's so much flexibility in what you can do with an engineering degree. That made a big impression on me."

For Matthews, pursuing a degree in engineering seemed the most normal thing in the world. "I was lucky to have two teammates who were engineering majors," he says. "Anthony Gibson (BSISE '83) was in ISE with me, and Fred Cornwell was in civil engineering. We were the same age, we took a lot of classes together, and we all felt that it was a great place to start, even if we didn't go into the field. I really didn't realize how unusual we were until I turned pro. I haven't come across many engineering degree holders in the NFL."

He put his training to good use. "Of course, the main concept I've utilized professionally has to be force equals mass times acceleration,'" Matthews says. "But engineering also taught me a lot of problem solving techniques, which I used as a pro, and also when I left football and got into construction. I'd be using physics, math – all kinds of things I thought I'd forgotten – while building cabinets and laying things out. I love the sense of completion you get when something's finished. That's why I enjoyed my engineering classes: there was always a definite answer. I struggled more in my classes that relied on abstract concepts, like English," he admits.

Matthews may have worked hard to excel in class and on the playing field, but he still found time for his social life. He met his wife, Kerry Kitchen Matthews (BS EXSC '83) when they were both sophomores. "I lived in Trojan Hall, and Kerry lived next door in EVK," he says. "I ate at her dining hall a lot, and would see her around." They met on the way home from the first football game of the year, against Knoxville. "Two weeks later, we went on our first date," Matthews recalls. "I'd gotten back from an away game at Minnesota at 11:30 at night, and we went to a midnight showing of Monty Python's Life of Brian in Westwood.

"Kerry and I were serious about each other from the start," he says. "Four or five weeks after we met, we starting talking about getting married when we graduated. And we're still

continued on next page

Elmer Kaprielian, BSEE '42

As a Class of '42 School of Engineering graduate, Elmer Kaprielian learned the kind of electrical engineering that we all take for granted today.

"It was about electricity. We learned about motors and transformers and generators and switches," he says. It wasn't about information technology, biotechnology or nanotechnology. "None of these things function if you don't have reliable and economic, commercial electric power. It all amounts to zero, absolute zero, when the lights go out."

After a stint as a reserve officer in the Navy, Kaprielian went to work in 1946 as an estimator for Pacific Gas and Electric Co. and retired 41 years later as senior vice president for Power Generation and Transmission. He takes great pride in the fact that during the 18 years he managed the department, the lights stayed on.

California's power problems in recent years and the blackout last August over large areas of the East Coast and the Midwest, are a reminder that we can no longer take reliable electric power for granted. Kaprielian suggests that electric power should be on the agenda of engineering schools.

"I'm just a bystander now who has never lost interest in the thing that got me into electrical engineering," he says. When the State of California began licensing engineers in the late 1940's, Kaprielian decided to get the license, although it was not a requirement, and he therefore holds license #342.

"I love engineering," he says.

Elmer Kaprielian was not the first Kaprielian to attend the School. His father, Michael Kaprielian (BS '13) graduated as an engineer in 1913 when Engineering was part of USC's Physics department. His older brother Roy Kaprielian (BSCH '43) received a chemical engineering degree. However, his son Douglas Dean Kaprielian, got his USC degree in business and finance.

Kaprielian says he has known all of the School's deans, including Zohrab Kaprielian to whom he is not related.

Elmer Kaprielian

"He was a good friend and I used to visit him a couple of times a year. He got his first degree in the Near East, in a part of the world where being an Armenian wasn't easy.

"I'm not the scholar that he was," adds Kaprielian. At USC, Kaprielian played in the Trojan Band and lived in a dormitory a block from the School. "Several of the happiest years of my life were spent at USC."

Matthews *continued from page 36*

together, with six great kids and another on the way." Today, Bruce, Kerry and their family live in Sugarland, Texas.

Family plays a major role in Matthews' life. "My brother Clay was five years older than me," he says. "Growing up, I liked being around him. He was always my hero. Even though I was taller and heavier than he was, I'd watch how he prepared and worked out with the Browns so I could pattern myself after him. Then one day – there I am, playing in the NFL against my brother's team! I'd been a fan of the Browns for five years, and part of me just wanted to watch what Clay and his team were doing. It was really hard for me to focus, those first two years when the Oilers were playing the Browns. I remember back in 1986, he beat me and sacked the quarterback. I had to fake being upset – because even though we were still trying to win the game, I wanted to cheer him!"

Matthews' sense of fair play and high personal standards were legendary throughout the NFL, where he was held in high regard for his work ethic, leadership and high level of play. "I feel a real sense of responsibility when I do stuff," he says. "I want to do it right, and I do whatever needs to be done. Though that doesn't keep me from thinking I could have done it better. My dad taught me something I've never forgotten: If you're going to sign your name to anything, make sure you do it right. That's something I've tried to do throughout my life."

Back in the early 1980s, this same approach to life, school and work endeared Matthews to his engineering professors. "For two decades now," says Prof. Fleisher, "I've held Bruce up as an example of the ideal scholar/athlete when I talk to new generations of engineering students. To me, Bruce was more than an All-American athlete — he was an All-American student as well."

This was one of the reasons why Dean C. L. Max Nikias nominated Matthews for a 2003 USC Alumni Merit Award, which he received last March. "Talk about humbling!" Matthews says. "There I was at the awards dinner, being recognized alongside a Marine Corps Major General who'd been a shuttle astronaut, a woman who's an internationally acclaimed expert on cancer and AIDS, and the chairman of Walt Disney Motion Pictures. What an honor! I've never felt I did anything that special. I've just taken what God gave me, and used it as best I can."

Bruce Matthews and Coach John Robinson at USC.

This modesty has been a hallmark of Matthew's entire career. "Sure, the attention, applause and money are great," he says, "but in the end we all have to answer to God. I'd like to think I've lived my life in a way that honors Him."

Albert D. Griffin, Jr., BSCE '45

Griffin with his pedicycle-drawn calliope.

Albert Devereux Griffin, Jr., is hardly your typical engineer. At 80 years of age, he can be found body surfing at Orange County beaches or kicking up his heels at a Dixieland dance. Awhile back, Griffin was thrown out of a parade in San Juan Capistrano thanks to the scantily-clad "Lady Godiva" who was riding in the back seat of his electric-powered pedicycle, accompanied by "one hundred year-old music" from Griffin's portable calliope.

Perhaps only someone with impeccable engineering credentials could get away with such colorful behavior. "My brother, Bill Griffin (BSCE '50), also graduated from USC Engineering," says Griffin, "and our father, Al Sr., was a famous civil engineer who invented the freeway. He designed the very first freeway in the United States — the Arroyo Seco, now known as the Pasadena Freeway, which launched California as the national leader in freeway development."

"Dad's first highway design of note was the Traffic Circle in Long Beach," Griffin adds. "Because it was before its time, many people got on it going in the wrong direction, and some were killed or badly injured. My dad was threatened with lawsuits many times. He also designed the famous four-level intersection where the Pasadena, Harbor, Hollywood and Santa Ana freeways meet near downtown L.A. He created a reverse cloverleaf design that didn't take up as much space as traditional intersections. Everyone told him it would never work, but it still does. "

Griffin recalls his days at USC with pleasure. He was a transfer student from Los Angeles City College, where he admits he was nearly flunking out. "Once at USC, though, I really took my engineering studies seriously, and quickly pulled my grade average up to a B." Following Griffin's first year at USC, he signed up for the U.S. Navy's V-12 training program, a collaboration with universities across the U.S. that was designed to produce well-trained, intelligent Naval surface line officers for World War II. "I had to be a very serious student," Griffin says. "It was a demanding course of study."

In spite of the rigors of wartime education, Griffin made sure he enjoyed a full undergraduate experience at USC. "In my first year," he says, "I pledged the Sigma Alpha Epsilon fraternity. I competed in swimming and in gymnastics, where I performed on the still and flying rings, coming up second in the all-city competition."

"My most fond recollections of USC Engineering are of Professor David Wilson," Griffin says. "He made difficult engineering concepts easy for us to understand. He was affectionately patient with some of us, not proceeding ahead until we understood what he had presented up to that point. I stayed in touch with him long after graduation, through his fall and recovery, and for awhile I was a member of the David Wilson Associates."

Griffin is grateful for the opportunity to study at USC. "To have attended USC and graduated in difficult times, in a field recognized to be challenging, gives me great pride," he says. "I often felt the envy of my colleagues who graduated from less prestigious universities. I am sure that my USC degree was a major reason I was offered some of the fine jobs I have had."

Upon graduating from USC, Griffin was ordered to the Naval Officer Candidates School at Camp Endicott in Rhode Island. Following that training, he was commissioned as an Ensign in the Civil Engineer Corps.

After the war, Griffin oversaw construction of the South Laguna Sanitary District sewer collection and disposal system, and did so well that he was later named district manager. "But my crowning achievement," Griffin says, "was being named facilities engineer for the Marine Corps Air Station at El Toro. I held the highest general service rank on base, and was also responsible for Marine Corps bases at Camp Pendleton, Station H in Tustin, and Yuma, Arizona." Griffin retired from this position 29 years ago.

Griffin has been married, divorced, and raised four daughters. He has stayed active in several of USC's Orange County alumni organizations and occasionally takes trips with the Trojan Travelers. He had a grand time at his 50th reunion in 1995. "We had so much fun, reminiscing about the past. Many of us were in the Navy's V-12 program, and it was wonderful to be able to share our stories. We'd definitely like to come back to campus in 2005, to celebrate our 60th reunion!"

Through the years Griffin has made sure that he stays in touch with the School of Engineering. "Ted McConville (BSCE '43) has been very good about sponsoring the David Wilson Associates events in Orange County each year. Lots of young engineers attend, many of them ladies. I think it's great!"

Griffin is equally enthusiastic about his numerous hobbies. "I was a lifeguard when I was younger, and I love the ocean, so body surfing is a real pleasure," he says, adding modestly that "You know, I'm not the only one from my era — my good friend Arthur Beard (BSCE '46) still board surfs in San Clemente with his kids!"

Griffin's other interests include the aforementioned Dixieland dancing, singing and playing the piano, organ and calliope. "After I retired," he explains, "I took a trip on the Mississippi Queen and heard my first calliope. I fell in love with the look and the sound, so when I got home I bought a trailer-mounted calliope with keyboard and music roll. Then when I was at the Embarcadero in San Francisco, I purchased a pedicycle so I could tow the calliope, which weighed a ton. I got a really good deal: the pedicycle had been made in Bangkok and was designed to carry Asian passengers. The American owner could only fit in one Western passenger at a time, so he sold it to me for only $300! I added an electric wheel chair motor, so it would look like I was pedaling even when I was taking it easy."

Griffin would play his pedicycle-drawn calliope at circuses, carnivals and parades near his home town of Dana Point, treating audiences to a grand repertoire of old-time tunes. He often invited a shapely young bikini-clad beauty to ride in the back seat of the pedicycle, dressed as Lady Godiva in a long blonde wig. "We were the hit of the parades," he laughs, "especially when the wind blew!" (Of course, the parade organizer from San Juan Capistrano might differ with this assessment.)

"I'm not your typical engineer," Griffin admits, "But I feel I am not boring. I enjoy working with people, I'm active, and I have a sense of humor. Perhaps I should have considered a different career," he muses, only half-seriously. However, with his enthusiasm for USC and his enduring good humor, Griffin provides a delightful example of how much fun life can be when you're a USC Engineering alumnus.

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Scalise (George M. & Dorothea K.) Family Trust
Mr. & Mrs. John F. Shea
Mr. & Mrs. Scott R. Shoults
Mr. & Mrs. Mark A. Stevens
Dr. & Mrs. Marvin S. Stone
Mr. & Mrs. John E. Tahl
Mr. & Mrs. Paul L. Traylor
Mr. Ronald N. Tutor
Dr. & Mrs. Andrew J. Viterbi
Mr. & Mrs. John Wakerly
Mr. & Mrs. Emrick A. Webb
Dr. Peter S. Willcox
Mr. Fred Zohouri

* WHILE EVERY EFFORT HAS BEEN MADE TO ENSURE THE ACCURACY OF THIS INFORMATION, SOME NAMES MAY HAVE BEEN INADVERTENTLY OMITTED OR INCORRECTLY LISTED. PLEASE NOTIFY THE ENGINEERING OFFICE OF EXTERNAL RELATIONS AT 213-740-2502 IF YOU NOTICE A DISCREPANCY IN YOUR LISTING.

snapshots

USC School of Engineering Events
Late Summer & Fall 2003

Susan and Lawrence A. Keller (BSAE '91, MSAE '92) at the pre-concert dinner.

Dean's Circle Dinner and Concert at the Hollywood Bowl

Over 40 of the School of Engineering's alumni and friends gathered on the Museum Patio of the Hollywood Bowl for a private dinner with Dean C. L. Max Nikias on Saturday, August 9. The group of the School's most consistent and generous supporters then enjoyed an evening under the stars with John Mauceri conducting the Hollywood Bowl Orchestra, special guests Carol Channing and Michael Buble, and a spectacular fireworks display.

Judith Miller, ARCS National President (l) with former ARCS scholar Sally Jercha (BSChE '00) and her husband, Tony.

ARCS National Visit Dinner

Dean Nikias hosted the national members of the Achievement Rewards for College Scientists Foundation (ARCS) on September 25 at an intimate dinner at the California Club in Los Angeles. Judith Miller, national ARCS president, along with sixty other members attended the dinner and listened to remarks presented by Dean Nikias entitled "Time for a New Hollywood". The ARCS National Board meeting was held the next day at the University of Southern California campus.

Natalie and Ken Klein (BSBME '82) and James Braze (BSME '68) at the Weekender reception.

Weekender Reception in San Francisco

On Friday, September 26, the School of Engineering hosted nearly 70 Northern California alumni, parents and friends during its annual Weekender reception. Held at the Hyatt Regency San Francisco overlooking the Embarcadero, the event attracted many from the USC East Bay Alumni Club, members of the USC Alumni Association and others traveling for the USC v. Cal football game. Dean Nikias was given a special introduction by alumnus speaker Kenneth R. Klein (BSBME '82), COO of Mercury Interactive Corp. and member of the School's Board of Councilors.

Alumni Reception in Chicago

Dean Nikias and other School of Engineering leaders hosted several dozen alumni, parents and friends at an alumni reception at the Hyatt Regency in Chicago on Friday, October 17. Also in attendance were members of the Mid-west alumni club and other USC friends traveling to the USC v. Notre Dame football game. Dean Nikias was graciously introduced by alumnus Chris Kittides (BSAE '63, MSAE '65), the president and CEO of BEI Associates, Inc. in Detroit. The group followed the reception with a Spirit of Troy pep rally also at the Hyatt.

2003 Homecoming Celebration

Over 250 alumni and friends of the School of Engineering celebrated their Trojan status at the School's 2003 Homecoming and Reunion Picnic. The group joined thousands of other Trojans for one of the most highly attended homecoming celebrations in USC history. Many of the School's picnic guests were winners of USC and Engineering products from the raffle held to raise money for student scholarships. The group then went on to cheer the Trojans as they enjoyed a decisive victory over Washington.

Alumnus Doug Litchfield (BSCE '80) and his family, wife Patrice and kids Cheryl and Jesse enjoying Homecoming.

Dean Nikias, Y. H. Cho, Cho family members and representatives from Inha University open the Jung Seok Memorial Library.

Dean C. L. Max Nikias Helps Dedicate New Library Built in Memory of C. H. Cho

Dean C. L. Max Nikias traveled to Inha University in Incheon, Korea on September 17 and 18 for the dedication of the Jung Seok Memorial Library built in memory of Choong Hoon (C. H.) Cho, late father of Y.H. Cho, member of both the USC Board of Trustees and the School of Engineering's Board of Councilors.

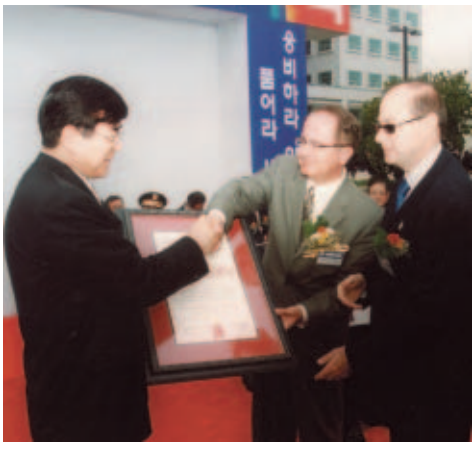
"It is the most advanced digital and multimedia library in Korea, and a wonderful tribute to a great man," says Nikias. "The six story building was designed by USC Trustee Gin D. Wong and C.H. Cho was able to see the site and the design while he was still alive."

During the dedication ceremony Nikias and Joseph Aoun, dean of the USC College of Letters, Arts and Sciences, named C. H. Cho as the first honorary alumnus of both the College and the Engineering school. They presented Y.H. Cho and his mother with a framed certificate honoring his father for spawning Korea's modern transportation industry and for his lifelong support of higher education, engineering, research and Korean studies.

The two deans also attended the Inha-USC High Tech Conference, which focused on information technology, biotechnology and nanotechnology. The speakers included Nikias, who gave an address on "The New Hollywood," and Priya Vashishta, professor of materials science, who described the use of high-performance computing in nanotechnology research. Ken Nealson, professor of earth sciences, spoke on geobiology.

Chris Kyriakakis, associate professor of electrical engineering and director of sensory interfaces at the Integrated Media Systems Center (IMSC), demonstrated IMSC's Remote Media Immersion (RMI) Internet technology for capturing, streaming and rendering big screen video and multi-channel audio.

Kyriakakis set up a complete RMI technology package that is permanently located on the fifth floor of the new library. It will be used for joint trans-Pacific experiments between Incheon and Los Angeles.



Dean Nikias and Dean Joseph Aoun of LAS present Y. H. Cho with an honorary alumnus certificate in his father's name.

ChevronTexaco and School Establish Center for Interactive Smart Oilfield Technologies

Dean C. L. Max Nikias, Donald L. Paul and Provost Lloyd Armstrong signing the memo of understanding.

The USC School of Engineering and ChevronTexaco Corp. announced plans August 29 to establish a new center to develop advanced technologies to improve oil and gas exploration and production efficiency. Provost Lloyd Armstrong Jr., Dean C. L. Max Nikias and Don Paul, vice president and chief technology officer at ChevronTexaco, signed a memorandum of understanding outlining the establishment of the Center of Interactive Smart Oilfield Technologies (CiSoft).

ChevronTexaco will provide R&D funding to establish the center, which will draw upon faculty expertise and resources within the School's Information Sciences Institute, the Integrated Media System Center and the Petroleum Engineering Program. CiSoft will focus on the research and development of integrated technologies targeted to the operations of instrumented, intelligent oil and gas fields. ChevronTexaco employees will directly participate in the center's R&D program and the company will provide real-world drilling and production data from oil and gas fields from around the world. ChevronTexaco also plans to provide additional research investments as expanded programs develop within CiSoft.

"Through this partnership, ChevronTexaco and USC hope to create an exceptional learning environment for engineering students, while accelerating the development of advanced oil field technologies in this area," says Nikias.

In addition to research and development, CiSoft will support a strong educational component drawing top graduates from across the world. Nikias says the School will create a new master of science degree program which uniquely integrates information technology and petroleum engineering.

"The USC School of Engineering is recognized for leadership and innovation in many areas, but has earned particular distinction for its work in information and communications technology, advanced visualization and petroleum engineering. Adding energy to the strong relationships the school has with the defense and entertainment industries will make this a unique environment for developing new technologies for real-time engineering and operations," says Paul.

CiSoft will form an integral component of ChevronTexaco's i-field* program, which is focused on the integration of field automation, reservoir simulation technologies, new and emerging well technologies and real-time reservoir management. Advances in i-field technologies and enhanced workflows will help reduce field development costs, speed up the analysis of information and enhance operational reliability.

CiSoft's co-executive directors will be Mike Hauser, i-field program manager at ChevronTexaco Exploration and Production Technology Company, and Iraj Ershaghi, professor of chemical engineering and director of the Petroleum Engineering Program.

> Nikias says the School will create a new master of science degree program which uniquely integrates information technology and petroleum engineering.

CiSoft is the most recent center formed as part of ChevronTexaco's strategy to develop unique, new research and educational partnership structures between the energy industry and universities. Last year, ChevronTexaco joined with the University of Tulsa to form the Center of Research Excellence in production fluid flow, which is conducting research in the areas of flow assurance, specifically the study of emulsions and multiphase flow, dispersions and heavy-oil chemistry.

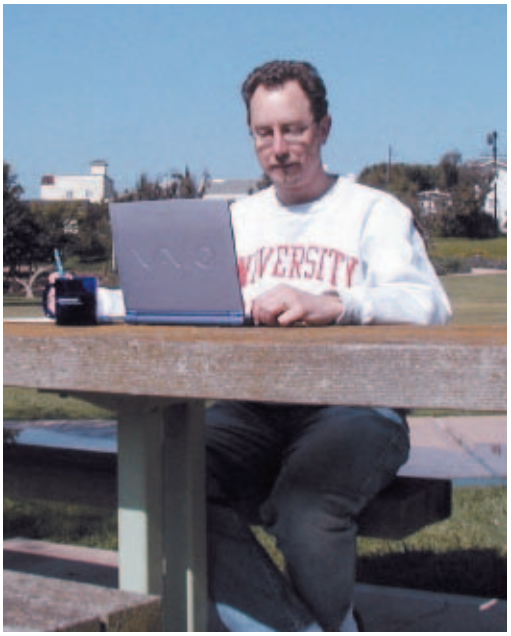
U.S. News & World Report has ranked the school's overall graduate program eighth in the nation for the past two years and ranks the Petroleum Engineering Program ninth.

Based in San Ramon, California, ChevronTexaco is the second-largest U.S.-based energy company and the fifth largest in the world based on market capitalization. More than 53,000 ChevronTexaco employees work in approximately 180 countries around the world.

** i-field is a trademark of ChevronTexaco Corp.*

No More Excuses.
USC has made it too convenient for you.

USC School of Engineering's Distance Education Network (DEN) lets you earn your Master of Science degree without leaving the comfort of your home, office or the great outdoors.



A USC DEN student attends class while enjoying the great outdoors with his wireless Internet connection!

Ranked as one of the top e-learning engineering graduate programs in the country*, DEN offers M.S. degrees specifically designed for the professional engineer. While working full-time, earn a Master's degree in:

- Aerospace Engineering (Astronautics)
- Aerospace & Mechanical Engineering (Computational Fluid & Solid Mechanics) — NEW
- Computer Engineering
- Computer Science
- Computer Security (Cybersecurity) — NEW
- Electrical Engineering
- Engineering Management — NEW
- Integrated Media Systems
- Mechanical Engineering (Dynamics & Control) — NEW
- Medical Device & Diagnostic Engineering — NEW
- Product Development Engineering — NEW
- Systems Architecture and Engineering

Further your career without stopping it.

Visit http://den.usc.edu
or email: info@den.usc.edu

Classes are offered fall, spring and summer.

USC
UNIVERSITY OF SOUTHERN CALIFORNIA
School of Engineering
Distance Education Network (DEN)

* *US News & World Report*

Alumni news & notes

Summer and Fall 2003

1968

James J. Braze (BSME) is an attorney in the San Francisco office of Gordon & Rees and is defending personal injury and wrongful deaths arising out of product liability claims and construction site accidents. Both he and fellow alumnus **Richard Grey** (BSAE '62, MSAE '65, MSME '71) are planning to help form a Northern California School of Engineering alumni club.

1985

Frank Principe (MSSM) is currently consulting for House for Urban Development (HUD) on a new data management system called MCB. He is also a part-time professor for the University of Phoenix and Learning Tree University. He resides in Mission Viejo, California with his wife Nancy.

1987

Bob DeFeo (MSCENG) has been appointed as Teranex's new chief executive officer. Prior to joining Teranex as president in April 2002, DeFeo served as president and executive VP of sales and marketing at Optibase.

David Jenn (Ph.D EE) was recently promoted to full professor of electrical and computer engineering at the Naval Postgraduate School in Monterey, California. David's research interests include microwave antenna design, stealth technology, microwave-powered autonomous unmanned vehicles, and reducing wireless network vulnerabilities in support of Homeland Security.

John Ramirez (BSEE) and his wife Darlene are proud to announce the birth of their son John Ryan on February 24, 2003. John is the owner of Digital Image Studios

1988

Elaine Iba (MSEE) has put her U.S. Skeleton National Team career on hold and returned to work as the senior principle systems engineer for Raytheon in Fullerton, California. She will aid in the support of the company's Capability Maturity Model Integration for the Network Centric Systems division. Elaine hopes to return to competition for the U.S. Skeleton National Championships later this season. *(See profile on Elaine in the Spring 2003 USC Engineer)*

1990

Peter Sabido (BSCHE, MSENE '95) has earned his J.D. degree, magna cum laude, from the Northwestern School of Law of Lewis and Clark College. He is currently an attorney at Kolish Hartwell in Portland, Oregon.

1991

Judith Redpath (BSAE), her husband Steve Redpath and daughter Veronica, happily announce the birth of Carlton Frank on February 27, 2003.

1995

David W. King II (BSISE, MSISE/MBA '98) and wife Melissa are happy to announce the birth of their daughter, Emma Lauren King, on January 12, 2003.

1996

Joyjeet "Bobby" Bhowmik (MSCECS) and his wife Madhumita "Monty", celebrate the birth of their first daughter, Rituja, on January 14, 2003. Joyjeet is a software architect/scientist with Agilent Technologies.

1998

Brian Karl Hiatt (BSCECS) was married on August 8, 2002. Brian recently moved to San Jose, California and is currently a software engineer for IBM.

1999

Omesh Piryani (MSEE) and Sadhna Jaisinghani were married on April 13, 2003.

2000

Marisela Avalos (BSBMME) returned to school this fall at the University of California, Berkeley where she was awarded a Graduate Opportunity Award. Marisela is working towards a masters degree in mechanical engineering with an emphasis in design.

Sally A. Jercha (BSCHE) married Anthony L. Jercha on April 26, 2003 at St. Rose's Catholic Church in Simi Valley, California.

2001

William L. McGill (BSAE) was recently named ASME Government Fellow for the Department of Homeland Security.

Staff News

Bob Calverley was named executive director of communications for the School in October. Bob is also the managing editor of *USC Engineer.*

Margaret Dufford was named senior associate dean of administration for the School on July 1, 2003. She was previously the senior associate dean of administration at the USC Marshall School of Business.

Kelly Goulis, executive director of the School's Distance Education Network, and her husband Chris, are happy to announce the birth of their daughter, Jiana, on July 18, 2003.

Anna Norville, the School's executive director of corporate relations, and her

Board of Councilors News

Gregg Brandow (BSCE '67) is the president of the board for Professional Engineers and Land Surveyors in California this year.

Ed Glasgow (MBA '70) received a number of awards in 2003. He was selected as 2003 Engineer of the Year by the San Fernando Valley Engineers' Council; he received an award at the 48th Anniversary Honors and Awards Gala Banquet at the Sportsman Lodge in February. He was also selected for Fellow grade of membership in the AIAA, receiving the honor at the International Air and Space Symposium and Exposition in Dayton, Ohio in July. That same month he was selected to serve a three-year term on the scientific advisory board for the National Institute of Aerospace. In September, he received the SAE Aerospace Engineering Leadership Award at the SAE Aerospace Congress and Exposition in Montreal.

Ken Klein (BSBME '82) has been added to the Wind River Systems Company Board of Directors. Wind River Systems is the worldwide leader in embedded software and services. Wind River provides market-specific embedded platforms that integrate real-time operating systems, development tools and technologies. Wind River's products and professional services are used in multiple markets, including aerospace and defense, automotive, digital consumer, industrial, and network infrastructure. Founded in 1981, Wind River is headquartered in Alameda, California, with operations worldwide. Ken is also the chief operating officer of Mercury Interactive Corp.

Regina Smith is happy to announce that she and her husband Henry welcomed Eric Alexander Schaefer to the world on April 11, 2003. He was 9 pounds 3 ounces. She also has a book called DNA due out in fall 2004 and has been named director at a new service called Bioinvestments.com. The company provides the general public with background information about pharmaceutical companies with pending drug approvals, technical terms and drug programs.

Richard Miller joined Information Systems Laboratories in San Diego. He is vice president and general manager of the Technology Development & Manufacturing Group. The company is privately held and primarily serves the DOD and intelligence community, providing services ranging from R&D, engineering, systems integration, testing and ISO-9001 certified manufacturing.

husband Michael Walsh, happily announce the birth of their first child, daughter Cora Mary Virginia Walsh, on September 4, 2003.

Gaurav Sukhatme, associate professor of computer science, and his wife Kalyani, joyfully announce the birth of their son, Mihir Gaurav, on October 13, 2003.

Binh Tran has been promoted to director of instructional technology for the Distance Education Network.

Alumni Recognition

Laksen Sirimanne

In December 1903, Orville and Wilbur Wright created aviation history with the first powered flight, soaring over Kitty Hawk, North Carolina. One hundred years later, in July 2003, Sri Lankan-born Laksen Sirimanne (MSAEAN '03) and co-pilot Assaf Stoler whizzed through those same skies, touching down at First Flight Airport, Kill Devil Hills in a Diamond Star DA40. In doing so, they etched their own names into aviation's history books.

Their flight, which originated at Santa Ana's John Wayne Airport and lasted over 17 hours, set three aviation records for a plane under 2,205 pounds, including the world speed record for a transcontinental flight. Their average speed—a blazing 137 miles an hour—smashed the previous record set in 2000 of 52 miles an hour.

"Everything on the flight went as planned," says Sirimanne. "We did a lot of preparation and took many test flights together to understand the performance characteristics of the aircraft." They loaded engine performance data into Excel spreadsheets and ran a number of computer models simulating ideal flight conditions.

As if Sirimanne's summer wasn't busy enough, he managed to complete a degree at USC just one month after this flight, having taken classes through the Distance Education Network (DEN) since the fall of 2000. He earned a master's in aerospace engineering with a concentration in astronautics. "I found the course offerings very broad with a great choice of classes," he says. "USC definitely has some excellent professors who really enjoy teaching and enjoy the subjects—a great mix of academic teachers and industry professors."

An Irvine resident, Sirimanne currently works at Edwards Lifesciences, where he directs research on artificial heart valves. He also has an application pending with NASA's astronaut program.

He says the importance of his flight is just beginning to sink in. "The media attention was quite unexpected, and we have been overwhelmed with the enthusiasm of friends, family, co-workers, and the general public."

He pauses, and then adds, "It still seems like a dream."

Please keep us informed of your personal and professional progress, as well as changes in your contact information by visiting www.usc.edu/engineering and clicking on Alumni. Or by writing to the Alumni Relations Office at the USC School of Engineering, Olin Hall 300, Los Angeles, California 90089-1454

In Memoriam

Paul E. Hood (BSCE '49) passed away on February 19, 2003 in Los Angeles. He served in World War II in the U.S Army 8th Air Force Second Air Division, 93rd Bombardment Group, and flew 35 combat missions as a right waist gunner in a B-24 Liberator — a four-engine heavy bomber airplane that was said to fly higher, faster and farther than any other plane in World War II.

Upon returning from the war, Hood enrolled at USC on the GI bill. In 1949, he joined the State of California Department of Water Resources in Sacramento as an engineer, working on the state's water and dam projects for more than 34 years until his retirement in 1983. He and his colleagues helped to create many of the engineering marvels that have shaped the state and served the people of California for many decades, including the California Aqueduct, the Feather River Project and the Whale Rock Dam Project.

Hood grew up in a small Irish farming community in Clare, Iowa. After graduating from high school, he worked at the Donahoe General Store, which was such a perfect example of mid-western life that the building was later moved and preserved at the Fort Dodge Museum in Fort Dodge, Iowa.

In 1940, at the age of 19, Hood hitchhiked to California. One of his first jobs was working as a flight dispatcher at Mines Field, now known as Los Angeles International Airport. He then joined Donald Douglas Aircraft, and was drafted into the military in 1943.

After training as an Army Air Corps Cadet, Hood was assigned to gunnery school at Tyndall Field in Florida and was then shipped — literally — to England aboard the Queen Mary, thanks to bad weather that forced cancellation of his trans-Atlantic flight.

Hood and his 8th Air Force bomber crew flew dozens of successful combat missions over Nazi Germany, until their unit was ordered to stand down in May, 1945, when there were no enemy targets left in Germany to attack from the air.

As soon as he was back in the U.S., Hood applied for admission to USC, where he served as treasurer of the student chapter of the American Society of Civil Engineers, and graduated in 1949.

According to Hood's daughter, Julie Hood, "Attending USC changed the direction of my father's life. He could have gone into the booming construction industry with his three brothers, or into an aviation-related field after his service in the Air Force. But he found his engineering classes at USC to be challenging — even after the challenges he faced during World War II — and he decided to build a career with the Department of Water Resources. He also used his engineering skills to design and construct our family home in Westchester."

Hood was very proud to be a USC graduate, and wore his USC ring every day of his life. He greatly enjoyed participating in his 25th and 40th year reunions at USC.

"My father knew from his own experience the value of a good education, which he emphasized to all eight of his children," says Julie Hood. "I guess he expected some defections to rival UCLA, and three of my four brothers did go there. He would pontificate about the superiority of USC and its football team to them at every opportunity, and he kept a coffee mug on his desk at home, with the inscription, 'My favorite team is USC and whatever team is playing UCLA.' He was very proud when I received a scholarship to USC."

Hood was an active member of Visitation Catholic Church, a Fourth Degree member of the Knights of Columbus, and a member of the American Legion Post 177 in Venice, California. He spent several years managing his sons' Little League baseball teams. He was an avid bowler, an enthusiastic precinct worker during local elections, and enjoyed traveling throughout the world.

The School of Engineering is proud to call alumni like Paul Hood their own. He epitomized the phrase "life-long Trojan". His story, his spirit and his many accomplishments are an inspiration to all USC alumni.

He is survived by his wife of 50 years, Martha; children Diane, Julie, Tom, Paula, Marilyn, Phil, Joe and Jim; grandchildren William and Jacob; sister Rosemary Shanahan; and many nieces and nephews.

Memorial contributions may be made to the Paul E. Hood Scholarship Fund, c/o American Legion Venice Post #177, 6430 Firebrand Ave., Los Angeles, CA 90045.

Alumni Recognition

Alumnus **Nagui Mankaruse** (MSME '73), president of Delta Engineers, was chosen to present at the IMAPS Advanced Technology Workshop on Thermal Management for High-Performance Computing and Wireless Applications on October 22-24 in Palo Alto, California. IMAPS is the largest symposium related to the microelectronics and the electronic packaging industries in the world. The workshop attracts presenters and attendees are from the microelectronics industry as well as from universities all over the world. This year's conference hosted a large gathering of technical experts and intellectuals from the United States, Britain, Germany, Austria, Italy, Canada, Japan, and Taiwan.

The presentation topics centered on new research and development of products and processes in thermal management and cooling for high-performance computing and wireless applications for things like consumer electronics, space and military equipment. Mankaruse's presentation was entitled "Thermal Cooling of High Heat Flux Electronics Using Delta Engineers High Performance Cold Plate".

John W. Marshall (BSEE '41) of Glendale, California, former director of industrial relations for the School passed away at his home on February 26, 2003 at the age of 85.

Jack was born in San Francisco and later moved to Baltimore. After graduating from Loyola Blakefield High School, he moved with his family to Pasadena, California. Jack enrolled at USC and graduated in 1941 with a bachelors in electrical engineering. Upon graduation, he was one of very few selected by General Electric Company to study advanced electrical engineering courses in order to pursue his career in electronics.

During World War II, Jack served in the Navy directing the installation of radar systems on US ships in the Pacific. He was also involved in the atomic bomb experiments at the Bikini Atoll. After his return from the war, he continued to work for General Electric in various capacities.

Jack attended Loyola Law School and after graduation in 1951, he successfully entered the California Bar Association.

In 1968, Jack returned to USC as director of industry relations for the School of Engineering. Until he retired in 1986, he was the key contact person to many major companies regarding fundraising, student employment and other activities. During his time at USC, Jack also worked with many international students. In addition to providing educational counseling, he helped the students adapt to life in America.

Ram C. Mukherji (MSEE '70, MSMgmt.Sc '74) was one of the students Jack assisted. "I was one of the very fortunate people to meet Jack in September, 1968. He guided me through the US Immigration process to obtain special permission to work in the first year in the US, and he introduced me to the company where I worked for 26 years prior to retiring. He picked up my wife from LAX when she came to join me here because I was not driving at that time. He taught me how to drive and many, many other things that have allowed me and my family to flourish. Without Jack Marshall, the Mukherji family would not have settled in this great land. His impression lives with many others in this country and as well as in many foreign lands".

Jack is survived by his wife Bertha of fifty-eight years, his brother and best friend Frank; children John, Nancy and Laurie; and six grand children.

In Memoriam

Robert Blumenthal (BSME '50) was born in Santa Monica, California on January 23, 1923, and died in Beverly Hills on April 20, 2003. He is survived by his wife, Eloise; children, Jan, Andy, Ellen, Karen, Steve and Tony; his adoring grandchildren, Annika, Marcus, Brandon, Nastachia, Erynn, Jennie, Barbara, Amanda and James and many loving cousins. Bob will be remembered for his sense of humor and his creative and artistic talents in all mediums. He will also be remembered for his love of aviation, tennis, skiing and acting.

Robert C. Cooley (MSEE '68) passed away on July 30. Born in Los Angeles to Donald and Lois Cooley, he was a U.S. Navy veteran, earned a masters degree and Arch Circle Award from USC and retired from Hughes Aircraft/SBRC as a program manager. Survived by his wife Jennifer Cooley; daughters Jennifer and Sarah Francis, and granddaughter Natalie Francis.

Charles R. Dippel (BSME '49) of Saratoga, California, passed away on June 23 at the age of 79. From 1962 until his retirement in 1986, he was employed at Westinghouse Electric Company where he was the director of U.S. airforce programs. Charles is survived by his wife Rose Marie; his sister Mary; sons Steve, Jim, and Wayne; daughters Susan and Elissa and 13 grandchildren.

Ervin S. Dean (MSEE '56), a longtime resident of Palo Alto, California, died on July 16 at the age of 79. After 8 years at Pacific Gas & Electric, Ervin transferred to the Sunnyvale campus of Lockheed Martin where he served as an engineer and project manager for nearly 35 years. Upon retirement, he became an active volunteer for many organizations, friends and family. He is survived by his wife of 56 years, Karen Strickler Dean; two daughters, Pamela and Lucie; two sons, Nathan and Thomas and four grandchildren.

Thomas J. Foley was a member of the Trojan Football team, and was also a member of The Newman Club. He was a very successful engineering contractor for 47 years. He also served as a 1st Lieutenant in the 8th Air Force during World War II. As a B-17 pilot, he was engaged in 35 missions. He was a valiant fighter against heart disease, cancer and other physical ailments. He is survived by his beloved wife Elaine Foley, loving brother Dan (Mary) Foley, Loretta and Bob Collins and many relatives and friends.

Wesley D. Gerber (BSEE '59) died at the age of 71 on May 29 following a short battle with cancer. He served in the Air Force during the Korean War and enjoyed a 29 year career at Ford Aerospace in Newport Beach, California. He was a dedicated family man and is survived by his wife Lois, two stepdaughters and a stepson; his son, four grandchildren and two great grandchildren.

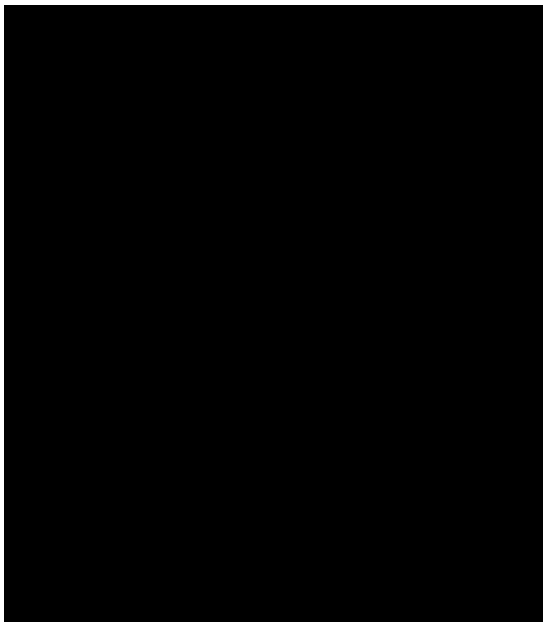
Donald G. Hardy (MAOM '71) Cmdr., passed away in his sleep at home on April 8, 2003 at the age of 72. He worked as an engineer in the aerospace industry before starting his own custom embroidery business. He is survived by his wife Judith, and her daughters Caryn Gregory, Susan Freudenberg, Sharon and Collene Gregory. He is also survived by his first wife Jean Hardy, and their children Susan Sneddon, Pamela Catalano, Lance Hardy and Meredith Hardy, as well as by his sister Dorothy Kirchner, nieces, nephews and grandchildren.

Edward E. Johnson (BSME '58) passed away on April 9, 2003 at the age of 71. He is survived by his wife Sara Jo, his sons, and two sisters. He was a member of Phi Sigma Kappa fraternity. Ed loved his years at USC and remained a loyal Trojan his entire life. His career included positions at Beckman Instruments, Servonic Instruments, Bertea, and ACL Technology.

William J. Miller (MSAE, MSME '70) of Bridgman, Michigan passed away unexpectedly on Sunday, April 20, 2003 at the age of 60. William served his country for 30 years in the U.S. Army. He earned a bachelors of science degree from the U.S. Military Academy, West Point and holds a masters from the Naval War College, Newport, Rhode Island. William is survived by his wife Carolynn J. Ott, his children Michelle and John Brusard, his parents, sibling, and grandchildren.

Firm Foundations: Charles Lee Powell's Generous Legacy

Charles Lee Powell was a pioneering, self-taught engineer who invented and patented new methods for building concrete structures underground. He is credited with building much of Los Angeles' early infrastructure, including the Second and Third Street Tunnels and the Angels Flight funicular railway in the historic downtown Bunker Hill district.



Charles Lee Powell

Following a successful career as a contractor, Powell made provisions in his will for a charitable foundation that would carry forward his legacy of innovation and entrepreneurial spirit. For nearly 40 years, the La Jolla-based Charles Lee Powell Foundation has supported groundbreaking engineering programs at USC, Caltech, Stanford, and U.C. San Diego.

"The foundation's directors identified a select group of universities in California that had quality engineering programs," says Joel Holliday, president and chief executive officer of the foundation. "Given the relatively modest size of the foundation's endowment, they felt it would be best to limit the number of schools they fund, in order to provide sustained support for leading-edge research and teaching in areas where it would make a difference."

Since 1970, the foundation has provided more than $13 million in grants to the USC School of Engineering, funding the Charles Lee Powell Hall of Information Sciences and Systems Engineering, the Charles Lee Powell Chair in Computer Engineering, the Charles Lee Powell Chair in Electrical Engineering and Computer Science and the Charles Lee Powell Foundation Photonics Industrial Laboratory.

"Thanks to the Charles Lee Powell Foundation's generous support, the School of Engineering is pushing the boundaries of research and teaching in fields that are of enormous importance to this nation and the world as a whole," says Dean C. L. Max Nikias.

"The core of our giving centers on 'bundle grants," says Holliday. "We fund exciting research, along with the equipment and graduate fellowships that are required to sustain this work." Holliday has been president and CEO of the foundation since 1999. He succeeded the late Herbert Kunzel (LAS '33, LLB '34), a San Diego trial and corporate attorney who served as the foundation's chairman and executive director since the mid-1980s.

Although Powell laid the foundation for his professional career in Southern California, he hailed from storied Southern stock. He was born on the campus of the Virginia Military Institute in 1863, during the Civil War, and his mother was a second cousin of General Robert E. Lee. Powell was the youngest son in a family of 11 children – a family that lost all its land and assets during the war, before young Powell's second birthday.

Powell's entrepreneurial spirit and ingenuity were evident from the start. When he was six, he paid for a sow by shucking corn for his grandfather's hogs, and made money raising and selling the resulting piglets. He worked steadily at a variety of odd jobs throughout his youth, and by the time he was 18, he had saved $158 (equivalent to $2,764 today).

By 1893, he had saved the princely sum of $10,000, which he carefully carried with him on a westward-bound train to Los Angeles, to launch what soon became one of the most successful construction businesses in Southern California.

When he was 21, Powell received his share of a small inheritance from his father's estate. Jobless, he was living in Kansas City at the time and wore folded newspaper in his shoes because they had so many holes. Nonetheless, he signed his entire inheritance over to his mother — just as each of his brothers had done.

Perhaps it is true that good deeds do not go unnoticed, for later that year Powell was offered work supervising a street paving job in Neosha Falls, Kansas — the first of several construction projects he managed in that state. By 1893, he had saved the princely sum of $10,000, which he carefully carried with him on a westward-bound train to Los Angeles, to launch what soon became one of the most successful construction businesses in Southern California.

In addition to landmark structures, Powell's firm built one of the first modern sewerage systems in downtown Los Angeles, replacing the open redwood sewer trenches that had served city residents. As a contractor, he was admired for implementing numerous worker safety measures in what were often dangerous underground construction projects.

Powell died in 1959, at the age of 96, leaving the Charles Lee Powell Foundation to continue his legacy. "Mr. Powell clearly was a man of great vision, compassion and entrepreneurial drive," says Christopher Stoy, the School's CEO of External Relations. "We are grateful to him, and to the foundation he created, for supporting exciting new frontiers of engineering research and teaching at USC."

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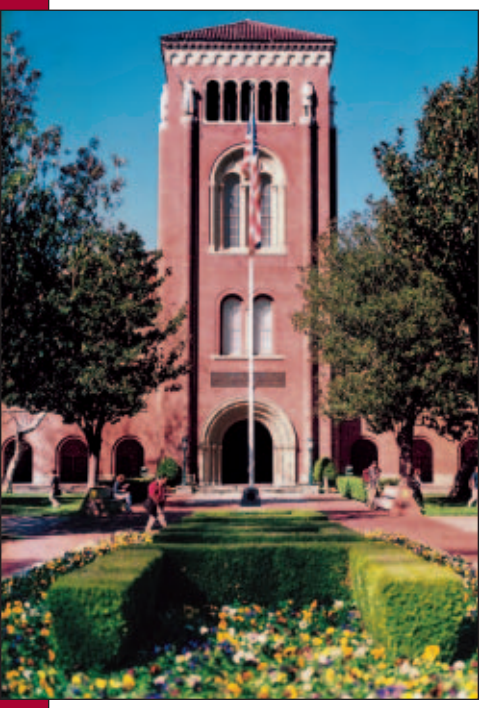

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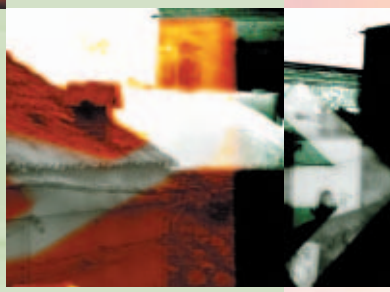

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THE SCHOOL OF ENGINEERING'S FUNDRAISING INITIATIVE

Please join Dean C.L. Max Nikias and other alumni, friends, parents and partners of the School of Engineering for a celebration to launch the School's new fundraising initiative.

FRIDAY, NOVEMBER 21, 2003
6:30PM Reception
7:30PM Dinner

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For more information on the Launch Celebration, please call the School of Engineering at 213 740 2502

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