Shaken but still standing

Dynamic Earthquake Test First Step In Study to Improve Woodframe Construction

BOOKCASES CAME CRASHING DOWN, a hotwater heater flipped over, glass shattered, and a heavy speaker landed squarely on a teddy bear’s head. Inside UCSD’s Charles Lee Powell Structural Research Laboratories, a 600 square-foot model home was jolted with .9 g’s, simulating the epicentral forces of the 6.7 Northridge Earthquake that rocked the LA area in 1994. Dozens of spectators and news reporters got a front row seat to the nation’s first full-scale, dynamic seismic test on a woodframe house. And although the contents of the house were destroyed, the structure itself stood strong.

This July 11 test was part of the CUREe (California Universities for Research in Earthquake Engineering)-Caltech Woodframe project, which is aimed at developing reliable and economical ways to improve woodframe performance in earthquakes.

“This house was engineered to current design code, and our preliminary conclusion is that the standards are probably very good,” said Andre Filiatrault, UCSD professor of structural engineering and principal investigator of the test. “Unfortunately, many older homes built before the seismic standards were implemented in 1997 may not perform as well in an earthquake.”

“One surprising observation from the test is that the stucco finish seemed to absorb some of the energy from the ground motion, protecting the interior plywood and drywall,” said Frieder Seible, UCSD chair of structural engineering and manager of the Testing and Analysis element of the overall Woodframe project.

The CUREe-Caltech Woodframe project was proposed after the Northridge Earthquake when more than $20 billion in property damage occurred to woodframe homes. Twenty-five people died because of building damage, and all but one of the fatalities occurred in this kind of construction. More than 50,000 residents

See EARTHQUAKE on page 4
Reinventing the Jacobs School
In the Coming Decade

When we broke ground in August for the Powell-Focht Bioengineering Hall, in many ways we broke ground on a new era for the Jacobs School of Engineering.

UCSD, and particularly the Jacobs School, have laid out a framework for unprecedented growth to take place over the next 10 years. We have thought carefully about our role, given that we are the only research university in the greater San Diego economic region. The strategy that we have developed is directly in line with the University of California’s plan to serve the growing population of students in California. As we look toward the coming decade, we have a powerful sense of opportunity and responsibility.

The chart at right illustrates our plan to double the size of the Jacobs School faculty, double the size of our graduate student enrollment, and increase the size of our undergraduate student body by 50%. This scale for the Jacobs School is what we consider to be minimum steady-state level for a school that has the mandate we have for this region of the State. A school of engineering of this scale will make us comparable in size to the engineering schools at the University of Michigan and UC Berkeley.

The responsibility we face as we go forward is nearly as awesome as that faced by the founders of UCSD in the early 60s. The decisions we make now, and have been making for the past six years, will determine the scope and character of the School for the next 50 years. Last May, we had a faculty retreat to begin to develop a common vision as we move forward. I’d like to share with you some of the ideas we discussed at the retreat.

In the area of research, the Jacobs School is a global leader in the fields of bioengineering, earthquake engineering, high performance computing, telecommunication and information technology, high performance materials, and energy research. As we grow, we have the opportunity to enhance our current strengths and establish leadership in additional areas.

Engineering continually advances and evolves as we begin to work on science that seems to be at the edge of several well-understood disciplines. Aerospace engineering, for example, grew out of mechanical engineering and the areas of fluid dynamics and structural mechanics.

strength include materials and nanotechnology, environmental engineering and civil infrastructure.

It is clear that new focus areas will be in fields that are now beginning to emerge from the mixing of other traditional disciplines. These new disciplines will cross departmental lines, and we discussed the concept of each faculty member having an appointment in two departments. This would also allow our graduate students greater opportunities for interdisciplinary research.

One of our highest priority growth areas is in computer and information science as applied to biology, medicine and health. This includes topics such as genomics and proteomics, a field that is often generically called bioinformatics. A second high priority area is information technology and systems engineering/systems integration, including topics such as networking, technologies to broaden the scope and availability of the wireless Internet, and the human-computer interface. Additional multidisciplinary areas where we will build expertise include materials and nanotechnology, environmental engineering and civil infrastructure.

We also talked about our education mission. In recent years, all of our departments have modernized their undergraduate curriculum to include new features such as freshman engineering, a capstone senior design project, and more hands-on laboratory work throughout the four years. Now, we’d like to develop a set of common principles for education across all of our departments. These may include written and oral communications as well as ethics brought in early in the curriculum and reinforced throughout all four years. We also plan to introduce courses in management, business and entrepreneurship at the graduate level and make these courses available to our undergraduate students. As always our goal will be to continuously monitor and improve the education we provide.

The next decade will be one of extraordinary growth and opportunity. Though we will not change our basic mission of education, research and innovation, we will reframe the outlines around what we do, expanding our scope in almost every area.
UCSD broke ground August 9 on the five-story, 105,000 square foot Powell-Focht Bioengineering Hall. The building will be equipped for modern bioengineering, enabling faculty and students to apply emerging technologies to better understand and treat human disease. Unique features of the building include core technology laboratories to encourage collaboration across all engineering and biomedical disciplines, state-of-the-art teaching laboratories for hands-on education, and facilities and programs to encourage technology transfer.

Funded almost entirely by private gifts, The Powell-Focht Bioengineering Hall was made possible by the Whitaker Foundation’s Leadership Award of $18 million and the Charles Lee Powell Foundation’s gift of $8 million as well as many other generous contributions. The building is named in honor of the late San Diego Superior Court Judge James L. Focht and Charles Lee Powell.

The Powell-Focht Hall is the first of several engineering buildings, which will be constructed in Pryatel Field, located between Engineering Buildings I and II on the Warren campus. Doors are expected to open in 2002.

Visit www.soe.ucsd.edu/events for photos and more information.

UCSD is celebrating its 40th anniversary with a year-long series of special events. UCSD will demonstrate the years of growth in quality, strength, and breadth since Roger Revelle, considered the “father” of UCSD, envisioned an educational and research mecca rising from a dusty La Jolla mesa.

A major focus of the celebration will be 40 “gifts” of service to the communities of San Diego County. In a variety of ways, the campus will feature more than 300 activities and programs which UCSD currently provides throughout the area.

Visit http://ucsdnews.ucsd.edu/calendar/40th/default.asp

S.S. Penner Lecture Series

Professor Stephen H. Davis, Walter P. Murphy Professor of the Department of Engineering Sciences and Applied Mathematics at Northwestern University, will present a lecture on “Interfacial Fluid Mechanics” as part of the S.S. Penner Lecture Series.

Mark your calendar for Friday, December 1, 2000 at 4 p.m. in the CMRR Auditorium. For more information, call (858) 534-0708 or visit www-mae.ucsd.edu.

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Job Opportunities
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were displaced long-term from their homes. Insurance claims and losses were 10 times what
the industry anticipated.

The impact of the project could be enormous. Although 99% of residences and many schools
and commercial buildings in California are constructed of wood, there has been very little
research focused on improving the earthquake resistance of this kind of construction. Through-
out the United States, 80 to 90% of all buildings are of woodframe construction.

Laboratory testing and analysis of both residential and non-residential woodframe build-
ings and studies of their damage in the Northridge Earthquake will be used to improve
building codes and standards, make insurance ratings and loss estimates more accurate, and
train practitioners in the design and construction industry.

The UCSD test was one of the first steps in the project. Over a period of five months, struc-
tural engineers subjected the full-scale model house to a series of ground motions recorded
from historical earthquakes. These ground motions were simulated by a 4.8 ton platform known
as a shake table. The house itself was engineered to current code, and structural components
and materials were modified throughout the test series.

Data gathered from 300 sensors and six cameras installed inside and outside the house will be
used to create computer simulations expected to aid in evaluating current design and construc-
tion practices.

The CUREe-Caltech Woodframe project is funded mainly by the Federal Emergency
Management Agency (FEMA) through a grant administered by the California Office of
Emergency Services (OES). Additional support is being provided by the California Earthquake
Authority (CEA). CUREe is managing the project under the direction of Caltech’s
Professor John Hall. Over a dozen universities and numerous consulting engineers are involved.
CUREe is a non-profit organization that represents a consortium of universities with major
earthquake engineering programs.

For more information on the CUREe-Caltech Woodframe project, and to see a video of the
UCSD test, visit [www.curee.org](http://www.curee.org)

Fixtures inside the home that were not properly secured toppled over, driving
home the importance of earthquake preparedness.

### Patents and Licenses

#### Analog to Digital Converters

Three inventions by Ian Galton (ECE) and his research group have recently been li-
censed. The first, “Digital DAC Noise Cancellation in ADCs” was licensed to Texas
Instruments, and is a technique for digital cancellation of DAC noise arising from
static analog errors such as capacitor mismatches. This invention promises to in-
crease the precision rating of present commercial pipelined ADCs without signifi-
cantly increasing their cost.

The second two inventions were jointly developed by Galton and future graduate
students Henrik Jensen and Eric Fogelman as part of a larger research project that culminated in the successful
development of a state of the art, oversampling delta-sigma ADC integrated

circuit. The prototype is a second-order delta-sigma modulator for audio band con-
version implemented in a 3.3V/0.5 micron, single-poly CMOS process using metal-
mesh capacitors that achieve 100dB peak S/N and 105dB peak SFDR. This level of
performance has not been achieved previously under these process con-

straints. One of the disclosed inventions is a technique for digital common mode
rejection and the other is a technique for dynamic element matching of compara-
tor offsets. Along with a component mismatch shaping technique previously origi-
nated and disclosed by Galton, the inventions enabled the achieved prototype per-
formance. NuroLogic Design, Inc. of San Di-

ego has licensed the prototype design along with the two disclosed inventions
from UCSD.

#### High Efficiency Transistors

Peter Asbeck (ECE) has recently filed two invention disclosures resulting from work
sponsored by Hitachi. This work was done in collaboration with Kazuhiro
Mochizuki who was a Visiting Re-

searcher on leave from Hitachi in Prof.
Asbeck’s laboratories. TTIPS is currently
in discussions with Hitachi regarding
the licensing of this work. “A Metal Base Trans-
istor” pertains to the design of a metal
base transistor whose collector is made of an oxide of a base metal. Selective
oxidation of the base metal leads to an

ultrashort intrinsic base which increases
current gain and cutoff frequency, leading to a high maximum oscillation frequency.
“A GainP/GaAs Heterojunction Bipolar
Transistor with Low Knee Voltage” is for the design of a npn GainP/GaAs heterojunction bipolar transistor intended for high-efficiency, high-power amplifiers.

#### Wireless Internet Protocols

Anthony Acapolana (ECE) has a recent invention disclosure entitled “Mobility Man-
agement in Wireless IP Networks”. In this work, Prof. Acapolana and graduate stu-
dent Joseph Soma-Reddy provide the outline for an improved method of man-
aging Internet protocol addresses within a

wireless network. The method involves a hierarchical utilizing a micromobility proto-
col that can manage host mobility within a

large domain and a macromobility proto-
col to handle mobility between domains.

This column is provided by UCSD’s
Technology Transfer and Intellectual
Property Services (TTIPS) office:
http://itvent.ucsd.edu
Dolphins, Spiders and Stronger Materials

UCSD RESEARCHERS ARE MODELING a new class of structures after the compliant, malleable properties of dolphin skin and the incredibly strong, flexible properties of spider fiber. The research is funded by a new $1 million grant from the Office of Naval Research.

Based on the speed at which they can swim and recent lab experiments, it is believed that a dolphin’s compliant skin has lower drag resulting from turbulent skin friction than a hard, solid surface.

Reproducing this phenomenon in man-made materials could optimize flow/structure interface and weaken near-wall turbulence responsible for increased drag.

According to MAE Professor Robert Skelton, “Such structures would actively control their mechanical properties to modify drag, acoustical response, shape control, and vehicle guidance, without hinged surfaces or flaps. Structures would be more flexible and adaptable, and would be less influenced by competing forces.” Skelton says the work may be applied to aquatic vehicles such as submarines and boats, deployable space structures, and aircraft wings.

These principles, combined with the structural efficiency revealed in spider fiber, nature’s strongest fiber, are leading to a new line of structures that Skelton has coined tensegrity structures. Skelton’s team has shown that tensegrity tends to be nature’s basic building architecture. The researchers are developing mathematical and engineering methods to create large controllable structures with similar efficiencies as those found in natural materials.

Participants include Jacobs School professors Robert Skelton, Thomas Bewley, Robert Bitmead, and Hidenori Murakami and math professors William Helton and Phil Gill.

Using Dusty Plasmas to Do Biology’s Dirty Work

Dusty plasmas are commonly found in space and for decades scientists have contemplated their possible role in the birth of stars and in such beautiful natural phenomena as Saturn’s rings and the vibrant tails of comets. But with recent technology breakthroughs, researchers are studying such plasmas here on earth, and looking to apply them to problems such as destroying harmful bacteria and viruses.

Dusty plasmas are electrified gases composed of free electrons and ions that are contaminated with miniscule grains of dust.

According to ECE Professor Emeritus Asoka Mendis, a leader in dusty plasma research: “The electrical charging of dust grains immersed in a plasma has consequences for both the dust and the plasma. Because the grain charge can be very large (1000s of electrons for a micron-sized grain), the collection of grains in a plasma can become strongly coupled, eventually forming highly organized lattice structures called Dust Coulomb Crystals in a confined, laboratory setting.”

Even though the physics are the same, in space plasmas and dust interact on a much larger scale. Because they are not confined by walls, the dusty plasmas in space are not expected to produce dust coulomb crystals, but are responsible for other important observed phenomena. The crystals are purely a laboratory creation.

Mendis says these crystals, which have recently been fabricated in several laboratories around the world, are strikingly visual and can be used to study basic properties of condensed matter. Currently, Mendis and his associates are extending their study of dusty plasmas to plasmas containing microscopic bacteria. In IEEE Transactions on Plasma Science, August 2000, the group found that plasmas can cause an electrostatic disruption of the outer cell membrane of the E.coli bacteria. Recent observations in several laboratories are consistent with this work. This finding offers promising possibilities for an alternative electro-physical treatment for destroying harmful bacteria. Mendis also speculates that the membranes of viruses, which are even smaller, may be more susceptible to electrostatic disruption than that of the bacteria.

The April 2001 issue of the IEEE Transactions on Plasma Science will be dedicated to Mendis on his 65th birthday in honor of his contributions to the field.

Your Health

Now that scientists have mapped the human genome, what will we do with the information? Watch “Bioinformatics: A Primer for the Genomics Era” to get the answers. The program will air Sept. 20 at 8 pm, on UCSD TV (http://ucsd.edu/ucsdtv) and features UCSD’s Shankar Subramanian, Daniel Masys M.D. and Andrew McCammon. The program will also be available on demand beginning September 18 at www.uctvonline.org.

AMCC Acquires YuniNetworks

Professor Ken Yun (ECE) founded YuniNetworks in late 1999, and Applied Micro Circuits Corp. acquired the company in June 2000. YuniNetworks was building a scalable terabit switch fabric technology based on Yun’s university research. Now that he has completed the technology transfer of his invention, Yun is back from leave of absence and serving as a full-time professor.

Chien Takes Leave to Work with Entropia

Professor Andrew Chien (CSE), is taking a leave of absence to serve as co-founder and Chief Technology Officer of San Diego-based Entropia, Inc. The company, which says it is creating the world’s largest Internet computing service, dynamically delivers processing power — more than 1 trillion computations per second — to commercial product developers and non-profit researchers. Entropia’s computing power is provided by PC owners who donate their computers idle processor time to science.

Prior to joining Entropia, Chien and his UCSD research group developed HPVM, or high-performance virtual machine, a system that exploits commodity PC hardware and software technologies to deliver supercomputer performance.

Founders

LAST ISSUE, WE REPORTED on companies founded by Jacobs School faculty and alumni. Since then, we’ve learned that CSE alum Rob Fassett. Also a correction: MP3.com was founded by Michael Robertson, who is a UCSD communications alumnus.
LARRY SMARR, KNOWN WORLD-WIDE FOR HIS ROLE in creating the modern information infrastructure, joined the Jacobs School as a professor of computer science and engineering in July. Previously, Smarr was the director of the National Center for Supercomputing Applications (NCSA) at the University of Illinois Urbana-Champaign. He was also the Director of the National Computational Science Alliance, comprised of over 50 universities, government labs, and corporations.

Smarr serves on a number of high-level government committees such as the President’s Information Technology Advisory Committee and the Advisory Committee to the Director, NIH. He is a member of the National Academy of Engineering and a Fellow of the American Academy of Arts and Sciences.

Smarr earned his bachelor’s and master’s degrees from the University of Missouri, a master’s at Stanford University, and a doctorate from the University of Texas at Austin (all in Physics). An internationally recognized astrophysicist, Dr. Smarr conducted observational, theoretical, and computational based research in astrophysics for 15 years before he became Director of NCSA.

Q & A with Vitali Nesterenko

Materials Science and Engineering (MSE) at UCSD is an interdisciplinary, graduate research program designed to provide a fundamental understanding and quantitative evaluation of materials with the objective of predicting, modifying, and tailoring their properties to yield enhanced performance. Behind the enthusiastic leadership of the program’s director, Vitali F. Nesterenko, MSE is breaking new ground.

Q: Why is the Materials Science and Engineering Program unique?
A: Although the MSE Program draws many of its associated faculty and resources from the Jacobs School, its focus is actually much broader; and includes physics, chemistry, and mineralogy.

Q: MSE has been experiencing tremendous growth. How do you explain this success?
A: One of our goals has been to increase the number of graduate students entering the Program each year from an average of five to 10-15. To accomplish the goal, we aggressively target potential students with our program’s website, invite the best prospective graduate students on campus during the annual Jacobs School Research Review, and promote interaction with faculty at early stages of admission process. This year, we admitted 14 graduate students.

Q: What is your highest priority for the educational program?
A: We feel it is critical to offer an updated, state-of-the-art curriculum, especially for recruitment purposes. From my discussions with incoming students, I have learned that they are very interested in the courses, surprisingly even more than the current research activity of the faculty. We need to have fresh, relevant courses focusing on subjects such as polymers, biomaterials, and the structure and properties of films, and we need to enhance mathematical component of core courses. Invited lecturers from industry are also important.

Q: What is the greatest challenge for MSE?
A: Finding a focus for joint research activity in the Program is probably the most difficult problem we face. This year, we created a distinguished lecture series with support from Vice Chancellor Richard Attiyeh. This will help in bringing faculty together to identify such joint efforts and promote collaborative research. We are also hoping to develop a Center for Characterization, which would be a central research and education laboratory available to all the students, faculty and collaborators involved in the Program.

Visit http://matsci.ucsd.edu/

Faculty Honors

Sangeeta Bhatia (bioengineering), was selected to participate in the 2000 Frontiers of Engineering Symposium, hosted by the National Academy of Engineering, September 14-16. The meeting brings together the nation’s top young engineers to discuss pioneering technical work and leading-edge research in various engineering fields and industry sectors.

Colm Caulfield (MAE) was awarded a Hellman Fellowship for 2000-01 to work on a project entitled “Mixing in stratified shear flows: the importance of layering and three-dimensionality.”

Juan C. Lasheras (Chair, MAE) has been elected a Fellow of The American Physical Society for his contributions to the study of turbulence in single and two-phase flows. Lasheras has served as a Secretary/Treasurer of the Society for the last two years, and will chair the organizing committee of the 54th Annual Meeting of the APS/Division of Fluid Dynamics to be held in San Diego November 2001.

Jeff Squire (ECE, Research Scientist) has been elected a Fellow of the Optical Society of America.

Kenneth S. Vecchio (MAE) and Dr. Andrew Strutt (now with BF Goodrich Aerospace) took home the 2000 Marcus A. Grossman Young Author Award from ASM-International for their paper titled ‘Simultaneous Oxidation and Sigma-Phase Formation in a Stainless Steel’ published in Metallurgical and Materials Transaction in February 1999.

Jack Wolf (ECE) will receive the 2001 Claude E. Shannon Award from the IEEE Information Theory Society. This is the Society’s highest honor. Wolf has also been awarded the Academic Senate Distinguished Teaching Award by UCSD, evidence of the admiration and respect that both students and colleagues have for him.
learning is a lifelong process. We encourage our students to think creatively and ask questions that will lead to new directions in technology.

The Jacobs School of Engineering at UC San Diego is a premier institution that is set apart by its entrepreneurial atmosphere. The School leads the nation in key areas that are at the convergence of more traditional disciplines. Our strengths include networking and communications, high performance computing, information technology, nanotechnology, earthquake engineering and civil infrastructure renewal, materials, energy, controls, bioengineering and tissue engineering.

The quality of the Jacobs School’s graduate program is recognized worldwide and the School was ranked among the top 10 engineering schools at public universities in the 2000 U.S. News & World Report survey. The Jacobs School has achieved excellence in education by steadfastly hiring only the highest quality faculty and attracting the very brightest students. Fifteen of our faculty are members of the National Academy of Engineering.

The Jacobs School has been extraordinarily successful in obtaining support for our research programs. In fact, the School ranks second in the nation among engineering schools in terms of average research support per faculty member.

Students at the Jacobs School enjoy living and learning in “Technology’s Perfect Climate.” UCSD rests high atop the bluffs of La Jolla, just minutes from the Pacific Ocean with its postcard-perfect beaches and breathtaking sunsets. UCSD is also located near the hub of San Diego’s burgeoning high technology and biotechnology industries. According to the Milken Institute, San Diego has one of the broadest and most balanced arrays of technology clusters in any metropolitan area of the U.S. One of the strengths of our graduate program is our proactive partnership with industry. Our students have the opportunity to work on research applied to real world industry challenges.
Degrees Offered

**Bioengineering**
www-bioeng.ucsd.edu (858) 534-7538

*Bioengineering Ph.D., M.S., M.Eng.*

**Biotechnology with Specialization in Bioinformatics Ph.D.**

**Research Areas**
Bioinformatics/genomics • Cardiovascular system engineering • Tissue engineering/cell-matrix engineering • Molecular biomechanics

**Computer Science & Engineering**
www-cse.ucsd.edu (858) 534-3622

*Computer Engineering Ph.D., M.S.*

*Computer Science Ph.D., M.S.*

**Research Areas**
Algorithms • Artificial intelligence • Bioinformatics • Complexity theory • Computer architecture/compilation • Computer-aided design • Data and knowledge based systems • Mobile computing • Internet technology • Networks • Operating Systems • Parallel/high-performance computation • Security/cryptography • Software engineering

**Structural Engineering**
www-structures.ucsd.edu (858) 822-1421

*Aerospace Engineering Ph.D., M.S.*

*Structural Engineering Ph.D., M.S.*

**Research Areas**
Advanced composite materials • Aerospace structures • Civil structures • Composite structures • Earthquake engineering • Engineering mechanics • Geotechnical engineering • Renewal engineering

admissions

**Requirements**
B.S. or M.S. degree in engineering, physical sciences or mathematics. Official transcripts required.

GPA of 3.0 or above (Bioengineering requires minimum GPA of 3.4).

GRE general test.

TOEFL for International Students (Minimum score 550 on paper exam or 213 on computer exam).

Application for Admission, three letters of recommendation, statement of purpose.

**How and When to Apply**
Departments of the Jacobs School of Engineering accept applications for Fall quarter admission only. Application deadlines for each department vary, but most require a January deadline for students seeking financial assistance. Call or consult the websites of the departments listed above for an application packet for the particular program of study you are interested in. Submit your application packet and a nonrefundable fee of $40 to the Office of Graduate Studies and Research, 9500 Gilman Drive, La Jolla, CA 92037-0003.

**Financial Aid**
The Graduate Admission Application includes financial aid applications. Your financial aid package is included with the offer of admission. Several kinds of financial assistance are available to graduate students at the UCSD Jacobs School of Engineering including fellowships; traineeships; assistantships in teaching, research or language instruction; scholarships; loans; and grants-in-aid. In addition, you may wish to apply directly to federal agencies and private foundations that provide other types of graduate student support.
**Electrical & Computer Engineering**
www.ece.ucsd.edu (858) 534-4286

- **Applied Ocean Sciences** Ph.D., M.S.
- **Applied Physics** including Electronic Devices and Materials; Optoelectronics; Radio and Space Science Ph.D., M.S.
- **Computer Engineering** Ph.D., M.S.
- **Communications Theory/Systems** including Magnetic Recording Ph.D., M.S.
- **Electrical Engineering** M.Eng.
- **Electronic Circuits and Systems** Ph.D., M.S.
- **Intelligence Systems, Robotics, Control** Ph.D., M.S.
- **Photonics** Ph.D., M.S.
- **Signal and Image Processing** Ph.D., M.S.

**Research Areas**
Communications-wireless/wireline/optical • Computer engineering • Computer-aided design • Integrated circuits and systems • Magnetic recording • Micro/nano-scale electronic devices and materials • Electromagnetics • Photonics/optoelectronics/biochips • Radio and space science • Signal/image processing • Systems and controls

**Mechanical & Aerospace Engineering**
www.mae.ucsd.edu (858) 534-5226

- **Aerospace Engineering** Ph.D., M.S.
- **Applied Mechanics** Ph.D., M.S.
- **Applied Ocean Sciences** Ph.D., M.S.
- **Chemical Engineering** Ph.D., M.S.
- **Engineering Physics** Ph.D., M.S.
- **Mechanical Engineering** Ph.D., M.S.

**Research Areas**
Chemical engineering • Combustion • Dynamic systems and control • Fluid mechanics • Fusion energy and applied plasma physics • Engineering physics • Environmental engineering • Solid mechanics and materials science

**Materials Science & Engineering**
http://matsci.ucsd.edu/matsci.html (858) 534-7715

- **Materials Science** Ph.D., M.S.

**Research Areas**
Advanced composite materials-behavior and processing • Biomaterials • Electronic, superconducting, magnetic, optical properties • Mechanical response/failure
**Affiliated Research Centers**

Cross-disciplinary research and collaboration with industry are often fostered through the School’s major research centers.

**Center for Energy Research**
www.mae.ucsd.edu/cecr/overview.html

**Center for Magnetic Recording Research**
http://orpheus.ucsd.edu/cmrr/

**Center for Wireless Communications**
www.cwc.ucsd.edu/

**Integrated Circuits and Systems**
http://pluto.ucsd.edu/icas/

**Powell Structural Research Laboratories**
www.structures.ucsd.edu/Powell_Laboratories/powell_laboratories.html

**San Diego Supercomputer Center**
www.sdsc.edu/

**Scripps Institution of Oceanography**
www.sio.ucsd.edu/

**Whitaker Institute for Biomedical Engineering**
www.bioeng.ucsd.edu/ibme/contents.html

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**did you know?**

> The Jacobs School ranked 9th in the nation in the National Research Council survey of engineering school graduate programs.

> The Jacobs School is the fastest rising institution among the top 15 universities in the 2000 U.S. News & World Report survey of graduate schools.

> Our alumni and faculty have founded more than 70 companies.

> 15 Jacobs School faculty are members of the National Academy of Engineering.

> 65 Fortune 500 companies recruit from UCSD, and 15 of those are in the Fortune top 50.

> The average annual research expenditure per faculty member is $728,000, which is second highest in the nation.

> Seven of our faculty were elected Fellows of IEEE in 2000, more than any other educational institution in the world.

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**Partnership with Industry**

Proactive partnership with industry is central to the mission of the Jacobs School of Engineering. Through a continuing dialogue with executives, we renew our curricula to ensure we are preparing students for the future. Our strong research collaborations allow faculty, students and industry engineers to exchange ideas, fueling innovation in both the university and corporate research laboratories. The Corporate Affiliates Program (CAP) is one of the primary means by which the Jacobs School cultivates relationships with industry. More than 50 leading-edge technology companies interact with the school and its students through CAP.
Mechanical Engineering Students Set World Record

Last September a team of about 20 Jacobs School engineering students began designing a human powered submarine with one goal in mind: shattering the International Human Powered Vehicle Association’s (IHPVA) world speed record for non-propeller human powered submarines. On July 23 they did just that with a remarkable run at 3.447 knots. The previous record for non-propeller subs was 2.9 knots.

UCSD team captain and mechanical engineering student Scott Ketcham says the San Diego sub, christened “SubSonic,” was modeled after a dolphin fish. “The submarine swims much like a dolphin. It has a horizontal tail fin that moves up and down for its propulsion. The submarine also does not use any external control fins for steering. Directional control of the submarine is done by the use of vectored thrust and dynamic ballast tanks. This reduces drag to achieve higher speed.” SubSonic also includes a software program to control the depth of the sub.

Nine teams competed in the contest which was hosted by the American Society of Mechanical Engineers (ASME), the Institute of Electrical and Electronics Engineers (IEEE), and the Oceanic Engineering Society. Sponsors included the Jacobs School, ASME, IEEE, OES, COI, Sempra Energy, Nokia, US Grants, Shell, Hamilton Sundstrand, and Orincon.

Get involved: If you are interested in funding a student project, please contact Joe Bear at (858) 534-7609.

Professional Results

Jacobs School engineering students achieved a 95% pass rate on this year’s California Board for Professional Engineers and Land Surveyors “Engineer-In-Training Examination.” The national average pass rate was only 61%.

Flying High

In its first year of competition, the Jacobs School’s American Institute of Aeronautics and Astronautics (AIAA) chapter took sixth place out of 30 international teams in the 2000 AIAA/Cessna/ONR Student Design/Build/Fly Competition.

Their radio-controlled plane was made almost entirely of composites. With a wingspan of 7 feet, the aircraft was 62.5 inches long and weighed less than 55 pounds.

Class of 2000 Undergraduate Survey

Immediate plans

For those going to work - starting compensation compared to Class of 1999

Where do our graduates go? 59% will stay in San Diego; 26% will go to other cities in California; 13% did not identify; 1% are going to New York; 1% are going to Massachusetts.
San Diego Universities, ORINCON and Navy Lab Form Partnership for Commercialization of Technology

CONGRESS HAS APPROPRIATED a $6 million fund to fast-track the development and application of advanced technology in San Diego. The program creates a powerful partnership including the UCSD Jacobs School of Engineering, UCSD Connect, San Diego State University’s Entrepreneurial Management Center, ORINCON Industries, and the Space and Naval Warfare (SPAWAR) Systems Center-San Diego.

“This initiative will help fill the gap between technology generators and end users in both the defense and commercial marketplace,” said Congressman Brian Bilbray.

The consortium will seek out marketable research from UCSD and SPAWAR. Academic, industry and government technical representatives will evaluate proposals and advance selected ideas. ORINCON and/or SPAWAR will develop and test prototypes, while San Diego State University’s Entrepreneurial Management Center and UCSD Connect will oversee market viability studies, business planning and technology transfer marketing.

Daniel Alspach, CEO of ORINCON, and a UCSD engineering alumnus and former professor, was one of the principal architects of the program.

“San Diego has experienced phenomenal growth in entrepreneurship over the last several years. With this kind of federal funding, we can do even better,” says Alspach. “This grant allows several significant entities, who may not have had the opportunity to work closely together in the past, to collectively facilitate the transfer of university and DOD-funded research for entrepreneurial ventures.”

Students Solving Industry Problems

COMPANIES HAVE THE OPPORTUNITY to provide senior Electrical Engineering and Mechanical and Aerospace Engineering students with valuable practical experience in industrial design problem-solving. These senior design courses enable your company to put the combined brainpower of three to five talented students to work on engineering design projects over a 10-15 week period.

The cost to participating companies is minimal — primarily that associated with fabrication. This type of university/industry cooperation promotes hands-on, real-world experience and is a critical part of the students’ educational and professional development.

Project topics can be interdisciplinary and have included electromechanical, fluid mechanics, heat transfer, thermodynamic, and electrical components.

For more information on senior design projects, please contact Pankaj Das, ECE course director, at (858) 534-0655 (das@cwc.ucsd.edu) or Nathan Delson, MAE course director, at (858) 534-0655 (ndelson@ucsd.edu).

Jacobs School students recently designed the Quadriplegic Shower Chair for GPK, an El Cajon company specializing in products and services for quadriplegics. Team members Randy Hull, Robert Rumbaugh, James Carr, and David Bibb designed the chair to enable quadriplegics to easily position themselves over the toilet and transfer in and out of the shower. The students successfully addressed numerous safety, portability, and price constraints. For example, a user had to be secure at all times, and the unit had to accommodate up to 250 lbs. and fit multiple bathroom layouts. Also, the prototype cost could not exceed $1,500 and the production cost needed to be under $500.
Seible Named to Reissner Professorship

FRIEDER SEIBLE, PROFESSOR AND CHAIR of the Department of Structural Engineering, has been named the inaugural holder of the Eric and Johanna Reissner Endowed Professorship in Applied Mechanics and Structural Engineering. The endowed chair was established by the Reissner family to honor Eric Reissner, who served on the faculty of the UCSD Jacobs School of Engineering from 1970 until the time of his death in 1996.

Reissner was an international figure in applied mathematics and structural mechanics. His research had a profound impact in structural mechanics, civil engineering and the design of aerospace structures.

Seible’s outstanding achievements include the development of large-scale structural testing techniques, seismic assessment and retrofit of bridges, and the application of composite materials in civil engineering structures. He developed and directs the Charles Lee Powell Research Laboratories, which are known worldwide for full-scale testing and analysis of structures. Among his many honors, Seible was elected into the National Academy of Engineering in 1999.

Faculty Fellowships Aid in Recruiting Outstanding Young Faculty

An outstanding faculty is the hallmark of any great university. The Jacobs School has created the Faculty Fellowship program to help attract and retain excellent junior faculty members. This program complements the endowed chair program, which is reserved to honor and reward senior faculty members.

Named faculty fellowships can be established by providing a two-year gift of a minimum of $25,000 per year. Or individuals may contribute to the general faculty fellowship fund. These gifts help promise faculty members create new curricula, establish their research laboratories, and conduct the preliminary studies needed to compete for larger federal grants. This support becomes important part of the start-up offer made to new faculty members, which greatly enhances the Jacobs School’s ability to attract the very best candidates.

The Jacobs School has in place two named faculty fellowship programs, which illustrate how your gift can be made. Established by the Charles Lee Powell Foundation, the Powell Assistant Professor Fellowships are awarded to faculty who have been with the Jacobs School for more than two years. Three fellowships are awarded including one at $50,000 per year and two at $25,000 per year. The Jacobs Faculty Fellowships were established by a gift from Irwin and Joan Jacobs and are awarded to assistant professors being recruited in the current academic year. Three two-year fellowships are awarded each year including one fellowship at $50,000 per year, and two fellowships at $25,000 per year.

Please contact Joe Bear at (858) 534-7609 for more information.

Graduate Fellowship Campaign Extended

The Graduate Fellowship campaign has been a huge success, and UCSD has extended the program until December 1. The goal of the program is to provide the type of support that will enable UCSD to compete with other top-ranked schools for the best graduate students. The university will match each dollar contributed and students will begin benefiting from the fellowships as early as fall quarter 2001.

To date, the Jacobs School has received $276,500. Combined with matching funds, these gifts provide a total of $553,000 for graduate student support. Many thanks to Amost and Kitty Fronck, and to Buzz Woolley, Jr. for their generous gifts.

There is still time to take advantage of this matching program. To participate, a minimum contribution of $3,000 per year for three years ($9,000) is required. A donation of at least $75,000 over three years entitles contributors to name the fellowship.

Please contact Joe Bear at (858) 534-7609 for more information.

Jacobs School of Engineering Fourth Annual Recognition Banquet

held May 19, 2000

2000 Awards

Outstanding CAP Awards:
Steve F. Blain, Ph.D., F.A.C.C.,
Vice President of R&D, Galileo Laboratories
Donald J. Spencer, Ph.D.,
Director of Technology, TRW Avionics Systems Division

Undergraduate Student Leadership Award:
Heidi Buck,
Department of Electrical and Computer Engineering

Graduate Student Research Award:
Max Rotunno,
Department of Mechanical and Aerospace Engineering

Outstanding Alumnus Awards:
Daniel Alspach, '70, Ph.D.,
President and CEO, Applied Micro Circuits Corp. (AMCC)
Brian Kenner '89,
Founder and former CTO of Intervu, Inc.

Outstanding Executive Awards:
Harry E. Gruber, M.D.,
Founder and former Chairman and CEO of Intervu, Inc.
Joel O. Holliday, M.B.A.,
President and CEO, Charles Lee Powell Foundation

Tau Beta Pi Outstanding Engineering Teaching Award:
Keiko K. Nomura, Ph.D.,
Assistant Professor of Mechanical Engineering, UCSD

Mark your calendar. The 2001 Recognition Banquet will be held May 4.
Different Ways, Different Reasons Alumni Give Back

Jeannine Menger

For Jeannine Menger (CS, ’86) a degree from UCSD means both a great education and open doors. She’s landed exciting jobs at SAIC, Jenny Craig, Overland Data, and PC Synergy.

Menger is now an independent software developer and is currently working under contract with Novatel Wireless in Carlsbad. To date, she’s automated their factory and shipping systems and setup their product activation and testing lines.

“My education at UCSD was very thorough,” says Menger. “We learned in depth how computers are designed and built and how the mathematics of them plays into their functioning. This has been incredibly valuable when applied against real world circumstances.”

Jeannine Menger brought the annual fund giving to a new level when she inquired about monthly automatic deductions from her checking account. This method of giving is now available to all alumni.

“When I think about the experiences that influenced my career, UCSD had by far the greatest influence of anything that came before or after.”

“At UCSD, I learned how to think logically—that’s a skill you can apply to anything you do.”

Brett Fox

Brett Fox (B.S., EE, ’84) has contributed to the annual fund for several years, and he consistently makes some of the largest gifts to the School. For Fox, giving back to the Jacobs School was an easy decision.

“When I think about the experiences that influenced my career, UCSD had by far the greatest influence of anything that came before or after,” says Fox.

At UCSD, I learned how to think logically—that’s a skill you can apply to anything you do.”

Fox recently joined Lightspeed Semiconductor Corp and serves on the management team as the Vice President of Networking and Communications Products. Lightspeed is a privately held corporation located in Sunnyvale, CA that offers high performance reprogrammable ASICs for the networking and communications market.

Before joining Lightspeed, Fox worked at Maxim Integrated Products, where he ran the telecommunications business unit and helped Maxim increase sales from $40 million in 1989 to $1 billion last year.

THANK YOU to all who participated in the Annual Fund 2000. Your gifts support students, education initiatives and priority programs. If you missed the annual fund, you can still give year-round to the School. Visit www.soe.ucsd.edu/alumni/alumni.html.

Taner Halicioglu

Taner Halicioglu (CS, ’96) makes his living in the Internet e-commerce sector, so it’s no wonder he was the first Jacobs School alumnus to use our new online giving form. Halicioglu is a Sr. Software Engineer for a Bay Area start-up called Loudcloud (www.loudcloud.com). The company establishes, monitors and expands network and systems operations, web servers and database servers for new e-commerce businesses.

Taner says he has fond memories of UCSD, and only began to truly appreciate the School and what it taught him after graduation.

“What I really enjoyed was the 1:1 time with my professors and classmates... just being able to “brain dump” ideas and talk about things,” said Halicioglu. Some of the teachers he remembers include Keith Muller, Keith Marzullo and Joseph Pasquale.

Aside from work, Halicioglu has traveled to Turkey, Australia, and Kentucky to visit friends and relatives. His most recent hobby is racing his car in Autocross and track events.
UCSD Homecoming 2000

Enjoy a weekend of athletic challenges and fun activities during the annual alumni homecoming on October 28 at RIMAC field. Be a runner, a winner, or a spectator. There is something for everyone!

The day includes annual alumni team competitions in tennis, women’s and men’s soccer, women and men’s water polo, and men’s basketball. There will also be food, live entertainment, and drawings for great prizes. Admission and parking are free.

For more information, call (858) 534-4037, or visit www.alumni.ucsd.edu.

Alumni Updates

1980 Mark Konno, B.S. AMES, Bioengineering. Konno is the Director of Technology Assessment for the Critical-Care Division of Edwards Lifesciences, and has served with the company for 20 years. He lives in Laguna Beach with his wife JoAnna (also a UCSD grad) and two children (Eric, 3 and Allison, 2).
E-mail: mark_konno@edwards.com

1981 Eesa Mohammed Bastaki, B.S., Electrical Engineering. Bastaki is currently director of the IT Center, UAE University, United Arab Emirates. Bastaki recently chaired the IEEE UAE Section and in May was chairman of the IEC 2000 conference.
E-mail: eesa@uaeu.ac.ae

1988 John H. Lienhard, Ph.D. AMES, Fluid Dynamics. Lienhard is a professor of Mechanical Engineering at MIT and recently became an ASME fellow.

1995 Brian E. Chavez, B.S., Bioengineering. Chavez received his Doctor of Medicine degree from the Medical College of Wisconsin on May 20, 2000. Chavez will conduct his internal medicine residency at UCSD. Dr. Chavez was honored with the Alpha Omega Alpha and Merck Manual Awards for academic achievement. Welcome home Brian.

1996 Randall D. Buehler, B.S., Mechanical Engineering. Buehler earned his M.S. in Mechanical Engineering from Berkeley in 1998 and is currently working for XCellSis Corporation in Poway.
E-mail: randbue@sd.ballard.com

1997 T. Todd Elvins, Ph.D., Computer Engineering. Elvins co-founded Indicast Corporation in May 1999 with UCSD alum Rob Fassett. Indicast is delivering the audio internet; a personalized voice portal accessed via your cellular telephone with an all voice interface. Elvins says people interested in working for the Indicast team may send resumes to resumes@indicast.com E-mail info@indicast.com

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