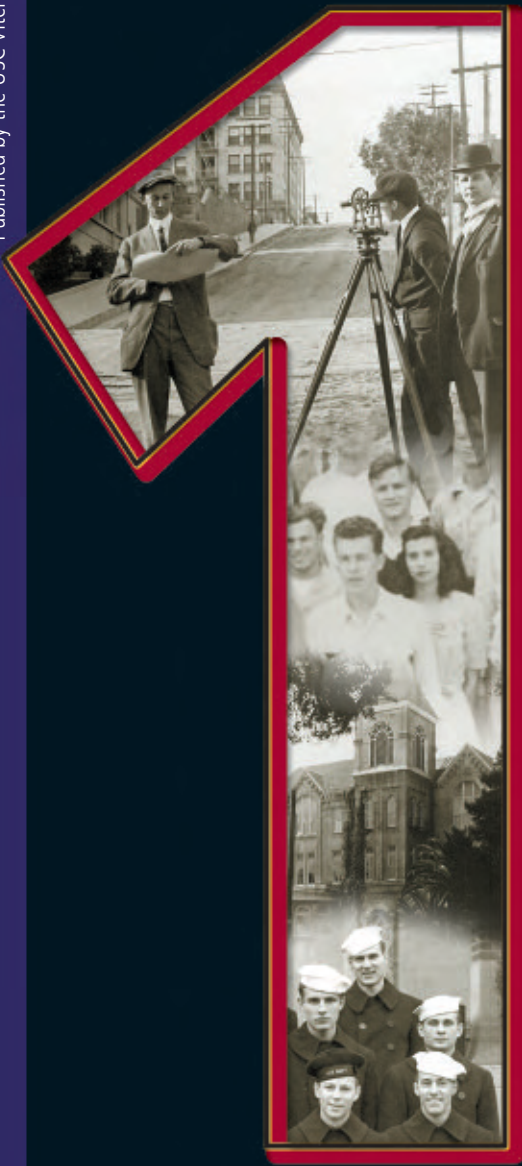


Fall/Winter 2005

USC Viterbi

Engineer

Published by the USC Viterbi School of Engineering for Alumni & Friends



CELEBRATING 100 YEARS OF ENGINEERING

AND ANNOUNCING

THE MORK FAMILY DEPARTMENT OF CHEMICAL ENGINEERING & MATERIALS SCIENCE

Volume 4 Issue 1

a generous gift
+
academic excellence } → a good reaction

Presenting the Mork Family Department of Chemical Engineering and Materials Science

Viterbi School Research Highlights:

- Ranked third among private schools and seventh overall by *U.S. News & World Report's* rankings of 2005 graduate engineering programs.
- One of only four engineering schools with two active National Science Foundation-funded Engineering Research Centers: the Integrated Media Systems Center and the Biomimetic MicroElectronic Systems Center.
- Its Information Sciences Institute co-created the Internet's Domain Name System, TCP/IP protocols, co-developed the Globus Grid Computing architecture and conducts research in a broad spectrum of information sciences.
- An SAT average of 1388 for incoming freshmen for the last two years has been leading a dramatic rise in the quality of USC undergraduates.
- Home of the Stevens Institute for Technology Commercialization (SITeC), which combines technology transfer with rigorous academic programs in commercialization issues.
- Home of the Distance Education Network (DEN), the largest engineering e-learning graduate program in the nation with 28 M.S. degree programs.
- A robust industry program includes the Center for Interactive Smart Oilfield Technologies, established by Chevron; the Pratt & Whitney Institute for Collaborative Engineering; and the Aerospace Institute for Engineering Research, funded by Airbus.



On the eve of the USC Viterbi School of Engineering celebrating 100 years of engineering at USC, the merger of our chemical engineering and materials science departments into one synergistic unit is momentous indeed. The new technology-focused department is poised to lead in critical research areas such as biotechnology, nanotechnology and energy—including petroleum engineering. Facilitating the merger is a very generous naming gift from the Mork Family. John Mork, a USC petroleum engineering alumnus, is founder of what is now known as Energy Corporation of America, an industry powerhouse in exploration and production. The Mork Family's exceptional naming gift will propel the new department's research into new frontiers, while continuing to attract outstanding students and faculty. And will provide the type of synergy that assures a promising future.

<http://viterbi.usc.edu>

USC Viterbi
School of Engineering



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by Bob Calverley & Eric Mankin



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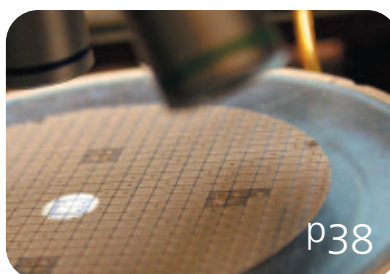
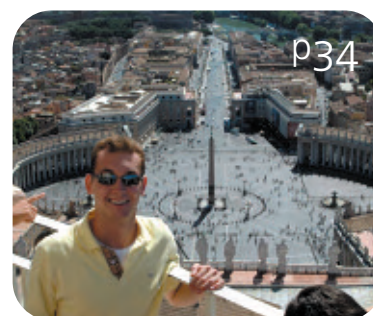
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Letters to the editor and comments are welcome. Please send them to: USC Viterbi Engineer, Olin Hall 500, Los Angeles, California 90089-1451 or email them to uscengineer@usc.edu.

1100100 Years of Engineering

Surely, Gabriel Garcia Marquez could never have thought that 100 years could be so long. But, measured in bits and bytes*, the past 100 years of engineering at USC have been full of excitement, discovery and innovation!

This academic year marks the centennial anniversary of the first engineering courses offered at USC. It is a significant occasion that we believe is a springboard for our continued success in the next century. It also coincides with the 125th anniversary of USC. How did USC survive a quarter of a century without engineering?

For 100 years, USC has been producing professional engineers that helped advance California, the nation and the world. Some, such as Andrew Viterbi or Neil Armstrong have touched the lives of virtually everyone in the world. Many others have made their impact less visibly, although that impact has been just as important.

In this special centennial magazine, you will read about a century of USC engineering. You will discover how the Viterbi School has become one of the top engineering schools in the world, and one that is only getting better.

We are celebrating the School's impressive history for the entire 2005/2006 academic year — the opportunity only comes once a century! But our spotlight will not just be on the past. The Viterbi School is focused on the next 100 years. In this issue's special section (*beginning on page 5*), you will also learn more about current research and the engineers who are burning a path toward tomorrow.

What is the next century going to be like? As Niels Bohr famously said, prediction is hard, particularly about the future...

The National Academy of Engineering has produced a more modest prediction target in its report of the "Engineer of 2020." The report notes the sweeping globalization trends, the revolutions in information, biological and nanotechnology, the constantly evolving aspects of education and the radical demographic changes expected in this country. All will change dramatically the engineering landscape, and with that, the model for engineering education.

Any school not busy leading is busy following. Our ambition is to lead the nation in the key aspects of engineering

education and research likely to shape the future.

We are revolutionizing undergraduate education through learner-centric methods, including instructional technology. We are retaining bright undergraduates in engineering with quality first contact, through our freshman academies, a revamped mathematics sequence, service learning and new minors, such as a minor in commercialization. We are offering opportunities for progressive degrees (BS and MS in five years). We are paying close attention to the need for a "value-added" engineering curriculum, by offering learning opportunities in business and market skills.

Our technologically superb Distance Education Network, currently experiencing double-digit growth, leads the way in making life-long learning a reality for working engineers.

Our commitment to the faculty as the pillar of academic excellence remains at the core of our mission. We continue to build faculty strength, with emphasis in areas critical to the future, especially at the nano-bio intersection. We will also redouble our efforts to increase the numbers of women and underrepresented groups to our faculty.

We are in the stretch run of our ambitious \$300 million fund-raising initiative. We have had a series of spectacular gifts — with the most recent in September 2005, the gift from John Mork (BSPE '70) and his family to name the Mork Family Department of Chemical Engineering and Materials Science (*see feature story on page 29*).

However, the success of fundraising usually depends on more modest gifts and at the end of the day, the Viterbi School relies on the support of its loyal alumni. We count on all of you to help us move the School forward.

So, celebrate our rich history with us and help us build the future 1100100 years!

Yannis C. Yortsos
Dean
USC Viterbi School of Engineering



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In Pursuit of Excellence

The USC Viterbi School of Engineering thanks the following corporations, foundations and organizations for their gifts to the School over the past fiscal year 2004-2005*. Their generosity is crucial to the success of our students and faculty as they pursue scientific and academic excellence. For more information on how your firm can help shape the engineers of tomorrow, please contact:

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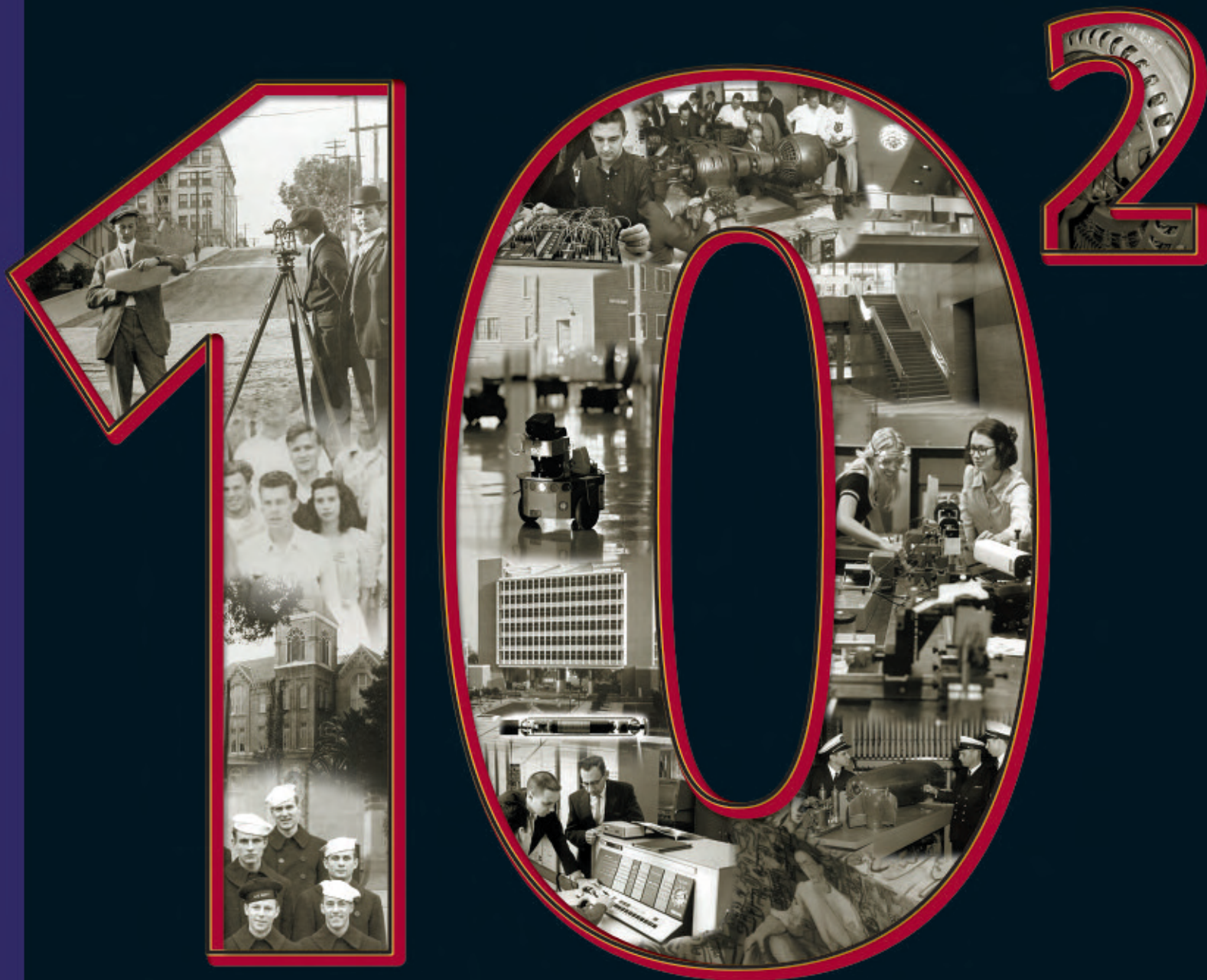
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VITERBI ENGINEERING

A BRILLIANT FUTURE COMES FROM A PROUD PAST

by Bob Calverley & Eric Mankin



The 2005-2006 academic year marks the 125th anniversary of the University of Southern California, as well as the 100th anniversary of engineering at USC. As we embark upon this celebratory year, it is essential to look back at the history, people, events, contributions, collaborations and research that brought us to this milestone. However, it is equally important to look to the future and to the bright stars that will illuminate our path for the next hundred years. On the following pages, you will read about our past. You will also discover more about current research and the engineers who are burning a path toward tomorrow. Our destination has always been the future. The journey is one hundred years old and yet the feeling is, we've only just begun.

1905 THE EARLY YEARS

1905-06 USC, led by Pres. George Finley Bovard, offers its first engineering courses.

1907 One hundred students are enrolled in physics and engineering.



Engineering classes in the early days were held in the basement of the Old College building.



Civil engineering students, 1914

THE EARLY YEARS

In 1905, the University of Southern California, which had been founded with the support of the Methodist Church 25 years earlier, had President George Finley Bovard, brother of USC's first president Marion Bovard, at the helm. The university's physics department, adapting to the times and its environment, began offering classes in engineering. Los Angeles was a growing western city in the throes of an oil boom in a nation that was rapidly being electrified. The first courses were Direct Current Principles and Machinery, Alternating Current Theory and Machinery and Dynamo Laboratory. During the same 1905-06 academic year, the



The Dynamo Laboratory

mathematics department began a course in surveying.

The first engineering professor, John B. Johnson, was hired in 1908, the same year that USC awarded its first engineering degree, a B.S. in civil engineer-

ing, to Omar R. Turney. The recipient of the first USC electrical engineering degree was Austin Byrant Gates, who graduated in 1911. In 1921, USC awarded its first mechanical engineering degree and its first master's degree in chemical engineering. Oddly, USC had yet to grant a single B.S. in chemical engineering. The first degree in architectural engineering was in 1926 and the first petroleum engineering degree was not awarded until 1927. By that year, USC had awarded 254 engineering

degrees, mostly bachelor's degrees in civil and electrical engineering.

The year 1927 was a milestone in another respect. Two decades after USC offered its first engineering courses, it established a separate College of Engineering with five departments — chemical, civil, electrical, mechanical and petroleum engineering.

Professor Philip S. Biegler, chair of the electrical engineering department, became USC's first dean of engineering. Under Biegler's leadership, the new College of Engineering moved from the "Red Barn," a temporary structure put up during World War I, to headquarters in Bridge Hall. Biegler began laying a foundation for further growth by recruiting a number of excellent teachers and expanding into the new Petroleum and Chemical Engineering Building. One of the recruits was alumnus Robert E. Vivian (BS CHE '17), who arrived in 1937 to teach chemical engineering. He found USC engineering's physical resources to be unimpressive and the Master of Science was the highest engineering degree awarded.



Dean Philip S. Biegler

"The electrical engineering department was still in the same basement laboratory ... where I had taken courses in 1917-18," Vivian wrote in his memoir, *The USC Engineering Story*, "and as far as I could tell, the equipment was the same as I had used then.... It is safe to say that all the equipment of the College of Engineering, including the few surveying transits and levels and drafting tables, could have been purchased for \$10,000."

At the time, the college had 10 full-time faculty, one secretary and 230 students. "In spite of the lack of equipment and small budgets," Vivian wrote, "there was optimism, initiative, cheerfulness and a willingness to work hard on the part of faculty and students. These are the elements which make progress possible."

1908

1908 USC awards its first engineering professional degree, in civil engineering, to Omar A. Turney.

1910 USC grants its first B.S. engineering degrees to Ralph W. Clark (CE), Stephen H. Clark (CE), Carl B. Wirsching (CE) and Austin B. Gates (EE). Wirsching would later become president of the Los Angeles Board of Public Works and the first chair of the Engineering Advisory Council when it was organized.



The "Old Red Barn" was a temporary building constructed during World War I. It was used until 1931. When it rained students would hold umbrellas over their heads in the classrooms to protect them from the leaky roof.



Electrical engineering lab, 1915

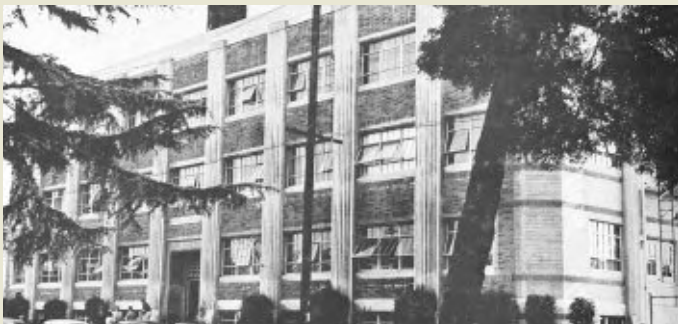
DECADES OF GROWTH

And progress continued. USC's first Ph.D. in engineering was awarded in 1939 to one of Vivian's chemical engineering students. The college completed its first building, the 28,000-square-foot Engineering Building (now Biegler Hall). The building cost \$86,000, an extraordinary bargain even for 1940, made possible because a USC engineering tradition — close ties with industry — was active even then. A member of the school's Engineering Advisory Council, a contractor and close friend of a USC alumnus, had agreed to build the new building at cost.

In 1940, Vivian became acting dean, an appointment that was made permanent in 1942, and he presided over nearly two decades of solid growth. He can be



Dean Robert E. Vivian



The Engineering Building was the first permanent building containing all engineering departments. Completed in 1940, it was later renamed Biegler Hall.

FutureTech

by Diane Ainsworth & Eric Mankin

Room-temperature superconductors, smart buildings, robot assistants, bionic chips and a totally immersive Internet are just some of the breakthroughs looming large for USC engineers.

Technological invention moves at an incredibly swift pace. Five short years ago, scientists and engineers cracked the human genome, mapping nearly all 3 billion biochemical letters of our genetic code. Computer scientists, some of them at USC, helped in the effort to mine huge databases of genetic information and help with the genetic sequencing.

A hard act to follow? Not necessarily. Great things are ahead at USC's Viterbi School of Engineering. We sit at the apex of many burgeoning new interdisciplinary fields — in biotechnology, information technology and nanotechnology — with groundbreaking work to advance everything from the ubiquitous virtual Internet to deep space

communications and cures for incurable diseases.

Five years into the new century, USC engineers have forged new trails in transportation, the environment, augmented virtual reality, imaging techniques, military combat and training, materials science, wireless communications and space exploration.

What will we find as we fast-forward through the 21st century?

A handful of technologies in development at USC tell the story. Some will revolutionize everyday life and accelerate our progress in important industries such as health care, education, environmental safety and transportation. Some seem as futuristic as airplanes, television and Moon exploration must have seemed to people living at the turn of the last century. But they aren't. All evidence is to the contrary. They're imminent.

On the following pages are some of our hottest technology picks — our FutureTech.

1915

1915 The eight engineering graduates include two Japanese students (another graduated in 1913), showing that USC engineering's global reach began early.

1920 USC implements a new curriculum in industrial and engineering chemistry, leading to a B.S. in industrial chemistry.

Engineering class of 1914

1921 USC awards its first engineering master's degree, in chemical engineering, to U. Soe Theim, who wrote a thesis on cracking petroleum.

Oddly enough, no B.S. degrees had yet been awarded in chemical engineering.



credited with starting an upward trajectory that is still accelerating today. When Vivian took office, USC engineering was devoted almost exclusively to teaching.

"You should leave the research to Caltech," a trustee bluntly told Vivian at one point. World War II changed that.

THE WAR YEARS

During the war, USC engineering's growth continued to be mainly in teaching. Immediately after Pearl Harbor, USC became a major center for the Engineering Science and Management War Training Program, fulfilling the war industry's burgeoning need for technically trained managers and supervisory personnel. Some 50,000 students swarmed through the program, the largest single-campus effort of its kind in the country. Simultaneously, the college was giving naval officers crash courses in various engineering disciplines. Engineering teachers put in 12 to 14-hour days. Almost no graduate degrees were awarded during the war as students went immediately into the military or the war industry upon graduation, or even before graduation.

After the war, the college's proficiency and efficiency in teaching advanced-level engineering led to another notable industrial collaboration that continues to this day. Hughes Aircraft Co. contracted with USC to offer master's-level instruction to its engineers under what was called the

Cooperative Engineering Program. Hughes employees received tuition, books and flexible work hours, enabling them to get advanced degrees.

The activity that would become a prime driver of USC engineering's expansion in the '50s and '60s — defense research — began in the war years. The first research contract, in 1944, was for \$10,000 from Lockheed Aircraft to study spot-welding aluminum alloy.

Continued defense spending on technology and a flood of veterans using GI Bill benefits to build careers in engineering, transformed the school into a major center for the development of new engineering science and technology.

By 1948, the College of Engineering had 100 graduate students. A decade later, in 1950, the count had quadrupled to 400 in the renamed "School of Engineering." For USC's Diamond Jubilee 75th anniversary celebration in 1955, Vivian was able to boast that the school had "graduated 5,000 engineers, 4,200 of them since 1940. They worked for more than 600 companies. Ninety-four were presidents, vice presidents or chief engineers of companies in this country."

THE KAPRIELIAN ERA

Vivian retired in 1958, one year after USC's first computer, the gift of an alumnus, had been installed in Biegler Hall. That same year, Zohrab Kaprielian joined the engineering faculty. While Alfred C. Ingersoll became dean in 1960, it would be Kaprielian who,

POV on VSOE

Point of View on Viterbi School of Engineering



I was admitted in 1957 and at that time, the entering engineering class was just 250 students. I'll never forget DEAN VIVIAN put all the freshman engineering students together and he said, look to your left, look to your right, and maybe one of the three of you will graduate in four years. And he was just about right, because I think in four years 65 graduated out of that class. But an interesting thing happened in the year of 1957, in October. The Russians put up *Sputnik* and all kinds of things changed in the engineering field, and it just accelerated.

—Henry Koffman, (BSCE '61) professor of civil engineering, is director of the construction engineering and management program.

1922

1922 Maude Milnes, a civil engineer, becomes the first woman to receive a USC engineering degree.

1923 Three men receive the first B.S. degrees awarded in chemical engineering.



1924 Students found the Alpha Chapter of Sigma Phi Delta, a fraternity for engineers.

1927

1927 USC establishes a College of Engineering with five departments — chemical, civil, electrical, mechanical and petroleum engineering. Philip S. Biegler, chair of electrical engineering, is appointed the first dean of engineering, though his appointment would be “acting” until 1931.

1929 Engineering students now have three honor societies — Chi Epsilon, Eta Kappa Nu and Phi Lambda Epsilon.

FutureTech: Shrikanth Narayanan

Shrikanth Narayanan has set remarkable goals — and made remarkable progress in realizing them. An associate professor of electrical engineering, computer science and linguistics, he has been zeroing in on natural communication modalities and finding ways to get machines to understand and seemingly empathize.

One element of self-expression is spoken language. On TV’s *Star Trek*, all manner of strange beings used the Universal Language Translator, a simple little device that could instantly translate all known languages. This fiction solved problems so difficult that Narayanan calls them “one of engineering’s holy grails.”

Not that it stopped him from taking a careful swing at the problem. Drawing on expertise across school and university disciplinary lines, ranging from the Viterbi School’s Information Sciences Institute to medical students at the Keck School, Narayanan has produced a laptop package called Transonics that translates a doctor’s spoken English into spoken Persian, and the patient’s Persian into English.

The system may be in emergency rooms in two years. And he has other even more remarkable inventions heading into the market. He holds 10 issued or pending patents and has published more than 150 papers. You could be seeing, or more likely

hearing, something created by Narayanan on a telephone number you will be calling soon.

Publications and broadcast media all over the world have been intrigued by his system for automated telephone answering machines that can tell whether a caller is angry, or becoming impatient, and then transfer them to a human. Besides relieving voice-mail frustration, Narayanan says such systems might someday live inside toys and games and listen to children for signs of frustration.

And not just listening. At Narayanan’s SAIL (Speech Analysis and Interpretation Laboratory) researchers are developing the technology for language and literacy assessment in young children, especially those from bilingual backgrounds. The hope is to empower teachers with new tools and provide consistent and efficient assessment methods to target individuals.

Narayanan wants to make robot voices more natural and human sounding, even friendly. He has another computer system that synthesizes sound clearly recognizable as laughter so that a machine will sound happy rather than macabre to human listeners. With help from the School’s computer graphics lab, an on-screen companion, or avatar, appears blinking and nodding when the computer talks.



An obvious benefit of this work will be machines that are much easier for humans to work with — machines that can understand human needs, anticipate questions, provide services.

“It is in that interface between humans and technology that a great many challenges lie. I believe we need to adopt a holistic approach and have no choice but to be interdisciplinary,” says Narayanan. “Researchers are already building machines that can talk, listen, understand, respond, perhaps even laugh and sing. The greatest challenge is in how we can bring these together in meaningful and societally relevant ways. My vision is science that unravels some of the mechanism of underlying human traits, to create technology that can be in tune with these human traits and needs.

“I think USC is a place where this can be really done.”

1930

1937

1940



Tommy Trojan

1930 The Trojan Shrine — “Tommy Trojan” — is unveiled in celebration of USC’s 50th anniversary. With more than 700 foreign students (10 percent of the student body), USC ranks third in the United States in international enrollment.

1937 Robert Vivian, later to become dean, receives the first full time faculty appointment in chemical engineering. The school has 10 full time faculty and 230 students.



Robert Vivian

1939 The first engineering Ph.D. is awarded, in chemical engineering.

1940 First engineering building is dedicated. The 28,000-square-foot Engineering Building (now Biegler Hall) costs \$86,000.



Dean Alfred C. Ingersoll

over the next decade, transformed the school into a major research institution.

Kaprielian had an uncanny ability to communicate his vision to others. Between 1958 and 1963, though remaining a professor, he behaved as a department chair and succeeded in recruiting a number of researchers from Bell Laboratories and other strong research institutions. George Bekey, who was recruited in 1962 to start programs in computers, controls and biomedical engineering, recalls how Kaprielian

interviewed him. “He was not the chair of the electrical engineering department, but he was clearly in charge. What I recall most was his vision of the future of the School, his vehemence and his commitment to its future.

“Most of us who came to USC in those early years were convinced by the force of Kaprielian’s personality, and not because of anything we saw when we came for interviews.”

Perhaps Kaprielian’s greatest moment came when he did become chair of electrical engineering. During this period in the 1960s, he worked to persuade the Department of Defense to award USC one of the coveted Joint Services Electronics Programs. The problem was that he did not have sufficient faculty to do the work. So Kaprielian took the possibility of this award to USC President Norman Topping and obtained

authorization for 10 new faculty positions.

By 1965, the graduate school of engineering had grown to one of the largest in the country with more than 2,000 students, including many from abroad. It ranked only behind MIT in numbers of M.S. degrees awarded, many of them attributable to the Hughes outreach degree program. Today, the USC Viterbi School is first in the country in the number of M.S. degrees awarded.

In 1968, electrical engineering professor Jack Munushian, who had become friends with Kaprielian when they were both graduate students at UC Berkeley, expanded this successful industrial outreach to a new medium for instruction — television. By broadcasting lectures via closed-circuit television into the corporate offices of Hughes and other

companies, it became easier than ever to complete class work. Students at the remote sites could even ask questions, thanks to an innovative two-way hookup. The Instructional Television Network (ITV), decades ahead of its time in 1970, was the precursor to today’s Distance Education Network, which has distance education’s most advanced high-speed Internet interface.

In the same period, the engineering school began to attract, and retain, faculty of great distinction. Between 1960 and 1970, 12 young faculty, who were eventually elected to membership in the National Academy of Engineering, joined the school. They were communications specialists Solomon W. Golomb (1963), Irving S. Reed (1963), Lloyd Welch (1965) and William Lindsey (1968); aeronautics experts John Laufer

POV on VSOE

AL INGERSOLL followed Dean Vivian’s long tenure as dean and I would say his was a period of assimilation of the past and preparing for the future. He developed greater relations with students and the alumni and deserves special credit for establishing Archimedes Circle, the School of Engineering’s first financial support group made up of the alumni and friends of the School of Engineering.

—Anthony Lazzaro (BSISE ’49) is a USC senior vice president emeritus.



WORLD WAR II & COLD WAR, 1942-1967

1943

1942 Robert Vivian is named dean. During World War II, USC becomes a major center for Engineering Science and Management War Training. 50,000 students come through the government-sponsored program, the largest single-campus effort of its kind in the country. The College of Engineering begins a Civilian Pilot

Training program at the U.S. government's request. Hundreds of military aircraft inspectors also receive training here.

1943 One third of the USC student body is wearing World War II uniforms.



School of Engineering Class of '44-45

FutureTech: Elaine Chew

As a concert pianist, Elaine Chew knows about performing. As an engineer, she knows about technology. And with her technology in the Expression Synthesis Project (ESP), the rest of us get to know a little about performing.

ESP allows anyone who can drive to perform a piece of music. With a steering wheel, foot pedals and a twisting road unfolding on a video screen, the ESP interface looks like something from a videogame arcade.

Foot pedals control volume and tempo while buttons on the steering wheel let you sustain notes or crisply cut them off. The road that you navigate with the steering wheel corresponds to the musical structure of the piece. It cues you, suggesting when to slow down or speed up.

"USC is fast becoming one of the places that truly fosters interactions between the arts and humanities, and science and engineering," she says. "ESP employs engineering tools to help people

understand what performers do when they communicate with music."

Chew, an assistant professor in the Epstein Department of Industrial and Systems Engineering who holds the Viterbi



Early Career Chair, is also a practicing concert pianist. She joined the Viterbi School in 2001 because she found it "an excellent home for interdisciplinary research, a place that wouldn't just pay lip service to my kind of work, but welcome it warmly."

The National Science Foundation supported her goals first with an Early Career Award followed by a prestigious PECASE (Presidential Early Career Award for Scientists and Engineers) Award, the eighth PECASE held by young faculty at the Viterbi School.

Born in Buffalo, N.Y., Chew lived in Singapore most of her childhood, where she received conservatory-level music training and diplomas, before returning to the United States to study music, mathematics and engineering. She majored in music and computational mathematics as an undergraduate at Stanford, and earned her master's degree and Ph.D. in operations research at MIT.

"Analogies in oral communication for questions we ask include: what makes one standup comic funnier than another? What makes a Shakespeare performance more powerful than the next?" she says. "Today, we can apply scientific tools and analysis to things we have taken for granted, or done by instinct. The results of these studies will allow more people to understand, and participate in, the creative process."

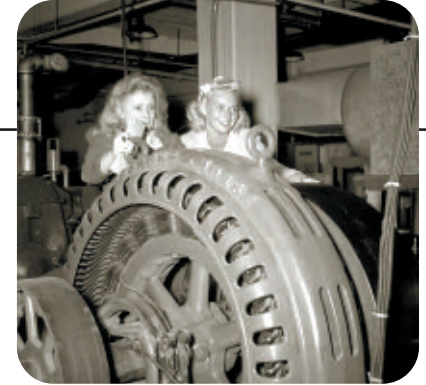
1944

1944 USC Engineering gets its first defense research contract — \$10,000 from Lockheed Aircraft for studies of spot-welding aluminum alloy.

1944 Foundation for Cross-Connection Control and Hydraulic Research is established in the department of civil engineering to study and set national standards to prevent accidental contamination of fresh water lines.



During World War II, Chief Petty Officer Mallory (middle) discusses the mechanism of a torpedo with two NROTC students, most of whom were engineers.



Women engineering students, 1940's

FutureTech: W. Lewis Johnson

W. Lewis Johnson, director of the Center for Advanced Research in Technology for Education (CARTE) at USC's Information Sciences Institute, looks forward to a USC education that is not only improved by new technology, but becomes a lifelong learning experience by virtue of the technology.

Johnson, who is also a research associate professor in the USC Viterbi School of



Engineering department of computer science, sees "a real upcoming revolution in the way people learn. I think that the way people learn 50 years from now will be very much different from the mode nowadays, which is dominated by sitting in classrooms listening to professors talk. I think we will change that. New interactive technologies are going to empower learners in ways that just are not possible at the present time."

Johnson's work on "Tactical Iraqi," a computer game that is now being used to teach Arabic language and customs to

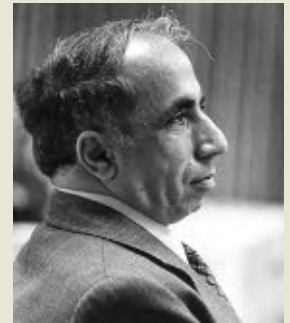
Iraq-bound soldiers, has received national publicity and won him a rare "significant technical achievement" award from the Defense Advanced Projects Research Agency, which funded the research. Johnson sees these new technologies continuing to reach students even after they graduate.

"We've seen some of that with the advent of the web, but it's going to accelerate, so I think it's very

important for USC actually to be in the forefront. I think one thing which has been very encouraging here is that the School has been promoting advanced learning technologies in its own curriculum," he says.

"I think that 50 years from now, when students come to USC, they're going to have an experience that they will take with them, a life-long connection in which they will be continually able to come back, further develop their skills, and USC will become, in essence a partner in our alumni's lives."

(1964), Hsien Cheng (1964), Tony Maxworthy (1967) and E. Phillip Muntz (1969); laser specialist Robert Hellwarth (1970, also a member of the National Academy of Sciences); the late biomathematician Richard Bellman (1965); roboticist George Bekey (1962); and future dean and electrical engineer, Leonard M. Silverman (1968). Meanwhile, the school introduced new departments — aerospace engineering (1964), industrial and systems engineering (1965) and materials science (1965).



Dean Zohrab Kaprielian

By the time Ingersoll retired in 1970, the USC School of Engineering had made major improvements in both quality and quantity. The formal, and inevitable, appointment of Kaprielian as the School's next dean ushered in a time of reorganization and consolidation. Kaprielian also rose to become senior vice president and provost at almost the same time. Professor Solomon Golomb recalls that at one point around 1970, there were five levels of administration between himself and the president of the university, "and all of them were Zohrab Kaprielian. At that time, we operated on the principle of one man, one vote," Golomb said, "and Kaprielian was the one man who had the one vote."

Kaprielian built departments by consciously

1947

1947 At the urging of Capt. Allan Hancock, then chairman of USC's Board of Trustees, engineering establishes a four-year aeronautical (later aerospace) engineering program. Aircraft production contracts in Southern California surpass \$7 billion.

1949 At commencement, USC awards 605 engineering degrees.

1950

1950 To reflect its professional status, the College of Engineering is renamed the School of Engineering.

1950 Irving Reed and associates demonstrate Northrup's MADDIDA, one of the world's first digital computers, to John von Neumann at Princeton.



Irving Reed

1953 Hughes Aircraft contracts with USC to offer master's-level instruction to its staff engineers under the Cooperative Engineering Program, a program that continues to this day.

targeting areas where nearby Caltech and UCLA were weak, a strategy that had particular success in electrical engineering, where USC developed great strength in the emerging disciplines of solid-state electronics, communications, signal processing, controls and computer engineering.

In 1971-72, Kaprielian reorganized what had been the department of electrical engineering into the separate departments of computer science, biomedical engineering, and two distinct departments of electrical engineering — EE-electrophysics and EE-systems.

POV on VSOE

I certainly feel that ZOHRA B KAPRIELIAN got us the running start that we needed to convert from a provincial school of engineering to the first-class, world-class institution that it has become.

—Andrew Viterbi (Ph.D. EE '62) is the co-founder of Qualcomm, a USC trustee and a member of the Viterbi School Board of Councilors.



new communications technology of packet switching. That research agency would be called the Information Sciences Institute.

"Vietnam was winding down," Uncapher said, but the legacy of the war had made defense work unwelcome at some academic departments. "ISI was designed as a bridge between the Department of Defense and academia."

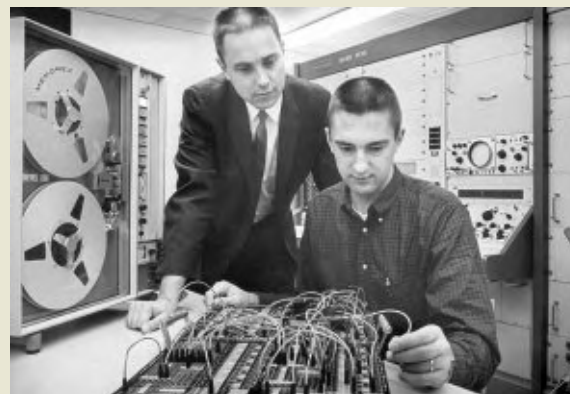
Kaprielian moved with his customary decisiveness to bring ISI to USC, though not to the University Park Campus. A location in Marina del Rey was selected due to the need for far more space than USC had available.

Uncapher had almost immediate success in turning ISI into a national center for computer studies, attracting many of the most creative minds working in computer science. It was one of the birthplaces of the Internet, owing to the work of researchers like Jon Postel, Paul Mockapetris and others. Its innovative MOSIS facility, which lets researchers across the country create prototype chip designs economically, has been serving all segments of the computer community since 1980.

The USC School of Engineering's growth in size and sophistication in turn



Keith Uncapher



System sim lab

THE BIRTH OF THE INFORMATION SCIENCES INSTITUTE

During this period, the reach and scope of engineering research was being immensely broadened. While working for RAND Corp. in Santa Monica, computer scientist Keith Uncapher devised and sold to the Defense Advanced Research Projects Agency an ambitious plan for a large, sophisticated research agency. The agency would work directly with the Department of Defense in developing short-term solutions to specific military needs. In particular, he was interested in developing a

1955

1955 Sol Golomb publishes his classic paper on shift register sequences, which is key to more easily detecting digital signals against noisy backgrounds.



Sol Golomb

1957 Zohrab Kaprielian joins the engineering faculty.

1957

1957 USC installs its first computer, the gift of an alumnus, in Biegler Hall.

1957 USC awards its first engineering Ph.D., in electrical engineering.

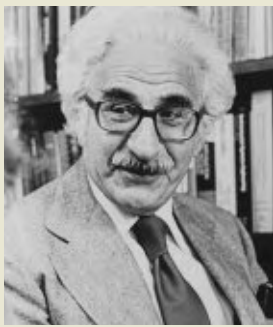
1959 Irving Reed and Gustave Solomon publish a paper on Reed-Solomon codes, now universally used to protect digital data on CDs, faxes, computers and other devices from corruption by noise.

1961

1960 Alfred C. Ingersoll becomes dean.

1961 Olin Foundation gives \$2.3 million to USC for construction of Olin Hall, the first major gift in USC's \$106-million fundraising campaign.

1961 Sol Golomb leads a team that bounces shift register-coded radar signals off the planet Venus.



Dean Melvin Gerstein

led to a bumper crop of distinguished alumni, including astronaut Neil Armstrong (MSAE '70), General Norman Schwarzkopf (MS '64) and Apple Computer co-founder A.C. Markkula (BSEE '64, MS '66). Alumni from this era also include numerous executives of major U.S. and foreign technology companies such as Andrew J. Viterbi (Ph.D. EE '62), co-founder of Qualcomm, and Lily Chiang (BSME '82) of Hong Kong-based Chen Hsong Holding Co., a multinational producer of specialized machinery.



Dean Leonard M. Silverman

SILVERMAN TAKES CHARGE

Following Kaprielian's untimely death from a heart attack in 1981, associate dean Melvin Gerstein was appointed interim dean while a major nationwide search for a new dean was underway. Ultimately, the search converged on an internal candidate — Leonard M. Silverman, then chairman of the EE-systems department. He was appointed to lead the School in 1984.

"Dean Silverman's great strength has been his ability to provide strategic directions for the School and then move decisively to implement them," said, President Steven B. Sample.

When the 44-year-old Silverman, a mathematical theorist and electrical engineer, became USC's chief engineer, the old Soviet Union was still intact and the Cold War was very much alive. Aerospace was still a big and expanding business in Southern California. Mortgage interest

rates were well into the double digits, and USC's football team had just beaten Ohio State 18-6 in the Rose Bowl. Few people owned personal computers, but if they did, they probably had 64K of memory and an operating system called CP/M. Microsoft, not yet a public corporation, was hard at work on the first release of Windows. A lonely band of researchers, including some from ISI, were working out protocols for a promising way to route electronic messages over a little known computer network called DARPA NET, a network based on packet switching technology.

POV on VSOE

I've gone to the administration — to Dean LEONARD SILVERMAN — with requests that were really over the top. I wanted the dean to support some research I wanted to do that had to do with biology. Here I am a computer scientist saying, I want many thousands of dollars from you so that I can run experiments involving biology. Deans giving up money for these kinds of endeavors [is] I suspect quite rare. Yet Len has always had the vision to see that excellence comes from daring and from doing good science. So he supported me in this regard. He provided a good chunk of money for me to carry out experiments, on an occasion where the request I was making was rather extraordinary. Many schools might not have responded. Our school did.

—Len Adleman is a USC Distinguished Professor who holds the Henry Salvatori Chair of Computer Science and also has an appointment in biological sciences.



Adleman photo by Brian Morri



Olin Hall groundbreaking

1963

1963 The Olin Hall of Engineering is completed.

1963 H.K. Cheng publishes a landmark paper on hypersonic flow, crucial to the design of ultra-high-speed aircraft.

1964

1964 Norman Schwarzkopf earns his M.S. degree in mechanical engineering at USC. He specializes in guided missile engineering, a program developed with the U.S. Army to incorporate aspects of aeronautical and mechanical engineering.



Colonel Norman Schwarzkopf, 1965

FutureTech: Sami Masri

Sami Masri, professor of civil/environmental & aerospace and mechanical engineering, has interests that include the modeling and control of nonlinear dynamic systems. Not surprisingly, he thinks “smart structures” — those that can actively resist damage rather than passively withstand it — will be among the star innovations of the future.

Masri uses an experimental shake table located in the basement of Kaprielian Hall to simulate earthquakes and help him design artificial neural networks that can be used to detect damage or hazardous conditions in structures, such as buckling, bending or swaying. By first gathering vibration measurements on a “healthy” system, such as a real bridge, he then simulates comparable vibration measurements in his artificial network to determine how much damage would be caused by a very strong earthquake, wind storm or hurricane.

“We have an international reputation

in what’s called ‘smart structures,’” says Masri, who holds joint appointments in the departments of civil and environmental engineering and aerospace and mechanical engineering. “The idea behind it is to embody some of the biological features of the human body in buildings and bridges, to make them respond to an earthquake or some wind loads or hurricanes in an active way, so they can adjust to their



properties and be less susceptible to damage. It’s a very big stretch to go from the research to the hardware.”

In addition to monitoring the condition of Los Angeles’s Vincent Thomas Bridge, Masri and a group of civil engineering graduate students have worked on other novel projects to make city treasures more earthquake-proof. The team applied engineering techniques during retrofitting of the Getty Museum to mitigate the effects of an earthquake and safeguard the museum’s priceless collection of artifacts.



Top: Alumnus Bob Weiner (BSME ’62, MSEE ’63) was president of his engineering class and took part in breaking ground for Olin Hall. Middle: Seaver Science Center opening. Bottom (left to right): Allan G. Weber, Alexander A. Sawchuk, Dean Silverman, John Silvester and Jerry M. Mendel at the electrical engineering building groundbreaking.

Masri photo by Brian Morris; Schwarzkopf photo by Cynthia Johnson, Time Life Pictures/Getty Images

1967

1965 The school establishes the department of materials science.

1966 The Olin Foundation gives \$2.7 million for the construction of Vivian Hall.

1967 USC Engineering alumnus Andrew J. Viterbi publishes a paper describing what later became known as the “Viterbi Algorithm,” the theoretical basis for worldwide cellular communication.



Andrew Viterbi

1967 Vivian Hall of Engineering and Materials Science opens.



Vivian Hall

FutureTech: Gerald Loeb

Bionics is the word Hollywood invented to explain “The Six Million Dollar Man” in the 1970s. It finally became respectable in the 1990s as sophisticated neural prosthetic devices, such as cochlear implants for the deaf, started to achieve real success with large numbers of patients.

BIONs™ — injectable neurostimulation devices about as big as a grain of rice — are Gerald Loeb’s technology focus now. The devices can transmit electrical signals into the peripheral nervous system to help people who suffer from a wide variety of neurological conditions, such as paralysis or incontinence. An M.D. and professor of biomedical engineering in the USC Alfred Mann Institute for Biomedical Engineering, Loeb has been working on bionic devices for many years.

“BIONs are intended primarily for paralyzed muscles, but there are many dysfunctions that occur in people who have lost the ability to control their muscles,” he says. “The idea behind this technology is to restore the electrical signals that are missing.”

During the 1990s, Loeb worked with Advanced Bionics Corp. in Sylmar, CA to commercialize the first truly multichannel cochlear implant. It was based on work he did in the 1970s with a team at UC San Francisco. Other neural prostheses are

starting to enter the market in the U.S., he says, noting that biomedical devices typically have long development cycles — at least five to 10 years — before they can be commercialized.

Right now, the BION is being used in research to relieve complications of stroke, such as shoulder pain and hand contractions. The long-term goal is to create functional movement in a paralyzed arm. The tricky part is building in continuous control, using sensors, so that the device will be able to move a limb relatively smoothly and continuously rather than in spastic jerks.

“That requires designing a pattern of signals to stimulate the muscles continuously, which means that we have to mimic not just the electrical stimulation to

activate the muscle but the hundreds of sensors that muscles normally have built into them to send information back to the spinal cord,” Loeb says.

A daunting task, but Loeb is busy incorporating movement sensors into the



bionic devices. The devices will transmit the data to an external controller, which will then adjust the level of stimulation, acting just as the spinal cord and brain act to adjust muscle activation in healthy people.

1968 THE INFORMATION AGE, 1968 - 1999

1968 H.C. Andrews and William K. Pratt (MSCE '61) publish the first paper laying the foundation for current digital methods for storing, compressing, interpreting and transmitting images.

1968 Phil Muntz publishes his seminal paper on "electron beam" technique that leads to major advances in understanding fluid dynamics.



Neil Armstrong inside the Lunar Module, 1969

1969

1969 USC engineering alumnus Neil Armstrong (MSAE '70) becomes the first man to walk on the moon.

1969 USC is elected to the Association of American Universities. Member universities are considered to be preeminent in the fields of graduate and professional research and study.

"I made the appointment of Len Silverman as dean of engineering," said the late Cornelius J. Pings, former USC provost. "I regard it as one of the best decisions I made."

Silverman recalls that his first priority was space. A defense buildup was in full swing, but in order for the School to fully participate, it had to have room to grow. So Silverman revitalized the School's development effort, which had only a single fundraiser when he arrived.

He personally reached out to allies in the industry which led to the Hughes Aircraft Electrical Engineering Building in 1990.

Additional square footage became available in 1989 with the opening of Kaprielian Hall, which included a well-equipped structural engineering laboratory in its basement and the Robert Glenn Rapp Engineering Research Laboratory. Altogether, in the five-year period after his appointment, the School of Engineering raised \$60 million. Silverman added nearly 90,000 square feet, doubling what the School had when he started.

Silverman also moved quickly to improve and diversify activities going on within these buildings. One target was undergraduate education. In 1989, after making some changes, the School embarked on a systematic, multi-part effort to improve offerings below the graduate level.

Silverman said he was always "attempting to build on strengths," and followed Kaprielian's model of bolstering areas where local rivals Caltech and the UC campuses — UCLA, UCI and UCSD — were not focused.

Two major initiatives began in 1985 that would shift USC engineering in a new, non-defense direction. One was the Biomedical Simulations Resource. Funded by the National Institutes of Health, it is a unique and pioneering application of an established engineering technique — modeling — to the medical field. The BMSR continues today and is the longest running NIH program at the University Park Campus.

Equally important was a center for the study of photonics — devices designed to use light, rather than electrons, as the medium for information transmission and processing. The Center for Photonics Technology started as a USC organized research unit. The idea was to develop it into something that could achieve recognition and funding as a U.S. government designated research center.

The key faculty member was P. Daniel Dapkus, who found Silverman's door open. "I remember approaching him with Professor Armand Tanguay to describe the concept of a directed effort in photonics that was circulating among a few members

POV on VSOE

It's really a special heritage that the school has. If you look at the history of the Viterbi School, they've had deep industrial relationships for over a half a century. Not just the aerospace industry, but the biomedical industry and other industries that rely on the research that the Viterbi School conducts.

The creation of SITeC [The Mark and Mary Stevens Institute for Technology Commercialization] was really based on a desire that I had to give back to the school. I wanted to do something unconventional and different. And so in collaboration with Max Nikias we came up the idea for SITeC.

SITeC is really intended to help researchers and students at USC to take the technological advances and the basic research that's being done on campus and make sure that that technology gets out into commercially viable companies and commercially viable products.

—Mark Stevens (BSEE '81, BAECON '81, MSCENG '84) is a general partner at Sequoia Capital, a USC trustee and a member of the Viterbi School Board of Councilors.



Stevens photo by Brian Morri; Armstrong photo by Time Life Pictures/NASA/Time Life Pictures/Getty Images

1970

1970 After more than a dozen years of behind-the-scenes leadership, Zohrab Kaprielian becomes dean. He will eventually become senior vice president and provost of the University.

1970 Seaver Science Center is dedicated.

1970 Electrical engineering is reorganized into four departments: computer



Seaver Science Center

science, biomedical engineering, EE/electrophysics and EE/systems.

1970 The USC Signal and Image Processing Institute (SIPI) is founded,

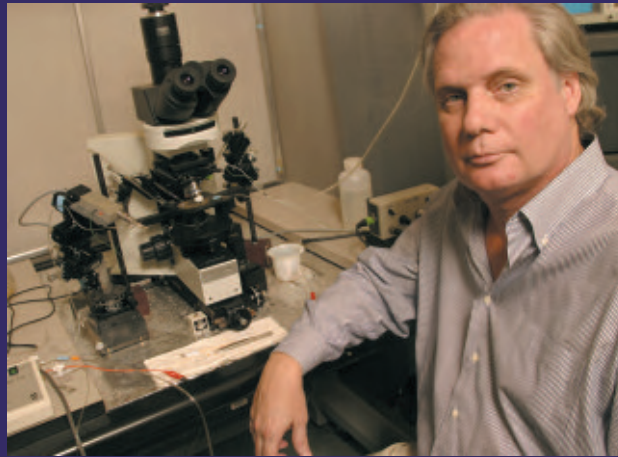


Kenneth Lakin, professor of materials science and electrical engineering, with a student in his laboratory.

carrying on basic research leading to jpeg and mpeg standards, laying foundations of neural net computing and leading to over 200 Ph.D.s by 2005.

FutureTech: Theodore Berger

For more than three decades, a Viterbi biomedical engineer Theodore Berger and his colleagues (Vasilis Marmarelis, John Granacki, and Armand Tanguay) have been pursuing an extraordinary vision: silicon chips that can speak to living brain tissue in the brain's own electronic language, chips that might someday be used to repair damaged or diseased brain tissue.



He is now within sight of his goal. In a living slice of brain from a rat he's demonstrated systems that are half-silicon, half brain tissue, which respond exactly as brain tissue does. From the point of view of function, there's no way to tell where the brain part ends and the silicon part begins. In two years, he is confident that his team will have chips implanted into the brains of rats, working as part of these brains to replace lost memory function. In 10 to 15 years such chips may be in human brains, curing patients with epilepsy, Alzheimer's, stroke and other neurological disorders.

And beyond that? The 50-something engineer smiles. "That'll take me past

when I'm seventy." But he believes that the next generation of researchers, building on his research, have extraordinary prospects. Berger says that "we are now on the verge of understanding the computing platform that makes up memory" and other higher mental processes. From afar, we are starting to see how to literally read minds, to decode the activity within living brains, to see how the brain represents objects, goals, abstract concepts.

"The next generation will start being able to manipulate the code," he says, referring to the brain's internal language. "And the possibilities from there are limitless."

of the faculty and that built on existing faculty strengths," Dapkus recollects. "He was enthusiastic and supportive and immediately grasped the importance of the field and of acting fast."

As a result, Dapkus recalled, "When we approached him with quality faculty candidates, he provided the startup funds necessary to attract additional high quality people and things took off from there." The USC Photonics Center became the DARPA-funded National Center for Integrated Photonics Technology (NCIPT) in 1992.

And as the program developed, Silverman led an effort to acquire funds to build a clean room fabrication facility that resulted in the construction of the W. M. Keck Photonics Research Laboratory. The lab is a centerpiece of the photonics effort which now serves all of USC with state-of-the-art research device fabrication facilities.

Near the end of his long tenure as dean, Silverman tapped Merwyn C. Gill (BS '37), universally known as "M.C.," for a \$7 million gift that named the Merwyn C. Gill Foundation Composites Center. Gill, a Pasadena industrialist, had once planned to go into the oil business. Instead, he started his own company in his garage and built the M.C. Gill Corp. into the world's largest manufacturer of aircraft baggage compartment liners and one of the largest manufacturers of composites. A longtime avid fan of all things Trojan, Gill, a member of the Board of Councilors, continues as an enthusiastic Engineering supporter.

Berger photo by Max S. Gerber

1972

1972 Rand Corp. computer scientist Keith Uncapher launches USC's Information Sciences Institute in Marina del Rey, a principal player in the development of the Internet.

1972 USC engineering pioneers "distance education" using closed-circuit and later broadcast TV.

1973 Powell Hall is dedicated.



Researchers used modem-equipped portable computers like this one when the Internet, as a new invention called Arpanet, was being developed at ISI and other centers.

1974 Irving S. Reed co-authors a paper on radar "adaptive arrays," a revolutionary rapid method to identify and filter out interference.

1974 Fred Browand publishes his classic paper that builds on work by Richard Kaplan and Ron Blackwelder on reducing air drag on vehicles, research that continues to influence vehicle design to this day.



Merwyn C. Gill

The move toward diversification from a heavily aerospace industry-dependent department helped the USC School of Engineering weather one of its most challenging periods. Historically, USC had received major support from tuition paid by aerospace companies for advanced education of their employees through the innovative Instructional Television Network (ITV). With the fall-off in defense spending at the end of the Cold War, this revenue dried up and harsh decisions had to be made.

"I think Len masterfully guided the ship through some very rough

times in the early 90s," said Alan Willner, a specialist in photonics.

Silverman managed to make the required savings through attrition, while still recruiting promising junior faculty even through the worst of the slowdown. The number of faculty members in the School declined from 160 to 136, but USC assistant professors were at the very top of the charts in winning Young Investigator and other special incentive awards for junior faculty.

Silverman also continued to look for new directions. The School successfully sought money from government to retrain laid-off aerospace engineers to work in other specialties including civil engineering and multimedia. It sought and won funding for work in civilian areas including transportation and manufacturing.

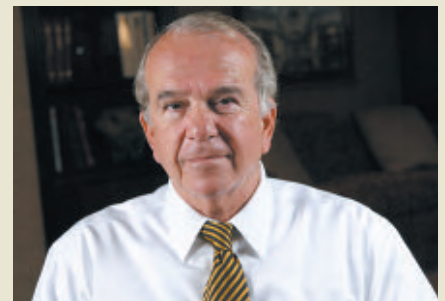
In 1991, USC established the Center for Advanced Transportation Technology to research a range of topics in the post-Cold War economy. Earlier, in 1987, Silverman established a graduate program in systems engineering under the leadership of National Academy of Engineering member Eberhardt Rechtin. This program continues to flourish today.

Silverman hired another National Academy of Engineering academician, F. Stan Settles, to take over and revitalize the department of industrial and systems engineering. While Settles had a distinguished record in industry, he did not have the usual academic credentials. Settles recollected, "Len brought me in with tenure, as a full professor. I think it took guts to back the appointment of someone without the traditional research track record."

But it was multimedia, under the leadership of C. L. Max Nikias, which became a signature of Silverman's deanship and a springboard for greatness for USC engineering. The competition for the National Science Foundation Engineering Research Center in multimedia and Internet technologies was intense, with Berkeley, Columbia and dozens of other engineering schools energetically trying to win the prize.

Nikias persevered and the result was a big win for USC, one that made front-page news in the *Los Angeles Times*. Nor was the success isolated, for it was followed by a series of major coups — the Institute for Creative Technologies, the BioMimetic MicroElectronic Systems (Center) and the Center for Risk and Economic Analysis of Terrorism Events, all of which built on the resources of both IMSC and ISI. The department of biomedical engineering also became the base for the \$112 million Alfred E. Mann donation to establish an institute which would include numerous new biomedical faculty.

Additional triumphs in fundraising included a \$10 million gift in 1997 from trustee Ronald Tutor for what was then to be called the Engineering Academic Center. This center, which would later be re-named Ronald Tutor Hall, would be a building project that spanned



Ronald Tutor

1976

1976 Sol Golomb is elected to the National Academy of Engineering (NAE), the first USC faculty member to attain such an honor.

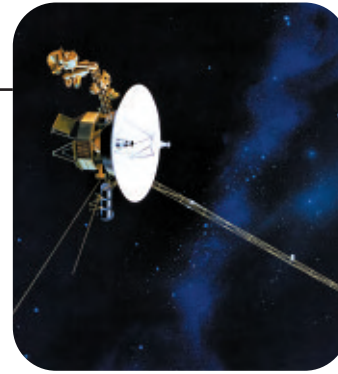
1977 Robert Hellwarth is elected to the NAE.

1978 Alexander Sawchuk, Armand Tanguay and others begin studying how to digitally process optical (phonic) signals.

1979

1979 *Voyager I* arrives at Jupiter and begins sending back striking images thanks to basic coding by Andrew Viterbi and error coding by Irving Reed and Gus Solomon.

1979 Irving Reed and Lloyd Welch are elected to the NAE.



Voyager I

1982 George Bekey and Mihran Agabian are elected to the NAE.

1983 Student Fred Cohen writes a program for a parasitic application that seizes control of computer operations, the very first computer virus, in Leonard Adleman's class.



Jim Baum

two deanships, and Tutor's construction company, Tutor-Saliba Corp., would complete the building in 2005.

In 2000, another \$2.5 million gift came from the Baum family to name the Baum Student Center, a student study and meeting room within Tutor Hall. It had been the late Dwight C. "Bill" Baum, a long-time supporter of the School, who first proposed the idea of building a student center. His son and current Board of Councilors Chairman, Dwight C. "Jim" Baum, worked with two deans to fulfill the dream.

After 18 years at the helm,

Silverman decided to step down. Once again, a national search was launched and a strong internal candidate emerged. In retrospect, it almost seemed that the national search was a waste of time, so strong were the attributes of the choice for the next engineering dean, C. L. Max Nikias.

Although he would be dean for just four years, the shortest tenure of all the USC engineering deans except for those who served in an interim capacity, he had a huge impact on USC engineering. Nikias was quick to point out that he took over "an excellent engineering school."

"I feel we have an extraordinary opportunity to move into that top group of the nation's great engineering schools," he said at the beginning of this tenure.

Much like Silverman was confronted with the end of the Cold War, Nikias faced a sudden unexpected challenge when the 9/11 terrorist attacks in 2001 triggered an atmosphere of economic uncertainty. It also quickly brought tighter visa procedures for international students attending American universities. This had great impact at USC, long one of the top academic destinations for such students.

Nikias declared a six-month budget freeze and undertook a reorganization of the School. He reduced administration to redirect resources to faculty and at the same time made a significant investment in new communications and development staff. He leveraged ISI's technical acumen to transform ITV almost overnight from a TV-based delivery system to an innovative, high-speed Internet-based delivery system that was renamed the Distance Education Network (DEN). DEN quickly became, and continues to be, the largest e-learning operation in graduate engineering education.

The budget freeze worked. At the end of six months, the School's reserves were healthy enough to support several new faculty hires. Spectacular enrollment growth in graduate programs, led by DEN, provided new resources. Nikias rewarded existing faculty with a one-time salary adjustment and a year-end raise averaging about nine percent.

Nikias viewed nurturing and hiring top-notch faculty as the key to greatness. He outlined his thinking in what he called a "positive feedback loop." It boiled down to a familiar USC dictum — "building on excellence."

It works this way: In an academic body, great faculty does great and important research, raising the school's reputation. As reputation improves, higher-quality students seek admission and when they graduate, those students attract superior employment offers, both in industry and academe. When friends and alumni of the school notice the climb in quality of faculty and students, they increase their support, as do government agencies, foundations and corporations. Resources pour in



C. L. Max Nikias

1984

1984 Leonard M. Silverman is named dean.

1984 ISI's Jon Postel and Paul Mockapetris

introduce "dot-com" by creating the Internet's domain name system.



Paul Mockapetris

1985 The Center for Photonic Technology is established. The National Institutes of Health establishes the Biomedical Simulations Resource at the department of biomedical engineering.

1985 The Institute for Robotics and Intelligent Systems is established.

1986 Gerald Nadler is elected to the NAE.

1987

1987 Eberhardt Rehtin, CEO of Aerospace Corporation, comes to USC to start a graduate program in systems engineering.

1987 Leonard M. Silverman and Hsien K. Cheng are elected to the NAE.

1989 Kaprielian Hall and the Hedco Neuroscience Building open.



Eberhardt Rehtin

and the school is able to attract more top faculty, thereby attracting even higher quality students, and so on in an upward spiral of success.

This was more than just a theory. Nikias made it work.

The Nikias approach to recruiting faculty was a little unconventional, but it was effective.

"We don't have openings; I don't allocate positions," he said. "We identify critical areas where we want to recruit faculty and then I authorize searches in those areas. If no top-notch hire

POV on VSOE

I didn't think of anyone else who could take over, who could possibly be better than MAX. He's just perfect for it and he proved that. He came out running fast, really did everything the right way. He's got personality, which you need, to deal with the faculty and with the administration and with the alumni. Being dean, you've got many, many audiences. And I have to say he really knew how to deal with those audiences. He was a natural at it.

—Len Silverman is a professor of electrical engineering and was dean of USC Engineering from 1984-2001.



FutureTech: Maja Mataric

Maja Mataric specializes in assistive interactive robotics. She's designing robot companions to help convalescent patients who have suffered strokes, partial paralysis, blindness or neurological conditions. A growing number of Americans will have to live with physical limitations like these as the population ages and people live longer.

"In the long run, we're really looking at putting robots in everyone's home," says Mataric, associate professor of computer science and director of USC's Center for Robotics and Embedded Systems. "We're building them really to help people in whatever area they need help."

Mataric says USC is a "tremendously vibrant place" for conducting this kind of interdisciplinary research. The emphasis on interdisciplinary work has allowed her and many colleagues to engage in truly innovative projects.

"Every problem that is worth studying is a multidisciplinary problem," she says. "We have faculty coming in from outside of engineering to study problems that really go well beyond any one discipline or any one field. I think the



future is about multidisciplinary work, about looking at global issues, really hard problems, and putting parts together to do something truly magnificent."

Mataric has worked on developing the capabilities of robots to interact one-on-one with humans. She is also working on defense-funded projects to build teams of robots that would be capable of collaborating with each other to accomplish a task, such as cleaning up a toxic or poisonous chemical spill. That work is supported by the Defense Advanced Research Projects Agency.

"We're only about five years away from seeing teams of human and robotic rescue workers on the scenes of disasters," she says. "That collaboration is closer than people imagine."

1990

1990 Hughes Aircraft Electrical Engineering Building opens.

1991 The Center for Advanced Transportation Technology is established.

1991 Tony Maxworthy and F. Stan Settles are elected to the NAE.

1991 Hughes Aircraft gives \$5 million for an electronics research center.

1992

1992 The USC Photonics Center becomes the DARPA-funded National Center for Integrated Photonics Technology. The W. M. Keck Photonics Research Laboratory opens with the largest and best-equipped cleanroom in academia.

1993

1993 Prof. Barry Boehm founds the USC Center for Software Engineering.

1993 E. Phillip Muntz is elected to the NAE.

1993 SIPI's Bart Kosko publishes an article, "Fuzzy Logic" in *Scientific American*. The techniques are now widely used in machine applications in consumer electronics.

FutureTech: John O'Brien

The endless quest for smaller, faster, and more powerful computers may have its end goal in sight in a USC Viterbi School project directed by a young Iowa-born associate professor of electrical engineering, John O'Brien. O'Brien is at the center of a multi-disciplinary team that, with National Science Foundation funding, is creating a kind of ultimate computing device. It is based on designing single pulses, or quanta, of light that perform computations based on the arcane and slippery rules of quantum mechanics. Theorists say that such devices could short-circuit the restrictions of normal electronic systems by creating clouds of quantum possibilities that will resolve — if the algorithm is designed properly — into the correct answer. Such devices would not only be much smaller, faster, more energy efficient and more powerful than existing systems, but would also be close to the physical limits of how fast and powerful a computing system could be.

One real-world use could be much better ways to make information secure from eavesdroppers. Beyond that O'Brien says that we're still to early in the process to know.

"Right now, we're just building a toolbox," he says. O'Brien's part of the toolbox is to make infinitesimal devices to create



the light pulses, from his Microphotonic Devices Group (MPDG), which already has to its credit the smallest laser ever built.

The individuals who comprise the rest of the team span a huge range of disciplines. The team includes two members of the National Academy of Engineering (P. Daniel Dapkus and William Lindsey) and two other full professors (Alan Willner, Anthony F.J. Levi); and others, including recently recruited quantum wizard Todd Brun. There's even another National Academy member, Joseph Campbell, from the University of Texas/Austin.

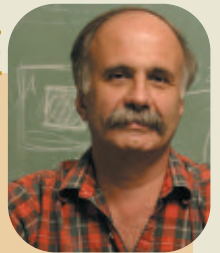
Where else besides the USC Viterbi School could such a team be assembled?

O'Brien pauses, thinks: "Maybe two other places in the world!" he guesses.

POV on VSOE

USC is in the geographic heart of the space science industry. We have a very powerful distance learning program, so we took advantage of this, building up our Astronautics program through education, by meeting the demands of the industry. In doing this, we were not arrogant — we always looked for feedback from the company, from the customer. We grew by listening to the industry, and not just to the companies and management, but also to the students. These students are in the trenches and they have an understanding of the industry. Many of them have already worked for 5, 10, 15 years in the industry. They have experience and perspective — but they want to go farther. So we were able to learn from our students, as we built up our program.

—Mike Gruntman is a professor of aerospace and mechanical engineering and chair of the USC Viterbi School's Astronautics Division.



O'Brien photo by Brian Morri; Gruntman photo by Max S. Gerber

1994

1994 Prof. Leonard Adleman demonstrates that the genetic substance DNA can be used as a computing medium.

1995 The Center for Composite Materials is established.

1996

1996 USC engineering wins its first National Science Foundation-funded Engineering Research Center, the Integrated Media Systems Center (IMSC). Its executive director is future dean, C. L. Max Nikias.

1996 Robert Scholtz (MSEE '60) founds the Ultrawideband Radio Laboratory.

1996 Leonard M. Adleman, Barry W. Boehm and Peter Staudhammer are elected to the NAE.

1997

1997 Backup astronaut and mechanical engineer Paul Ronney explores the zero gravity "flame ball" phenomenon in two successive shuttle missions.

1997 Ronald Tutor gives \$10 million for the Engineering Academic Center.

1997 William Lindsey elected to the NAE.



Paul Ronney

materialized in the search, the job evaporated." The three critical areas were information technology, biomedical technology and nanotechnology, and Nikias launched initiatives in all of them. All three areas were interdisciplinary, vital to the economy of the 21st century and related to the four critical pathways outlined in USC's strategic plan at the time (communications, life sciences, the arts and the urban paradigm).

Whenever faculty candidates came to campus, Nikias found time to personally interview every single one of them. He pushed hard to find underrepresented minorities and women, getting support from USC's unique Women in Science and Engineering (WISE) program to help put together attractive start-up packages for female faculty.

In his first two years, he hired 26 tenured or tenure-track faculty, including bonafide superstars like biomedical engineering professor K. Kirk Shung, perhaps the world's foremost ultrasound researcher, and a trio of renowned supercomputing heavyweights — Priya Vashishta, Rajiv Kalia and Aiichiro Nakano. The latter three all had appointments in the USC College, for Nikias had long been an active USC collaborator. He hired promising younger faculty like computer scientist and cybersecurity specialist Leana Golubchik and musician and operations researcher Elaine Chew.

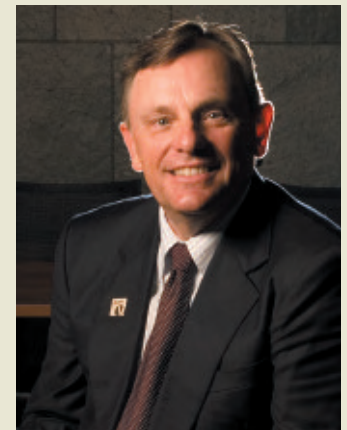


Daniel J. Epstein

multimedia whiz Paul Debevec, who created the special effects technology used in the movie *Matrix*; Laura Marcu, a top researcher in molecular imaging; Ann Chervenak, a grid computing specialist; and



Mark Stevens



John Mork

Jennifer Swift, an expert in earthquake engineering.

The energetic dean moved swiftly on the fundraising front as well. Though an ambitious seven-year initiative with the goal of raising \$300 million was not announced until the fall of 2003, it actually began the day Nikias became dean, if not before.

The first major gift, \$10 million, came from Daniel J. Epstein (BSISE '62), a USC Trustee and San Diego real estate entrepreneur who named the department from which he received his degree, The Epstein Department of Industrial and Systems Engineering.

Mark Stevens (BSEE '81, MS CENG '84), also a USC Trustee and a Silicon Valley venture capitalist, and his wife Mary stepped forward with \$22 million to start the Mark and Mary Stevens Institute for Technology Commercialization (SITeC). The institute was created to stimulate USC's technology transfer efforts and to provide students with a solid grounding in technology issues.

John Mork (BSPE '70), an energy entrepreneur, his wife Julie and their family donated \$15 million to name the newly merged Mork Family Department of Chemical Engineering and Materials Science.

1998



President Steven B. Sample

1998 Alfred E. Mann announces a gift of \$112.5 million to USC for a new institute allied to the department of biomedical engineering for creating and commercializing medical devices.

1998 Steven B. Sample and Keith Uncapher are elected to the NAE.

1999

1999 The U.S. Army chooses USC as the site of the \$45 million Institute for Creative Technologies.

1999 METTRANS, the National Center for Metropolitan Transportation, is founded as a joint venture between the USC School of Engineering and Cal State Long Beach.

2000 **A NEW MILLENNIUM, 2000-PRESENT**

2000 Gerald Loeb invents the BION, a miniature muscle stimulator.



The Bion

2001 C. L. Max Nikias is named dean and the School's rise accelerates sharply.



Andrew Viterbi

But the crowning fundraising achievement and the high point of the Nikias deanship, as well as a milestone in the School's 99 year history, came on March 2, 2004 when Andrew and Erna Viterbi gave \$52 million to name the School the USC Andrew and Erna Viterbi School of Engineering. While the monetary gift was the largest ever to name an existing engineering school, the Viterbi name was priceless.

"The gift by the Viterbis will be a powerful catalyst for bold research and innovation and will forever associate USC's engineering school

with one of the most illustrious names in the history of engineering," said President Sample the day of the announcement. Viterbi, who received his electrical engineering Ph.D. from USC in 1962, is a USC trustee, the co-founder of Qualcomm and the creator of the Viterbi Algorithm, which is embedded in almost every cell phone in the world.

Another significant triumph for the School occurred on Feb. 2, 2005 with the opening and dedication of the \$50 million Ronald Tutor Hall. With 103,000 square feet for research labs, classrooms and student

activities, as well as a café, it quickly became the new heart of the Viterbi School.

In four years, Nikias would raise almost \$200 million for the Viterbi School and depart with great momentum toward completing the fundraising initiative. The USC campus grew to expect big gift announcements from engineering, all accompanied by much fanfare — balloons, banners, blaring trumpets from the Trojan Marching Band and confetti cannons. But fundraising was not the only triumph.

In October 2003, the School won its second National Science Foundation (NSF) Engineering Research Center (ERC), with \$17 million in funding for the Biomimetic MicroElectronic Systems (BMES). The center is a collaboration with the Keck School of Medicine at USC to develop biologically-inspired implantable microdevices designed to replace damaged or diseased parts of the human

POV on VSOE

The VITERBI name is a classic example where the name is by far much bigger than the money they contributed to the endowment of the school. Andy Viterbi has truly been a pioneer in the area of communications and wireless technology. He's a world-renowned expert in the area of communications and he's someone who has succeeded not only in academe but also in industry. And, therefore, Andy Viterbi and his career path, as well as the very strong bonding of the Viterbi family, will be an inspiration for our students and our faculty in perpetuity.

—C. L. Max Nikias is USC Provost and was dean of the Viterbi School from 2001 to 2005.



POV on VSOE

The very same boost to success that we've gotten we want to pass on to others. We want to pass on to those who will hopefully lead us for the next century.

—Andrew Viterbi (PhD EE '62)

2001

2001 A \$7 million gift from Merwyn C. Gill (BS '37) to the Center for Composite Materials is the first in a series of record-setting gifts.

2001 Carl Kesselman (MSEE '84) founds the Center for Grid Technologies. His Globus Toolkit is adopted as the standard for grid computing on the next-generation Internet structure.

2001 Al Mann is elected to the NAE.

2002

2002 A \$10 million gift from alumnus Daniel Epstein is the first ever to name an industrial and systems engineering department.

2002 ITV morphs into the fully Internet-based Distance Education Network (DEN).

2002 The Center for Robotics and Embedded Systems (CRES) is established.

2003

2003 The Center for Biometric Microelectronic Systems gives USC its 2nd NSF ERC; the founding of the Center for Risk and Economic Analysis of Terrorism Events gives USC the nation's first Dept. of Homeland Security Center of Excellence; computer science professor Leonard Adleman wins the Turing Prize, often described as the "Nobel Prize in Computing."

body. With this center, the Viterbi School became one of only four schools with two active NSF ERCs.

A month later, in collaboration with the USC School of Policy, Planning and Development, the School was chosen as the home for the first Department of Homeland Security Center of Excellence. So while 9/11 brought challenges, it also brought opportunities that Nikias had been quick to recognize. The \$12 million center would be known as the Center for Risk and Economic Analysis of Terrorism Events.

The competition for both of these centers was intense. There were 71 competing proposals for the homeland security center and USC not only won the competition, but it was a partner on the second homeland security center when it was awarded to Texas A&M in April of 2004. The NSF said that USC's BMES proposal was one of the best it had ever received for an ERC.

Many other faculty were also successful in attracting research grants so that the Viterbi School is now consistently ranked at or near the top among engineering schools in the amount of research expenditures per tenured faculty.

When Nikias became dean, he reached out to industry, forging new partnerships. This resulted in the Center for Interactive Smart Oilfield Technologies (CiSoft), established by Chevron; the Pratt & Whitney Institute for Collaborative Engineering; and the Aerospace Institute for Engineering, funded by Airbus.

He also reached out across the world, beginning relationships with the Indian Institute of Technology, Kharagpur, Tsinghua University in Beijing and Inha University in Incheon.



(left to right) President Sample, Erna and Andrew Viterbi and Dean Nikias at the School naming in March 2004.



The dedication ceremony of Tutor Hall in February 2005.

During the presidency of Steven Sample, the quality of undergraduates seeking admission to USC began going up, slowly at first, but steadily gaining momentum so that by the time Nikias became dean, USC was competing for top students with universities like UC Berkeley, UCLA and Stanford. Recently, Sample has been noting in speeches that USC's freshmen have a higher SAT average than Berkeley's. The Viterbi School has been leading USC's dramatic rise with incoming Viterbi freshmen averaging an SAT score of 1388 during the past two years — strong evidence that Nikias' positive feedback loop was not only working, but crackling with energy.

Senior associate dean for academic affairs, Yannis Yortsos led an aggressive effort to revamp the curriculum for the challenges of the 21st century, particularly concentrating on engineering education's most challenging area — retention. About 45% of students who start out in engineering fail to receive an engineering degree with many switching to other majors, especially during their freshman or sophomore years.

Some of the inventive changes to the curriculum included freshmen academies where students heard from working engineers to gain insight

2004



2004 The School is named with a record \$52 million gift from Trustee and alumnus Andrew Viterbi, and his wife Erna.

2004 A \$22 million gift from Mark and Mary Stevens founds the Stevens Institute for Technology Commercialization (SITEC).

2004 *U.S. News & World Report* ranks the School #6 in graduate engineering programs (#3 among private universities).

2004 P. Daniel Dapkus is elected to the NAE.

2005

2005 Ronald Tutor Hall opens.

2005 C. L. Max Nikias is named USC Provost and Yannis Yortsos becomes dean.

2005 Alumnus John Mork, his wife Julie and their family provide a generous naming gift for the newly combined Mork Family Department of Chemical Engineering and Materials Science.



Ronald Tutor Hall

1100100
CELEBRATING 100
YEARS
1100100

2005 USC celebrates its 125th Anniversary and the Viterbi School commemorates 100 years of educating engineers.

The timeline has been edited for print. For a complete and growing timeline, go to http://viterbi.usc.edu/about/100_years/timeline/

POV on VSOE

The future of the engineering school looks very bright to me. I look forward to working with Yannis, with his great leadership, his great ideas and all the things that will happen in the near future... Under Yannis' leadership, I believe there are no limits to how good we can become.

—John Mork (BSPE '70) is the CEO of Energy Corp. of America and a member of the Viterbi School Board of Councilors.



on how engineers affect society, technology, history and politics. The Viterbi School added a course in biology for engineers to the traditional mix of physics, chemistry and mathematics.

The number of minors available expanded and now includes 3D animation, astronautical engineering, interactive multimedia, law and Internet technology, petroleum engineering, environmental engineering, technology commercialization, video game design and management, video game programming, music technology, web technology and applications, engineering management and construction planning and management.

So well was the Viterbi School doing under Nikias' stewardship, it surprised no one when Sample tapped him for USC Provost to replace

Lloyd Armstrong, Jr. On June 1, 2005, when Nikias assumed the office of USC Provost, Yannis C. Yortsos became dean of the USC Viterbi School of Engineering.

"Although this appointment is for an interim period, it is still one of great responsibility and challenge. Leading the Viterbi School, particularly after Max's spectacular tenure, is a non-trivial task," said Yortsos on the day he became dean. "My goal is to deliver to the next dean a School even more vibrant and promising than I received it. To this end, I will devote all my energies."

The School continues to build upon the foundation of the last 100 years while looking ahead to the next great research revolutions. As its history demonstrates, the journey has been one of incredible leadership, agility, accomplishments and growth. In looking at the technological innovations of the 20th century, it is clear that one cannot even imagine what engineers will create in the 21st. But one thing is certain. The USC Viterbi School of Engineering will continue to be a leader, blazing a path toward that mind-boggling tomorrow.



Dean Yannis C. Yortsos

The writers wish to acknowledge "The USC Engineering Story" by Robert E. Vivian as the main source of historical information used in this special issue. Vivian was the School's third dean and published his comprehensive history in 1975.

POINT of VIEW on RESEARCH

Viterbi Leads USC's Rise

For many decades, USC was perceived as a regional school that was good at training professionals...largely for the local market. As the vision of USC has expanded to being a national and even a global research university, I would say that the Viterbi School has been in the forefront of that increased scope and vision.

—Solomon Golomb is a USC University Professor of Electrical Engineering.



On Becoming a Research University

Dean Vivian didn't invent the concept of research university. The first major research contract that we had was with Lockheed Aircraft Company. It was related to the manufacture of aluminum-framed aircraft, because welding aluminum was an exotic activity in 1944. Additional contracts followed with Northrop. There was the creation of the Foundation for Cross Connection Control, which was a separate activity that took about 20 years to come to fruition, but was put in place also during the war. That was not related so much to the war effort as it was to infrastructure. The sewer system and the potable drinking water system in Los Angeles intersected in too many places and there wasn't enough technology in place to protect the drinking water supply. So the foundation was created by agencies and like-minded industries who were prepared to support research to improve our capability to protect the water supply.

—James Moore is a professor of industrial and systems engineering and of civil engineering and chair of the Daniel Epstein Department of Industrial and Systems Engineering.



The View from the 10th Floor at ISI

ISI works in a broad range of information technology research areas. We're working in or are interested in working in almost any part of information technology that you can think about. We now have some 30-odd research faculty that teach courses and participate fully in faculty life. They attend faculty meetings and help design curriculum. And I think that's been good for both the School and for ISI. It attracts people who want to be involved with academics, who like dealing with graduate students, dealing with the rest of the faculty, being exposed to new ideas, but who are also conducting important research.

This is the best job in the world, I think, because you have an opportunity to work with very intelligent people on very exciting problems and it's in the context of a great university. The Viterbi School has gotten better and better over the years since I've been here and I think we're on a roll and we'll get even better, and ISI will be a key part of that.

—Herb Schorr is executive director of the Information Sciences Institute and senior associate dean for the Viterbi School.



Destination: Viterbi

There are clear signs that the school is rising nationally and internationally. The fact that we are viewed as an attractive destination for distinguished researchers is something that would not have happened ten or fifteen years ago, and their level of leadership and expertise makes a critical difference. Additionally, a commitment to cross-disciplinary research that has become almost a mantra for the School, allows us to explore and excel in areas that are really exciting. I strongly believe that these elements will help to continue our upward trajectory for the next 100 years and beyond.

—Steve Nutt is a professor of the Mork Family Department of Chemical Engineering and Materials Science, M.C. Gill Chair in Composite Materials and senior associate dean for research at the USC Viterbi School.



POINT of VIEW on GIVING

Stepping up and Giving Back

I have tried to stay a member of the Trojan family. But it was only when I read about Andrew Viterbi stepping up to the plate, that I said, 'I can do that too.' Because he and I were there under the same circumstances. We were working at day jobs and yet we absorbed an education that set the foundation for the future... If we have done well in life, if the University has equipped us well, we need to help. We need to do something. If you succeed a little, you want to take care of your children. If you succeed a lot, you really ought to take care of a lot of the next generation... we have to look for the kids that are going to make this a better country and a better place.



—Tom Reed (MSEE '59) is former Secretary of the Air Force and author of "At the Abyss: An Insider's History of the Cold War."

Staying Connected



The engineering school made it financially doable for me to come to USC. And that was such a big reason for me to continue here, that I feel like I want to give back to the School. It's a part of what has brought me to where I am today, so I think it is important to give back and try to stay involved where I can.

—Dianna Tetz (BSISE '95) is a computer analyst for The Capitol Group Companies, Inc., and is an annual supporter of the Viterbi School through the USC Associates.



A Trojan for Life

"I love USC, and I love the Viterbi School of Engineering. I'm trying to give back of my time and my talents. It's very rewarding and I enjoy it a lot. USC [is] one of the top engineering schools in the country and that positions us with some pretty good company."

—Jay Kear (BSME '60) is president of HamiltonTech Capital Partners. He was chair of the Viterbi School's Board of Councilors from 2001-2004, during which time the School launched its \$300 million fundraising initiative. Jay worked closely with Dean Niekias during this period and has been an involved alumni leader and supporter of the School for many years.

Thinking Globally

My biggest accomplishment was in Iran. In 1972, I asked the head of the Iranian Oil Company to give us fellowships for [the] petroleum engineering department. And he sent the check to me directly, in my name. And, of course, I gave it to the department. Later, I wrote a letter to the head of the petroleum engineering department at University of Tehran. I said, 'Send me a couple of students. I'm giving \$10,000.00 scholarships.' And at that time, \$10,000.00 was quite a bit.

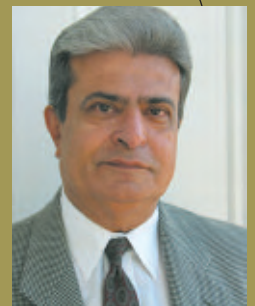
—George Chillingar (BSPE '49, MSPE '50, Ph.D. GEOL '56) is a professor of civil and petroleum engineering.



A Parent's POV

Well, it's what we call the Trojan spirit. The School has a tremendous ability to get you. The embrace is one that you can't break. And it makes it a family experience. As soon as my son started here, I started getting involved with the faculty. And I found out that it was an absolutely amazing faculty. Some world renowned people. As a result of that, I funded several research contracts. I also donated some very sophisticated equipment for research. And I started serving on the electrical engineering advisory board and helping to mold the actual program. So, as you can see, I am a committed parent, but more importantly, I have a vested interest in the School.

—Asad M. Madni is president and COO of BEI Technologies, Inc., and is an active Trojan parent.



Tetz, Reed and Chillingar photos by Brian Morri

John and Julie Mork



All in the Family

by Diane Ainsworth

John Mork and his family leave a lasting legacy

Mork Family Department of Chemical Engineering and Materials Science



Energy entrepreneur John Mork (BSPE '70) and his family have donated \$15 million to the USC Viterbi School of Engineering to name the newly merged Mork Family Department of Chemical Engineering and Materials Science, which includes petroleum engineering, the program from which Mork received his degree in 1970.

The gift from Mork, chief executive officer of the Denver-based Energy Corporation of America (ECA), his wife, Julie, and children Kyle and Alison, establishes the department's new name. Since 1989, petroleum engineering has been a program within chemical engineering.

"Advances at the nano-bio-chemical interface will have a significant impact on many fronts, including our ability to develop a new means of energy production, for example, through fuel cells and new materials to facilitate the conversion of natural gas to hydrogen," says Mork, who oversees ECA, a privately held company.

"We are deeply indebted to John Mork, who is a visionary alumnus and partner committed to academic endeavors of the highest caliber," says USC President Steven B. Sample, who is an electrical engineer on the faculty of the Viterbi School. "The Mork family's naming gift will allow us to strengthen our research and teaching in fields of vital importance to society, while enabling faculty and students to collaborate across disciplines to develop chemical, biological and nanotechnology innovations that we're only beginning to imagine today."

An Opportune Time

Viterbi School Dean Yannis Yortsos, a chemical engineer, says the departments of chemical engineering and materials science were merged to maximize faculty expertise and collaborative efforts.

"This gift, along with the merger, is propelling an exciting synergy of research interests among the chemical engineering, materials science and petroleum engineering faculty, and it strengthens our teaching, particularly for undergraduates," he explains. "This is the only chemical engineering and materials science department to be named and we have now become an even

more unique engineering school with two named departments."

Yortsos added that a portion of the gift will be used to support efforts to retain undergraduate students in petroleum engineering.

"If we are to meet the technological, energy and medical challenges of the 21st century, this new department will unify our efforts in rapidly changing fields that are crucial to society," adds USC Provost C. L. Max Nikias, who worked with Mork on the Viterbi School Board of Councilors before becoming provost.

The Mork family gift, announced in mid-September, coincides with the celebration of USC's 125th anniversary and the Viterbi School's centennial.

Both chemical engineering and petroleum engineering have been part of USC almost since the first engineering courses were offered during the 1905-06 academic year. Because of the oil boom in Southern California at that time, many of USC's early chemical engineers studied petroleum engineering. In 1922, USC awarded its first engineering master's degree to U. Soe Theim in chemical engineering even though USC had yet to grant any B.S. degrees in chemical engineering. Theim wrote his thesis on cracking petroleum.

When USC established a College of Engineering in 1928, chemical and petroleum engineering were two of the five original departments. Petroleum engineering flourished as an academic department in the post-World War II years. In 1989, it merged with chemical engineering. In contrast, materials science did not become a department until 1965. Since 1989, it has been a graduate program offering masters and doctoral degrees.

From Bioengineering to Molecular Thermodynamics

The Viterbi School's chemical engineering research spans such



"If we are to meet the technological, energy and medical challenges of the 21st century, this new department will unify our efforts in rapidly changing fields that are crucial to society."

(Opposite page) left: John Mork chats with biomedical engineer Ellis Meng in one of the new Tutor Hall labs; right: John Mork with chemical engineer Rich Roberts, new faculty in the new Mork Family Department of Chemical Engineering and Materials Science.

areas as bioengineering, peptide and protein design, polymers, rheology, statistical and molecular thermodynamics, reactor design, fluid mechanics and molecular transport processes. The petroleum engineering program is one of the oldest and most academically respected programs of its kind in the country and is the key player in the Center for Interactive Smart Oilfield Technologies (CiSoft), funded by Chevron and others, to improve oil and gas exploration and production efficiency.

Materials science faculty at the Viterbi School have been investigating the properties and data-processing capabilities of metallic, semiconductor, ceramic and biomaterials, and developing advanced semiconductor materials and nanostructures. At the Viterbi School's Gill Composites Center, faculty are developing and studying new composite materials.

"These two departments have been relatively small, but very distinguished," Yortsos says. "We will work to expand the faculty from 14, the current number of full time faculty, to about 20. Furthermore, the materials science faculty will now be available to teach a larger number of undergraduate students."

The Mork family's gift is the second gift to name an engineering department at USC and is one of several major gifts received by the Viterbi School of Engineering since the inception of its \$300-million fundraising initiative, Destination: The Future.

Mork and his wife, Julie, who live in Denver, built an oil and gas exploration and production company from the ground up. Today, Energy Corporation of America is an industry powerhouse with more than 5,000 gas-producing wells across the United States and New Zealand.

In 2002, Mork became a member of the Viterbi School Board of Councilors and in 2003, he received the Viterbi School's Distinguished Alumnus Award.

THE NAMING CELEBRATION

Held on the University Park campus on September 16, the Viterbi School hosted a formal announcement of the Mork Family Department of Chemical Engineering and Materials Science. At the announcement, a plaque honoring the Mork family was presented. It will be installed in the Neely Petroleum and Chemical Engineering building. The Trojan Marching Band played while a Mork department banner was revealed. Hundreds of cardinal and gold balloons were released into the air while a large group of faculty, students, staff, friends and family looked on and cheered. President Steven Sample and Dean Yannis Yortsos remarked on the significance of this gift and praised the Mork family for their generosity. John Mork, (BSPE '70) gave a heartfelt speech and words of inspiration to the students in the crowd. In attendance were John's wife, Julie and his

children Kyle, and Alison (BSBCT '05).

The festivities continued that evening with a celebration dinner at the California Club attended by over 200 guests. After dinner, guests enjoyed a special tribute video and John Mork was presented with a personalized baseball jersey. In addition, the family was given an original piece of art representing the new department. A highlight of the evening was a breathtaking performance on violin by Martin Chalifour, first chair of the Los Angeles Philharmonic. John Mork also received the Russian Academy of Natural Sciences Crown and Eagle Award which was presented by professors George Chilingar and Solomon Golomb. To conclude the evening, Julie Mork was named an honorary alumna of the Viterbi School in a special presentation given by Provost C. L. Max Nikias and Dean Yortsos.



Left to right: Dean Yannis Yortsos, John Mork, President Steven Sample, Julie Mork, Alison Mork and Kyle Mork.



John Mork the boy, and John Mork the young man were equally comfortable out in the field around oil-drilling rigs, but his passion was baseball as evidenced by the picture with his father Roy.

John Mork: Explorer and Entrepreneur

As an energy entrepreneur, John Mork (BSPE '70) knows that special engineering niche populated by chemical and petroleum engineers.

The son of a California wildcatter, he was born in Santa Monica, educated in Los Angeles, and grew up around oil rigs, showing an early interest in his father's trade.

"I fell in love with exploration," says the 6' 2" engineer, with a twinkle in his eye. "I couldn't read enough about Magellan sailing around the world and exploring continents that had never been seen before. And Lewis and Clark's expeditions to the West? I thought that was so cool."

He was athletically inclined, but did well in math and science too, and when it came time to apply for college, Mork tested out of some college math prerequisites. Initially, he planned to attend the University of Oklahoma, but after rough-necking in Kansas the summer before college — working the oil rigs in sweltering Midwest humidity — he says he called up his parents and asked them to find out if USC was still interested.

When he got the nod, he left to play baseball at USC.

Baseball Giants

"That's what I wanted to do," admits the left-handed outfielder. But he found himself playing alongside some giants on the baseball diamond — first baseman Bill Seinoth and pitcher Tom Seaver — who dashed his hopes of turning pro. "I played for about a year and a half before an injury sidelined me," he says. "By then, I knew it was time to be something else."

He turned to petroleum engineering, which was a bit unusual during the *Apollo* era. Most of his engineering classmates were pursuing space careers. But like his father Roy, young John Mork wanted an outdoor job, something he could really sink his teeth — or maybe just his feet into.

However, USC's petroleum engineering curriculum proved much more rigorous than baseball. Mork struggled to keep up with the workload, but he latched onto faculty who could help him — professors like Lyman Handy, "the consummate teacher," who was then chairman of USC's petroleum engineering department, and Nicholas Van Wingen, a petroleum engineer who later joined Caltech.

In his sophomore year, the young would-be petroleum engineer enrolled in an upper division course taught by George Chilingar (BSPE '49, MSPE '50, Ph.D. GEOL '56), one of the world's best known faculty in petroleum engineering. A champion role model for students, Chilingar, sensing Mork's discouragement, took the latest textbook that he had authored and wrote on the inside front page, "To my best student." The gesture touched Mork so deeply that he vowed to stick with it and finish his degree.

"I gave him my book because of his performance in my classes. He took several of my classes and his performance was exquisite," explains Chilingar. "I saw the potential, the great potential, the kind of questions he asked, the kind of answers he gave."

Modern-Day Magellan

Mork turned overnight into a modern-day Magellan, a student who was always ready



to take on a new challenge, always ready to point his compass toward the next unexplored academic horizon. He never shied away from difficult classes.

In 1970, he was awarded a B.S. degree in petroleum engineering and went to work for Union Oil (later renamed Unocal) in Santa Paula, California “where I thought I had died and gone to heaven.” He loved the work and was transferred to Alaska a year later to become a platform-drilling superintendent.

Meanwhile, his father was chasing dreams of gushers in the tiny town of Glenville, West Virginia. But after years of dry wells, Roy was low on capital, and in 1972, he suffered a heart attack, which brought the younger Mork to his side.

Drilling wells in the Appalachian basin was tough. Happily, Mork met his future wife, Julie, during those lean years. Julie shared Mork’s enthusiasm for exploration and made the hard times seem easy. After their marriage, she took over the business side of Mork’s small, privately owned company, Pacific States Gas and Oil Co.

The couple lived by the turn of a drill. Then after two dry wells, Mork’s crew hit a 25-billion cubic foot natural gas reserve, one of the largest new fields at the time, and sparked a gas rush in Glenville. Mork’s company took off.

Today, Energy Corporation of America (ECA) would be ranked the 50th largest energy and petroleum company in the country if it were publicly owned. Headquartered in Denver, Colorado, where the Morks make their home, ECA employs about 250 people, 150 of whom are stationed in West Virginia. The company has approximately 5,000

wells in the United States and New Zealand and more than 5,000 miles of pipeline.

Engineering the Future

As a competitive industry entrepreneur, Mork hires talented engineers and gives them “great responsibility, great authority and lots of encouragement,” but he is also aware of the decline in engineering graduates nationwide. His concern took him full circle this fall, when he and his family decided to contribute to Mork’s alma mater and direct a portion of the gift toward improving the retention rate of undergraduate petroleum engineering students at USC.

“For the United States to be great, we need good engineers and technically trained people,” Mork says.

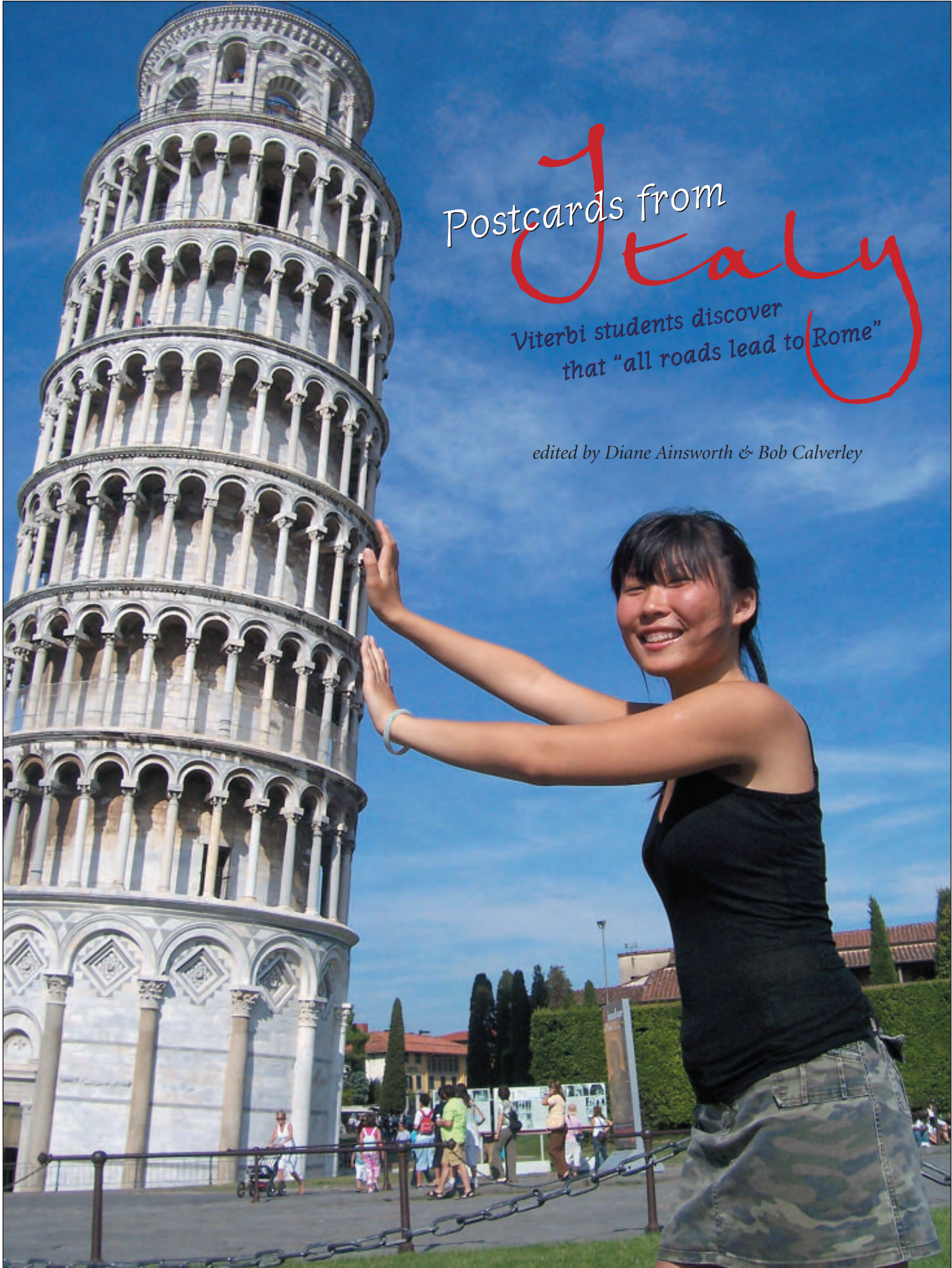
“I’m thrilled to have this opportunity to contribute to an exciting new department.”

His family is thrilled too. Longtime philanthropists for educational and youth-related causes, the Morks believe the Viterbi School’s newly formed department will give USC a leg up on a whole spectrum of rapidly emerging fields — everything from nanotechnology to oil, gas and hydrogen-based energy systems — all of which are vital for fueling technological advancement and improving people’s lives.

It’s an irresistible chance, the Morks say, to invest in a department that is poised to lead tomorrow’s engineers into an entirely new world of scientific and technological challenges.



From top left: The Mork family — Newly married; celebrating an anniversary; and enjoying time together in the late 70’s. The Morks with children Alison and Kyle. Today, John and Julie Mork in the office of Energy Corporation of America.



Postcards from
Italy

Viterbi students discover
that "all roads lead to Rome"

edited by Diane Ainsworth & Bob Calverley

Destination Viterbo: "The City of Popes"

One hot Saturday morning when "you feel as if someone has crammed you into a vat of crazy glue and let you dry in an oven," Mark Weaver, a civil engineering building science senior, saw a caravan of cars come through the gates of Vatican City. Only ten feet away, Benedict XVI, the newly elected pope, waved to the crowd. The town of Viterbo, known as the City of Popes because so many popes were chosen there, is located an hour-and-a-half north-east of Rome.

Viterbo holds a special interest for the Viterbi School. The Viterbi family name, and thus the Viterbi School name, originated from an old custom in which immigrant families adopted the name of the place in which they settled. So, shortly after the summer program began, the students, faculty and their friends made their first excursion to Viterbo.

"I couldn't help but notice the universal thread in all of the city's architecture," said Calvin D'Silva, an aerospace engineering student. "From the great walls surrounding the borders, the moats and trenches surrounding each palace and the towers hovering over each manor, the entire city was built to protect its inhabitants." D'Silva related that the fortifications eventually failed when the Roman Empire fell and he saw a lesson for aerospace engineers, who often work on defense projects. "As engineers, we must continue to

develop and update our technologies and ability to protect ourselves so that we do not share the same fate."

During the seven weeks, there were countless other excursions.

"The weekend is going to be filled with vibrant color and culture, sights and sounds, history and hot weather. Pack your sunblock

boys and girls," said Adam Anderson as he prepared for a trip to the beach city of Sorrento, the Isle of Capri and the historical city of Pompeii. "The bus was filled with the sounds of MP3 player music, card games, laughter and the occasional thermodynamic homework question."

Anderson was curious about how the residents of Capri coped with their limited water supplies. He observed that water faucets were attached to a large box with a series of copper pipes inside where the water was heated with a natural gas flame. "Because water is heated almost instantly, very little water is wasted while the sink or faucet runs, waiting for warm water," he said.

Shawn Matsumoto found immersing himself in Italian culture, "whether it's eating pizza or pasta for lunch to having gelato

whenever the time is right or trying to communicate with the locals at the open air market, is the best way to learn."

He was

fascinated by the ruins of the ancient city of Pompeii, which was engulfed by lava when Mount Vesuvius erupted in 79 A.D., and preserved until its discovery in 1790. "I'm still amazed that a large amount of Pompeii has yet to be uncovered by archeologists."

"Egg-shaped Lemons are Sweeter Fruit"

While Kirstin Harper-Smith found Sorrento "a place of absolute beauty," it was the local egg-shaped lemons that snared her attention. She learned that the lemons, from trees that originated in India, "are ripened under a pagliarelle, a straw mat attached to wooden poles," that helps protect them from salty air, drops in temperature and "allows them to ripen over a longer period of time." The extra ripening time and scrupulous handpicking results in sweeter fruit. She cut one open and tasted it. "The verdict...egg-shaped lemons are

Every summer a hardworking group of engineering undergrads have an opportunity to participate in the USC Viterbi School Study Abroad Program.

At a time when both USC and the Viterbi School are celebrating anniversaries — 125th and 100th, respectively — the students went to Rome. There is perhaps no other city than Rome, and no other country than Italy, that have such rich engineering histories. For seven weeks, the students fulfilled course requirements while learning about Italian culture, art and, of course, engineering. While they gazed in wonder at past engineering marvels such as the Pantheon or Colosseum, they remained firmly focused on their future in engineering. Classes are demanding. They must cram an entire semester into seven grueling weeks. The idea is to provide students with the valuable opportunity of an overseas experience without adding an extra semester to their undergraduate program. The experience gives them a global perspective by observing engineering in another part of the world. And what a perspective it was, for they were in a city with engineering wonders that date back more than 2,000 years.

The students took pictures, made observations and sent them to *USC Viterbi Engineer* in electronic postcards. You will find the highlights here, but you can read all of their postcards on the School's website at: <http://viterbi.usc.edu/links/?23>.

Left page: Trisha Gibo attempting to hold up the Leaning Tower of Pisa. Above right: Joanne Zhang, May Chang and Donovan Schaefer pose in front of the Viterbo sign.



sweeter fruit.”

It was the mopeds, called Vespas in Italy, which intrigued Tricia Gibo. “It’s actually quite amusing to see businessmen and women riding their mopeds to work and young children sporting their oversized helmets while seated in front of their parents,” she said. “It seems much easier to maneuver such a small vehicle in the narrow streets and alleys. Who knows, I may just have to trade in my car for a little moped and have some fun zooming around the streets of California.”

A group of students took a day trip to Pisa to study what can only be described as one of engineering’s most well known mistakes, the leaning tower of Pisa. “During the first five years of construction, engineers realized that the ground beneath the tower could not support its weight. For the past 832 years, engineers have been developing different methods to prevent the tower from toppling over,” said Guillermo Garcia. “As an engineering student, it is such a great opportunity to actually view the designs created by engineers of the past. Whether it is the leaning tower of Pisa or the Colosseum of Rome, Italy is home to some of the most breathtaking wonders in engineering history.”

Close Encounters with Gaetano

In the third week of the program, Idah Mansor, a senior, met a young Italian civil engineer named Gaetano. Walking past the Pantheon, Gaetano spoke only his “perfect, accented English” to her and she spoke to him only in her “halting Italian,” and they learned from each other. Gaetano’s firm was



sending him to Morocco to be project supervisor for a highway running from Rabat to the edge of the Sahara. She noted that Gaetano, in addition to Italian, spoke English, French, and Spanish and was learning Moroccan Arabic. His “multilingualism made him a prized asset of his firm.” She said, “it reminded me that engineering needs more than just technical prowess.

It needs a dose, if not more, of basic human communication.”

Zenzile Brooks, a civil engineering junior, said “Rome has a beauty that defies technology. We don’t know why a camera somehow fails to truly capture the glint of the sunset off the dome of an ancient basilica or the footsteps of a hundred dumbfounded tourists on the floor of the Sistine Chapel.” Instead of being frustrated by photographic shortcomings that don’t capture the moment, Brooks slowed down, looked around more carefully and began taking mental pictures. “Last night we climbed to the top of the world,” she said about her trip up the Spanish Steps. “We left our cameras at home.”

Jessica Dean, a civil engineering student was impressed with the Colosseum, Pantheon, the Forum and much more, but Italian social culture proved even more interesting. She and classmates made a journey to the beach near

Rome at Ostia. “Men walk around in a state that most Americans would consider almost naked. Those who are not wearing Speedos are often donning very small

shorts,” she said. She observed men applying sunscreen to each other and lying quite close to each other, “an overall comfortableness with each other such as girls have with each other in America. Needless to say, this is not your average male behavior in Los Angeles.” She saw women sunbathing topless or wearing “bikinis that were less than conservative from an American point of view.” But the Italians paid little if any attention and it “seemed to have almost nothing to do with being provocative.”

On a side trip to Barcelona, Spain, Karen Eitan, a civil engineering senior, studied Antoni

Gaudi, an architect and designer whose influence can be found all over the city. “His use of colorful mosaics adds a positive touch to his architecture and his use of nature is always evident,” she said. “Through Gaudi’s work, we can see how important nature really is and how it can be integrated into our future work.”

In Barcelona, Jessica Dean was not sure how she felt about Gaudi’s spectacular La Sagrada Familia. “Innovative, unique, impressively detailed, yes, it is all of these things. Heavy-handed, imposing, and in many ways indelicate, it is most certainly these as well.”

Kellen Sick, a senior in aerospace engineering, led a group of nine students as they toured Barcelona on their “California Cruiser” bikes. They saw the Arc de Triomf, Roman ruins, churches, parks, fountains and the steps where Christopher Columbus announced he had found “the New World.”

Joseph Yeargan, another aerospace engineering student, got up early to climb the 500 stairs to the top of the dome on St. Peter’s Basilica. “One begins to get a sense of the



tremendous accomplishment of the 100 year building project...millions of bricks form the complicated slopes of the minor domes...there are complex structures built to direct light into the basilica as well."

Traveling by himself, Lee Berra made a touching personal trip. He became the first Berra in his immediate family in 125 years to set foot in Cuggiono, a town 30 kilometers outside of Milan. It is a town where his grandfather had been born and from where his grandfather and a large number of others immigrated to St. Louis. He found the graves of many Berra's in the town cemetery. "A main piazza by the church was named Berra Piazza and a main street was named Via St. Louis. My grandfather left his home and all he knew so that he could find a better life in America."

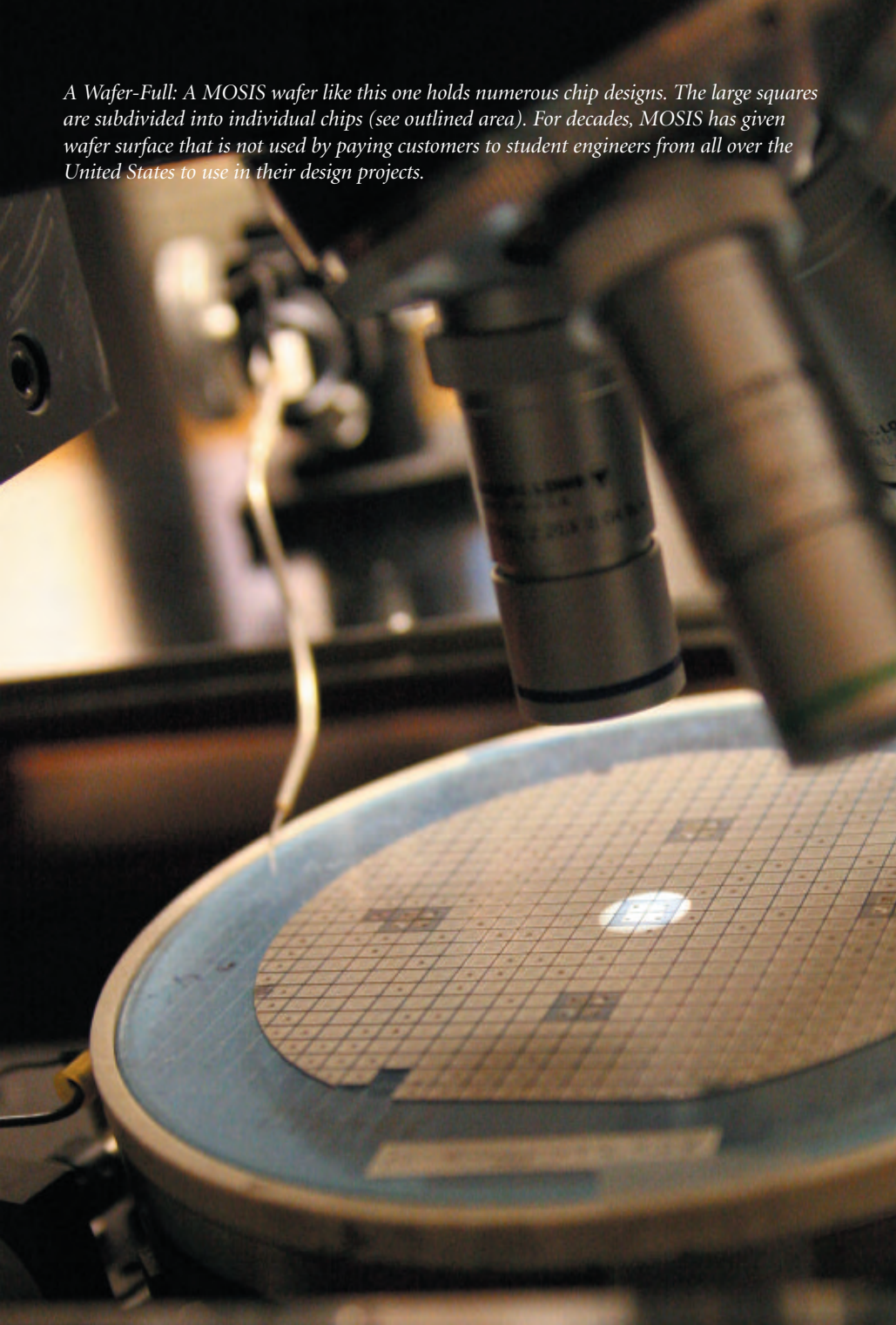
With one week left in their program, the London terrorist attacks changed everything. "Suddenly the metro systems were filled with police and security personnel. For a few days, I had to show my metro pass every time I got onto a bus or train, sometimes even twice at the same station," said Kristine Skinner, an electrical engineering junior. All activity ceased as all of Europe paused for two minutes of silence in memory of the victims.

The Roman program had come to a sudden and somber end. However, the experience was still one that each student will never forget. It is the memories of the people, the places, the history, and the wonders of Rome that they take with them.



Left page, clockwise from top left: Guillermo Garcia, Tricia Gibo, Jeff Keiser and May Chan in front of the Leaning Tower, Pisa; A summer's evening view from the Spanish Steps, Rome; Arch of Constantine, Rome. This page, clockwise from top right: View from St. Peter's Basilica dome; Students found time to visit the Isle of Capri; Bikers Kurt Nakamura, Lee Berra, Ben Ferrara, Karen Eitan, Jeff Kaiser, Calvin D'Silva, and Kellen Sick cruise Barcelona; Palazzo Ducale, Venice; San Marco Basilica, Venice; Arc de Triomf, Barcelona.

A Wafer-Full: A MOSIS wafer like this one holds numerous chip designs. The large squares are subdivided into individual chips (see outlined area). For decades, MOSIS has given wafer surface that is not used by paying customers to student engineers from all over the United States to use in their design projects.



MOSIS Turns 25!

USC's free-chips for students program continues to thrive

by Eric Mankin

The USC Viterbi School's MOSIS chip brokerage, which provides low-cost prototypes of new computer chips to companies and institutions nationwide and gives the same prototype service free to students, is celebrating its 25th birthday this year.

How important is this program? Michael McCorquodale, a University of Michigan Ph.D. graduate last year is now CEO/CTO of a new start-up company, Mobius Microsystems, which is commercializing a chip that grew directly out of his graduate student research. With the help of MOSIS, McCorquodale was able to get three versions of his design fabricated and version number three worked. In fact, it worked so well that it won a prize at the Design Automation Conference in 2003 and is now on its way to becoming a Mobius product.

"The whole project has been MOSIS dependent," he says. "When you're a student, there aren't a lot of options." Without MOSIS, he says, "we wouldn't have anything except an interesting idea." But with it, he explains, "we had silicon we could demonstrate to investors and prospective customers."

Multiply McCorquodale's experience by hundreds and you'll have an idea of the impact of the program. In 2004, the year he received his Ph.D., MOSIS prototyped nearly 1,000 chips for students across the country. Between 1990 and 2003, some 66,539 students have learned chip design in MOSIS-associated programs, and a total of 13,734 designs have been realized according to a detailed report prepared by Richard Brown, a chip design expert formerly at the University of Michigan who is now dean of the University of Utah College of Engineering.

"There are innumerable examples of students who have learned to design chips because the MOSIS service was there.

These students matured as VLSI engineers because they were able to test chips they had designed," Brown says, adding that in many cases "the courses they took would not have been offered without MOSIS."

The dollar analysis makes the magnitude of the MOSIS contribution clear. In 2003, MOSIS fabricated a total of 852 student chips, 752 of them instructional, another 135 research projects. Had the students and researchers gone out and paid market price to realize these chips, the total bill would have come to \$6.7 million.

César Piña is director of MOSIS, headquartered at the Viterbi School's Information Sciences Institute in Marina del Rey, Calif. For decades, MOSIS has been facilitating commercial chip design by providing a secure, economical and reliable way of prototyping chips.

MOSIS contracts directly with commercial chip foundries for wholesale silicon "acreage" and retails the subdivided space on an affordable non-profit basis. MOSIS keeps the cost of fabricating prototype quantities low by aggregating multiple designs onto one mask set.

MOSIS has prototyped more than 50,000 chip designs for businesses, government agencies and universities, including the originals of many now widely used commercial chips such as those used in Sun Microsystems SPARC and SGI's MIPS systems. These architectures grew out of the work of David Patterson, a UC Berkeley computer scientist, who divided his class into two teams that designed some of the world's first RISC chips — architecture that later found its way into SPARC & MIPS.

The MOSIS educational program dates back to August 1980, when MOSIS began offering for free to students what would otherwise have been waste space on chip runs.

In many runs, after all paying customers have designs in place, space often remains on the silicon blank. Waiting for more designs to arrive would delay customers so the empty space is allocated, as available, to students. "It's as if we were running a bus line," says Piña. "The bus leaves at a scheduled time, whether it's

empty or full. The student work goes in the empty seats."

The process is not cost-free for MOSIS. Besides the work of placing the designs into the mask, MOSIS staff must deal with questions and make sure everything is according to specifications. "Our paying customers need little help on this," says Piña. "They know the design rules. But the students are often coming in cold."

While the students know the theory of chip design, they haven't actually had the experience of submitting a design for fabrication. Piña estimates that answering such questions costs the brokerage an average of 1-2 man-weeks per run, an expense that is written off as a donation.

Between 1985 and 1996, DARPA and the NSF provided funding for such activities. "We were sorry to see that support end," says Piña, "But we thought the program was too important not to continue."

The professors and students taking advantage of the arrangement are grateful. Don Bouldin, a professor of computer science at the University of Tennessee, has been teaching chip design for more than 20 years with students now working at Intel, Motorola, TI, and IBM. He says his students have submitted nearly 200 chips for fabrication by MOSIS under the program.

"It has been a highly motivating experience for my students." Bouldin explains. Along with the satisfaction of having their work actually fabricated, the process "presents them with the realistic fear that the project might not work, and therefore causes them to exert extra effort in checking their work. Additionally, the



César Piña is director of MOSIS at the Viterbi School's Information Sciences Institute.

experience of testing the fabricated chips and comparing those results to simulations is very valuable."

Bouldin started a MOSIS users group that now has 3,300 members and organized a continuing series of biannual conferences aimed at bringing together instructors and students using MOSIS.

It can be a career saver for some students. Professor Steve Long of UC Santa Barbara has been working with MOSIS as a researcher since the mid '80s. Now, he reports, "I have two Ph.D. students who are designing circuits to be submitted to MOSIS. Both students are in their last year and have outlived their original funding sources. MOSIS MEP has generously agreed to offer them space on some upcoming runs so they can verify their work and finish writing their dissertations."

Finally, what goes around comes around in the most direct possible way for MOSIS. As a start-up entrepreneur, Michael McCorquodale no longer qualifies for MOSIS student chip making, but he still needs to have chips made to realize his designs for the product Mobius Microsystems is building.

So "now we're a paying customer," he reports. "We just did a chip. We got the silicon back through MOSIS."

Anthony “Tony” D. Lazzaro, BSISE ’49

The Gift That Kept On Giving

Tony Lazzaro’s role in the first multimillion-dollar gift to the University put Olin Hall and the Engineering School on the map.

When Anthony “Tony” D. Lazzaro joined USC 60 years ago, the School of Engineering consisted of Biegler Hall and five army barracks, newly donated from the military camp at Santa Ana, Calif., to accommodate the flood of young men returning to college under the GI bill. Many engineering classes were still being held across campus, in Bridge Hall, near Exposition Blvd. and Trousdale Parkway, and in the basement of the Old College building near



the heart of the campus. Neither was too far away, because in 1946, the entire campus was situated on half the land it occupies today — 57 acres sandwiched between Hoover Boulevard and McClintock Avenue.

Lazzaro, who showed up in his Navy lieutenant uniform to fill out his application for admission, would change all of that. After graduating cum laude from USC in 1949, with a degree in industrial engineering and business management, he began his climb up the university business management ladder, holding positions of assistant business manager and director of campus development, associate vice president for business affairs, and ultimately senior vice president for business affairs.

“Tony Lazzaro virtually built the USC we know today,” former USC President James H. Zumberg once said of the young industrial and

systems engineer. “Since 1960, he has been responsible for the construction of 132 buildings on the USC campus. He oversaw the landscaping that turned city streets into attractive walkways. He has worked closely with the campus planning committee of the USC Board of Trustees for many years

Instrumental Role in Olin Hall

Lazzaro not only helped to shape the USC campus, he played an instrumental role in the first multimillion-dollar building to be donated to USC: the Viterbi School’s very own Olin Hall.

“In 1953, Bob Vivian had learned of the F.W. Olin Foundation, which was based in Minneapolis, and stopped in to see Charles Horn, who was the president,” Lazzaro recalls. “Basically he told Horn he needed help, but Horn told him there were so many people ahead of him that he’d have to wait. Bob kept checking in with him every year, though, and in 1960, after he had stepped down as dean of the School of

Engineering, Horn called him, saying he wanted to consider USC for a building.

“Vivian let his successor, Dean Ingersoll, know, and Dean Ingersoll let the president know, and everything was in motion,” Lazzaro says. “We got an application for Olin Hall together, which included a design rendered by William L. Pereira Associates, really a blueprint for the School of Engineering’s urgent space needs, and submitted it. I was deeply involved in the entire process. In 1961, they announced a grant to the University of \$2.3 million for what is now Olin Hall.”

The gift came at just the right time. USC President Norman Topping had rolled out the university’s new 1960 Master Plan, which called for expanding the campus to 160 acres and moving its boundaries all the way out to Vermont Avenue, Figueroa Street, Exposition

and Jefferson boulevards. Topping announced a price tag for the expansion of \$106 million.

Totally Unheard Of

“This was totally unheard of, something we’d never done before,” Lazzaro says. “But when the Olin Foundation members, President Charles Horn and his two associates, James Wynn and Ralph Clark, came in with their grant, they told President Topping that they wanted more proof that the trustees, friends and alumni of USC would start giving. So the Olin Foundation gift became the catalyst for launching a successful fundraising campaign. Then in 1962, the Ford Foundation came in with a grant.”

Groundbreaking began on February 22, 1962, after which the School of Engineering’s new support group, Archimedes Circle, held a formal black-tie dinner for its 100 charter members, and Olin Foundation trustees Horn and Wynn. The Olin Foundation added an additional \$150,000 to its initial \$2.3 million gift to build a new hybrid computer laboratory, designed and installed by Drs. George Bekey and Robert McGhee. “We returned \$65,000 of the total grant because we had completed the project under budget,” Lazzaro says. “That really impressed the Olin Foundation.”

On September 23, 1963, the building was dedicated and USC entered a new era of broadband communication technology, making its courses and educational resources more accessible to the Los Angeles community. By then, the Olin Foundation was so taken with USC that it donated an unprecedented second gift of \$2.7 million in 1966 for Vivian Hall of Engineering. In 1971, the foundation awarded a third gift of \$825,000 for the Norman Topping Instructional Television Center, which was “absolutely unheard of,” Lazzaro says. Combined, the gifts totaled \$7 million. Lazzaro was very involved with all three major gifts to the School.

“It was a momentous occasion for the School of Engineering because it marked the beginning of a long period of unprecedented growth and development,” former Dean Zohrab A. Kaprielian wrote in a tribute to the Instructional Television Center.

continued on next page

Alice Goldberg, BE '49

First Woman In A Man's Field

Ford Foundation Follows Suit

Shortly after the initial Olin Foundation gift, the Ford Foundation announced a three-year, \$6.5 million matching grant. "For every \$3 we raised, they said they'd add \$1," Lazzaro says. "But to qualify for the full \$6.5 million, we had to raise \$19.5 million by November 1965. We raised the full amount a year before the deadline, and the Ford Foundation came back again and gave us another \$7.5 million." In all, the two Ford Foundation gifts came to \$14 million.

By 1967 when Vivian Hall was dedicated, USC was well on its way to becoming a first-class teaching and research university. Gone were the 27 wooden army barracks that had once dotted its 57-acre campus. All but two of the five serving the School of Engineering were removed. The last barracks stood stoically on the site of Ronald Tutor Hall until construction for that building began in 2003.

Lazzaro went on to serve as chief liaison officer with the 1984 Los Angeles Olympic Organizing Committee, negotiating agreements that totaled more than \$19 million and turned USC into a major Olympic games venue.

When former President Ronald Reagan showed up looking for a temporary office near the games, Lazzaro graciously offered him several choices in Bovard Hall, but Reagan wanted Lazzaro's suite.

"It was near the helipads, near the Seeley Mudd Building and Cromwell Field," Lazzaro says, laughing.

Reagan left after opening day, but when the games were over, Zumberg praised Lazzaro, more than any other individual in campus administration, for bringing the Olympics to USC.

Today Lazzaro is a vice-president emeritus and can be found many days meeting with people in the building he helped the School to secure, Olin Hall. He is a very involved and supportive alumnus of the School and has worked closely with the School's last four deans, offering valued advice and insight on programs and activities.

—Diane Ainsworth

Alice Goldberg, was voted "most courageous for surviving as the only woman in the class of '49." She was part of the G.I. boom of 1946, transferring to USC from Stanford University with one year of undergraduate work already completed. Three years later, she became the first woman to graduate from USC with a bachelor of engineering degree in chemical engineering.

Raised in a family of chemical engineers — both Goldberg's father and brother were practicing chemical engineers — Goldberg thought nothing of entering the field herself. She excelled in the sciences in high school and declared a chemistry major at Stanford her first year because the university did not have a chemical engineering program. After her first year at Stanford, she took a year off to get married, then accepted her mother's offer to continue her undergraduate studies at USC on her mother's dime. Her husband, Jack, also enrolled in the chemical engineering program.

She remembers the campus was spacious, "with a lot of land and a lot of bungalows," she says. "They didn't have the buildings to accommodate all the returning vets, who were coming back on the G.I. bill, so the place was loaded with students."

Goldberg had "a wonderful time" being one of only two women in engineering.

"The classes were interesting and being the only woman was kind of fun," she says. "But I was married to another engineering student, so I had it easy. I was in a nice social circle. We made a lot of good friends here. I think if I had come in as a single woman, I would have been out of luck."

Goldberg lived a charmed life at USC until she began to job hunt.

"Then I hit the discrimination," she says. "USC brought companies on campus to interview the students, but I found that nobody wanted to talk to me. I had a better grade-point average than my husband, but no one would



hire a woman in engineering. That's just the way it was."

She persisted and finally landed a job testing aluminum specimens at Harvey Aluminum, with the help of some personal contacts.

She left Harvey Aluminum years later to raise a family. By 1982, when she reentered the job market, women had broken through the gender barrier in engineering.

"I got a job at Hughes Aircraft teaching new, incoming engineers computer-aided design, because that was when they first started using computers for design and drafting," she says. "So I finally did get a job as an engineer."

Her advice to young women engineers today is to "go for it."

"I don't think women face any discrimination today," she says. "They are on an equal footing with men. So if they want to become engineers, it's really a matter of going for it and sticking with it."

—Diane Ainsworth

snapshots



USC Viterbi School of Engineering Events
Summer & Fall 2005



USS Midway welcomes the Viterbi School of Engineering for a private alumni evening.

USS MIDWAY RECEPTION SAN DIEGO ALUMNI EVENT

On Thursday, June 9, 2005 San Diego engineering alumni came together for a private evening aboard the USS Midway — San Diego Aircraft Carrier Museum. Alumni shared in private tours of the museum, flight simulations and a special keynote presentation by historian Scott McGaugh, author of *Midway Magic*. USC's Vice Provost for Research Advancement Dr. Randolph Hall commented on the engineering research at USC. The USC Viterbi School of Engineering extends its gratitude to event sponsors: Julie and Bryan Min (BSISE '86), Rita and Hal Potter (BEME '57), and Jeannie and Ted Scalise (BSEE '88). With special thanks to Daniel J. Epstein (BSISE '62) for his inspiration and guidance in making the evening possible.



Viterbi alumnus Tom Reed (MSEE '59) with daughter Carolyn, son Gordon and granddaughter Gabrielle.

FATHER'S DAY FAMILY CELEBRATION – USS HORNET BAY AREA ALUMNI EVENT

All aboard the USS Hornet — northern California engineering alumni joined together with their families for a great Father's Day celebration. Over 150 alumni joined the Viterbi School for a special presentation led by alumnus and former Secretary of the Air Force Thomas C. Reed (MSEE '59). Alumni enjoyed a private barbeque and Viterbi kids explored the carrier on special Kids Ship Adventure tours.



Alumnus Al Visceral (MS ISSM '81) celebrates Father's Day with his extended family aboard the USS Hornet.



BOC member and event sponsor Ed Glasgow (MBA '70) and his wife Lynne enjoy an evening at the Hollywood Bowl.

THIRD ANNUAL EVENING AT THE HOLLYWOOD BOWL

On July 23rd, the Viterbi School hosted its third annual "Evening at the Hollywood Bowl." 125 alumni and friends of the School gathered for a reception and dinner prior to the concert at the Bowl's Museum Garden.

They were also treated to a fascinating presentation by Eric Elias, the Bowl's pyrotechnic operator, responsible for the fireworks that accompanied the concert later in that evening. Following dinner, the group enjoyed the "Tchaikovsky Spectacular" with a brief performance by the Trojan Marching Band.



Viterbi School parents Mary and George Larson with Dean Yannis Yortsos.



Alumnus Dan Chapel (MS ChE '62) and wife Nancy pour the first glass of Pinot at the Viterbi wine tasting.



Viterbi alumnus Michael Alderete (BSME '77) and daughter Jenni celebrate 100 years of engineering at Viterbi Oktoberfest.

PARENT'S MOVE-IN DAY RECEPTION

The Viterbi School hosted a reception for incoming freshman parents on move-in day, Wednesday, August 17. Over 150 parents and family members attended to meet other parents, Viterbi School faculty and staff, and Dean Yannis Yortsos. Along with the dean, Beth Saul from the USC Parents Office and current Viterbi School parent Asad Madni spoke about the value of engineering education, and offered advice on what students and parents could expect in the coming years.

CHONETTE CHAIR CELEBRATION

On September 21, at a dinner hosted by Dean Yannis Yortsos in the dean's boardroom in Tutor Hall, the Viterbi School celebrated the dedication of the Chonette Chair in Biomedical Technology and the installation of Professor David D'Argenio as the first chairholder. The chair is a gift from Dave Chonette (MSME '60, ENGME '64) and honors the generations of engineers in the Chonette family. Provost C. L. Max Nikias accepted the chair on behalf of the university.



Dean Yannis Yortsos, David Chonette (center), and chair recipient David D'Argenio at the dedication celebration.

PORTLAND WEEKENDER OREGON ALUMNI EVENT

Preceding the kick-off of USC Trojans to the Oregon Ducks, the Viterbi School hosted a special reception for Engineering alumni on Friday, September 23, 2005 at Portland's Heathman Hotel, featuring wines from Cardwell Hill Cellars, compliments of winery owners and fellow Trojans, Dan (MS ChE '62) and Nancy Chapel. Cardwell Hill Cellars is located in the Willamette Valley, near Corvallis, and specializes in premium Pinot Noir and Pinot Gris. Viterbi board member, Kenton Gregory (BSEE '76, MD '80), along with twenty other guests enjoyed this pre-game celebration.

VITERBI OKTOBERFEST

The School kicked off its 100 years celebration with a family-friendly pre-game celebration and feast in the heart of the engineering quad on October 8 during the university-wide, Festival 125 and parents weekend. Alumni, staff and parents enjoyed German Om pah pah music and endless bratwurst. Children enjoyed the kids' engineering corner lead by Viterbi's Mission Science program.

USC HOMECOMING

The annual celebration of USC took place on Saturday, October 29th. Over 400 Viterbi alumni, parents and friends gathered for the engineering Homecoming picnic. Guests of the picnic mingled with other alumni and friends while feasting on a delicious pre-game barbecue. Dean Yortsos made a special

appearance and the popular raffle, benefiting engineering scholarships, also took place. The Viterbi spirit carried over to the football game where our Trojans went on to beat the Washington State Cougars 55-13.



Alumnus Abel Espinoza (MSCE '86, PhD CHE '86) celebrates Homecoming at the Viterbi picnic with his wife Marita, son Dominic and daughter Katrina.

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USC **Viterbi**
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Alumni news & notes

Summer & Fall 2005

1969

T. Wayne Rounsavell (MSEE, PhD '75) has joined the firm of RK Associates as business manager and senior consulting associate. Wayne is responsible for all sales initiatives and lean operating strategies consulting for small to medium size businesses. He previously taught at USC and is currently restarting a private consulting firm, KeWay Innovations. Wayne and his wife Christine live in Poway, CA.

1972

Dr. Bill (E. P.) Hamilton (BSEE '72, MSEE '74) authored the feature article in the July-August issue of the International Association of Electrical Inspectors "IAEI News" technical journal, dealing with code enforcement, design and inspection issues to ensure safe electrical systems in and around bodies of water. Bill is president of E. P. Hamilton & Associates Inc., an Austin, TX architecture, engineering and technical services firm.

1974

Clemente Teng (BSEE, MBA '77) has joined Public Storage, Inc. as vice president of investor services. He serves as the primary contact with investors and shareholders of the company and its affiliates.

1978

Cork Van Den Handel (BSAE) was selected as a Resultant hire for the Thomas Group, Inc. Known as The Results Company (SM), Thomas Group employs more than 100 process improvement experts (Resultants) for client projects. Van Den Handel has 27 years

of experience in finance and engineering. He has held positions in the aerospace manufacturing and supplier industries, at such companies as Aviall, Inc., The Dee Howard Co., and Lockheed Co.

Rear Adm. Craig E. Steidle (MSSM) has recently been named as vice president of international affairs for The Aerospace Industries Association. He joins AIA from NASA where he was the associate administrator for the Office of Exploration Systems, a position created in January 2004 to implement the nation's Vision for Space Exploration. In his new position Steidle will be responsible for spearheading industry efforts to promote government policies that support exports, avoid protectionism, and foster fair principles of international trade. In addition to his contributions at NASA, Steidle has had a distinguished career in the U.S. military. He commanded the Navy's F/A-18 Program, naval aviation's largest production, research and development program, as well as the largest foreign military sales program. He also was the director of the Defense Department's Joint Advanced Strike Technology Office and was the director of the Joint Strike Fighter Program, DoD's largest program. Under his leadership, the Joint Strike Fighter Program was awarded the David Packard Excellence in Acquisition Award.

1983

Col. Norman C. Anderson (MSAE) was recently promoted as the new chief engineer for the U.S. Air Force Research Laboratory Space Vehicles. A 27-year Air Force Reservist

currently serving on an extended active duty tour at Kirtland Air Force Base, he has also held several engineering positions in both the public and private sectors. As the organization's principal engineer, Col. Anderson develops and administers policy for systems engineering of space technology development, as well as conducts technical oversight of systems design and integration for flight testing.

1985

Gregory A. Garrett (MSSM) was recently selected to win a National Achievement Award from the National Contract Management Association (NCMA.) Nominated for many of his contributions to the general field of contract management, he has been an active member of NCMA since 1981. Garrett is a respected international educator, author, consultant, and industry executive. He joined Lucent Technologies in 1997, where he currently serves as chief compliance officer of U.S. Federal Government Programs.

1986

Dan Hair (MSSM) has joined Workers Compensation Fund as senior vice president of safety and underwriting. He has taught courses in safety and health at San Diego State University and is a member of the American Society of Safety Engineers.

2004

Yazdan Aghaghiri (MSCENG, PhD '05) was issued a patent in June for developing an instruction-set aware method for reducing transitions on an irredundant address bus

with two associates. The method retrieves an instruction from a memory location indicated by the first address, transmits the instruction on a data bus, and determines a category of the instruction. The method predicts a second address based, at least in part, on the first address, the instruction, and the category of the instruction.”

Please keep us informed of your personal and professional progress, as well as changes in your contact information by visiting www.viterbi.usc.edu and clicking on Alumni. Or by writing to the Alumni Relations Office at the USC Viterbi School of Engineering, Olin Hall 500, Los Angeles, California 90089-1451 or email viterbi.alumni@usc.edu.

Viterbi Storybook

Make history! Do you have a great story about a moment that changed your life? A fond memory of late nights in the robotics lab? A special memory of a fellow classmate or professor? In celebration of 100 years of engineering at USC, help us



compile a living history of USC engineering as seen through your eyes. Visit viterbi.usc.edu/100

Thank You

The Viterbi School would like to thank the following alumni for participating as the first group of **Alumni Mentors in the Engineering Writing Program — Alumni Mentorship Project**. The Viterbi School’s writing program has undergraduate engineering students complete consulting reports for non-profit organizations in the USC area. In the past 6 years the School has worked with over 85 organizations. Not only do the students learn how to communicate effectively, but they also see how their ideas as engineers can have a direct and positive effect on society. The alumni mentors play a key role in the development of the student engineer.

Jack Bryant
MSCE '60

Johnna (Shay) Dalby
BSCE '98, MCMCNMG '03

Bruce Juell
BSME '55

Jeff Lin
BSEE '90, MBA '94

Ray Lowe
BSEE '84, MSEM '93

Larry McMillon
BSME '60

Ted Napolitano
MAOM '71

Devon Shay
BSMEPE '97, MSPTE '03

Frank Stirling
BSAE '68, MBA '72

If you would like more information on how to become an alumni mentor, please contact: Kirstin Strickland, Director of Alumni Relations, 213.740.6379, kstrick@usc.edu.

Staff News

Please welcome new additions to the Viterbi Team:

Calen Boutilier
Associate Director
Corporate and Foundation
Relations
External Relations

Wendy Campbell
Development Assistant
External Relations

Scott Catherall
MIS Director
Office of the Dean

Kathleen Concialdi
Alumni Relations
and Annual Giving Assistant
External Relations

Kim Denes
Director of Operations
External Relations

Lynette Mutter
Director of Development
External Relations

Julie Samere
Admission Coordinator
Student Affairs

Brenda Siqueiros
Development Assistant
External Relations

Traci Thomas-Navarro
Director
Center for Engineering Diversity (CED)

*And special congratulations to: **Erika Pratt**, Mentoring Program Coordinator, Student Affairs on her marriage to Michael Chua, October 15, 2005.*

In Memoriam

Don N. Cooper (BSCE '47). Don died peacefully at his Manhattan Beach home Tuesday, May 31, 2005 at the age of 78. Born in Los Angeles on August 2, 1926, Don was a lifelong resident of the LA area. After graduating from Beverly Hills High School, Don attended USC. He also did post-graduate work in civil engineering at Harvard University. While at USC, Don was a midshipman in the NROTC. After VJ Day, he was commissioned an Ensign in the U.S. Navy. He later served for many years in the Naval reserve, attaining the rank of Lieutenant. Don had a successful career with Ted R. Cooper Construction Engineers, working both in construction and real estate acquisition and management. He was an active snow skier, sailor and world traveler, having skied most of the best-known mountains in North America and Europe and raced competitively in various classes of sailboats. He was a past Commodore of the Lake Arrowhead Yacht Club. Don is survived by his sister, Bette Scott, five nephews, a niece and eighteen grand nieces and nephews. He will be greatly missed by his family and by all of his many friends across the country.

David Earl King (BSCE '50). A founding member of the California Coalition for Adequate School Housing (C.A.S.H.), David passed away on January 17, 2005 in Orange, CA at the age of 78. Under Dave's leadership, C.A.S.H. sponsored and passed the first statewide school bond worth \$500 million in 1982. In 1970, Dave joined the Irvine School District where he served as director of facilities for 17 years. He brought to the district his expertise as a registered civil engineer who specializes in educational facility planning. When Dave retired from district in 1987, he continued assessing school districts through private consulting. The California State Legislature recognized him with two legislative resolutions for his extraordinary dedication to structurally safe learning environments. In addition to C.A.S.H., Dave was active in the American Society of Civil Engineers and the Council of Educational Facility

Planners. Dave was the loving husband for 57 years of Audrey King and is survived by his wife, daughter and grandchildren.

Colonel Joseph 'Bud' H. Meyer (MSME '61). Bud passed away on Sunday, June 5, 2005 in Utah at the age of 81. Born January 31, 1924, in Salt Lake City, Utah, he served his country in the U.S. Army and was a veteran of WW II, the Korean War, the Vietnam War and the Cold War. After marrying Virginia Biddle at the U.S. Military Academy in West Point in 1948, he spent many years in the military traveling the country and world. He also served at the Pentagon. Military awards include Bronze Star Medal, Commendation Medal, and Legion of Merit Medal. After his Army retirement he was a Senior Systems Analyst for San Diego Unified School District for 12 years. He always loved skiing, golf, music, and participating in sports. His wife Virginia noted, "Over the years, Joseph often recounted anecdotes and his admiration of the brilliant Dr. Choudhury," who was a professor of mechanical

engineering at USC. Joseph is survived by his wife, children, grandchildren and his brother and sister.

Eugene "Gene" M. Noneman (BSAE '50). Of German birth, Gene came to the U.S. at the age of six, was naturalized and served as an officer in WW II. Following the war, he graduated cum laude from the USC with a degree in aeronautical engineering. He was called to active duty during the Korean War. After the war, he returned to civilian life and began his career as an aeronautical engineer, first employed at J.B. Rae Company, followed by Del Mar Engineering Labs, and Radioplane Company, a subsidiary of Northrop Corporation. He later moved to TRW serving in many positions and finally retiring as vice-president and general manager of the Defense Projects Division. His wife noted, "Gene always read the Viterbi Engineering Magazine cover to cover." He is survived by his wife of 55 years, Elizabeth; his children, grandchildren and his sister and brother.



Roy Mitchell Acker (MSME '57)

Roy passed away on August 19, 2005 at the age of 86. Born on September 8, 1918, he graduated with honors in mechanical engineering from Caltech and then earned his Master's degree from USC. He married Hazel Hooper in 1948 and they settled in Westchester, raising a family of three daughters, Cheryl, Janet, and Marilyn. During the war years he worked at Lockheed Aircraft Company and then joined the Navy, serving on a supply ship in the Pacific. After the war, he returned to Southern California

and the aircraft industry working for Hughes Aircraft and then TRW. Roy was one of the early employees at TRW where he was highly valued for his talent in engineering. He was instrumental in the design work for some of America's important space and defense programs, including the Atlas missile, Apollo lunar module, and the Pioneer spacecraft. He loved his work so much that he waited until the age of 74 to retire. Everyone who knew him valued Roy for his lively intelligence and his gentle, cheerful disposition. He is survived by his wife Ruby Acker, his children, grandchildren and cousins.



Celebrating a Century and Securing the Next 100 Years



The USC Viterbi School's Board of Councilors held their annual meeting Oct. 28 followed by a spectacular evening gala to celebrate the 100 Years of Engineering at USC.

The highlight of the day was the surprise announcement of an \$8 million gift from BOC-member Ken Klein (BSME '82), and another

\$2 million gift to fund a chair to honor Leonard Silverman, the Viterbi School's longest serving dean.

Klein, who earned a dual B.S. degree in biomedical and electrical engineering in 1982, is president, chairman of the board and chief executive officer of Wind River, a global leader in device software optimization. His gift will fund a new institute devoted to undergraduate engineering student life including student government, engineering club activities, competitions, social, leadership and career-oriented programs, and an array of new programs and services yet to be designed.

"The timing could not be better," said Dean Yortsos. "With our brand new Ronald Tutor Hall, we have created a vibrant, bustling hub for student life. Now, during our centennial celebration, we begin phase two, to design an institute that will provide students with all of the support services, social and cultural outlets, and career counseling they need to make their years at USC meaningful, productive and successful. I am deeply grateful to Ken."

The newly endowed Leonard Silverman Chair is being funded by the estate of Arthur Settle, an electrical engineering alumnus, in memory of his aunt, Mary Zell and will be awarded to faculty in the Department of Electrical Engineering who have

demonstrated exceptional achievements in research and teaching.

"Establishment of the new Leonard Silverman Chair, especially during our centennial anniversary, is a fitting tribute to the Viterbi School's most enduring dean," said Yortsos. "Dean Silverman provided strategic leadership during a very challenging time of growth and change in the school and in the world."

Chairman Dwight J. Baum welcomed the Board of Councilors (BOC) who received a detailed update of the state of the USC Viterbi School from Dean Yortsos and a report on the Fundraising Initiative from Christopher Stoy, chief executive officer of external relations.

Sol Golomb, university professor and professor of electrical engineering, gave a presentation on the past 100 years of USC engineering and Maja Mataric, associate professor of computer science tackled the next 100 years with a description of the rapid strides being made in robotics technology.

Peter Beerel, associate professor of electrical engineering, reported on the new education programs of Stevens Institute of Technology Commercialization (SITEc) while Cauligi S. Raghavendra, senior associate dean for academic affairs described "The Engineer of 2020," a report of the National Academy of Engineering.

Three Viterbi School students — Nick Balair, a biomedical engineering senior, Irene Simpson, a mechanical engineering senior and Zenzile Brooks, a civil engineering junior with a minor in theater — wowed the BOC with sharp, articulate and often surprising observations on engineering education and the future for engineers. The student's

presentations triggered a lively discussion by BOC members on teaching the next generation of engineers to be "leadership engineers."



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