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The Jacobs School honored top graduates, alumni and executives at its annual banquet, May 4

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UC San Diego

SPRING 2001

Jacobs School of Engineering



The Power of the Sun... on Earth

The Answer to the Energy Puzzle May be in the Stars

WHILE LEGISLATORS ARE SCRAMBLING to find a near-term remedy for California's energy crunch, UCSD engineers are exploring solutions for the long haul. Researchers at UCSD's Center for Energy Research are bringing the energy of the sun down to earth.

The power of the stars — fusion energy — would be an inherently clean, safe and stable source of power. Fusion reactors could extract energy from abundant, ordinary seawater without producing greenhouse gases or long-term radioactive waste. The energy that could be mined from one gallon of seawater is equivalent to that in 300 gallons of gasoline.

"We know it works, because our sun and all the stars are just big balls of plasma; they're just big fusion reactors in the sky," said Charles Baker, Deputy Director of the Center for Energy Research. "What

we're trying to do is find a way to basically build miniature stars in the laboratory."

A plasma is a hot mixture of charged particles created when extremely high temperatures strip electrons from atoms at high temperature, typically about 10,000 degrees centigrade. In the sun, gravity creates immense pressure to force together the atomic nuclei of hydrogen in the plasma that is a few millions of degrees centigrade. The nuclei fuse and some of the mass is converted to energy by the famous Einstein formula, $E=mc^2$.

Researchers have attained the high temperatures — over 100 million degrees — and pressures here on Earth needed to fuse the atoms. The challenge is maintaining the plasma at high enough temperatures to sustain the reaction.

"In a nutshell, I think fusion research is far enough along that one could say it's doable in terms of just basic physics,"

- Charles Baker, Deputy Director, Center for Energy Research

Jacobs School of Engineering

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Dean's Column

The Challenge of Growth



THE UNPRECEDENTED GROWTH planned in the coming decade for the Jacobs School of Engineering provides both an extreme opportunity and an extreme challenge.

The opportunity is to expand and enrich our programs, build new facilities, broaden our faculty and enlarge our student body. The challenge is, at the same time, to maintain and even improve the excellence of our programs while we become ever more important as an educational institution, a research engine and a source of ideas and technology to enhance the quality of life for us all.

To address this challenge, we have developed a long range plan, put together a Council of Advisors that includes a number of industry leaders and convened a committee to define the ethos and culture of the School.

Since an "ethos" group might seem unusual, let me explain its purpose. This Ethos Committee will help us articulate the fundamental values we hold in common and help us use these values to guide the decisions we make as the institution grows.

The committee grew out of discussions we had during a retreat in the spring of 2000. Department chairs, center representatives, faculty and staff together discussed the future directions of the School. While we all expressed optimism about the excellence of the School, we also recognized that sometimes conflicting responsibilities – for research, teaching, public service, consulting and technology transfer – all impact the culture, atmosphere, productivity and collegiality within the School.

Growth – and the growing pains that come with it – add another dimension to these issues.

Bob Bitmead (MAE) and Gill Williamson (CSE) co-chair the committee of faculty, staff and students. The essential questions they are exploring in this process are: What is the ethos and culture we want for our School? What are the basic values we hold, consistent with our ethos? And what should we be doing to ensure widespread commitment to these values?

Bob and Gill would like to hear your thoughts on these topics, especially in relation to the work the committee has already accomplished.

The committee's report is a work in progress and they expect the document to evolve over time. During the coming year, the committee invites everyone in JSOE – faculty, staff, graduate students and undergraduate students – to read the preliminary report on-line and post comments to an on-line bulletin board. We hope that the evolving principles will guide our day-to-day interactions both now and in the future.

The goals outlined in the committee's draft report are ambitious. Simply put, we hope to provide an engineering education of such extraordinary quality that our students shape and define the future.

We also hope to serve society through the advancement of both fundamental and applied scientific and engineering knowledge, and through the broad application of that knowledge to address real-world challenges and societal needs.

The driving and unifying objective is to make UCSD and JSOE an institution and a school of academic excellence in all areas of research, education (both graduate and undergraduate) and service (to the profession and to the community). With everyone's commitment, we shall succeed.

To learn more, visit:
<http://soeadm.ucsd.edu/ppi/ethoughts.html>

Bob Conn
 Bob Conn, Dean

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2001 Recognition Awards

May 4, 2001

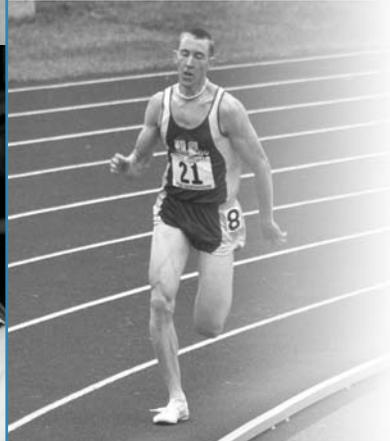
Named one of the top 100 college students in the nation by USA Today, **Merdad "Doc" Khaleghi** served as President of UCSD's Associated Students organization and has been a teaching assistant for 13 classes.



Odyssey on the web

www.soe.ucsd.edu/news_events/

Undergraduate Leadership Awards



James Nielsen will graduate with a 3.95 GPA and numerous track & field victories to his name, including two NCAA National Championships in the 5K.

Under **Karmina Bustamante's** enthusiastic leadership, UCSD's Society of Hispanic Professional Engineers student chapter grew from 50 members to more than 200.



Graduate Research Award

Mihrimah Ozkan and her advisers, **Sadik Esner** and **Sangeeta Bhatia**, have pioneered a technique to efficiently and quickly assemble cells using electrical current. With seven patents issued or pending, their work may be used to construct live tissues and organs, for drug discovery or for gene therapy.



Outstanding Executive Awards

As CEO of Overland Data, **Scott McClendon** transformed the company from a small privately-owned firm into a publicly-owned national manufacturer of high quality, reliable tape storage systems.

Outstanding Alumnus Awards

One of San Diego's original wireless communications entrepreneurs, **Rick Kornfeld** is overseeing Texas Instruments' rapidly growing third-generation cellular chipset business.



John Brooks Slaughter, CEO of the National Action Council for Minorities in Engineering, has dedicated his career to helping institutions achieve excellence through diversity. He has served as Director of the National Science Foundation, President of Occidental College and Chancellor of the University of Maryland.



HNC Software is recognized as one of the most innovative and successful software companies in the world, thanks to the vision and creative genius of co-founder **Todd Gutshow**, former CEO **Robert North** and current CEO **John Mutch**.

FUSION ENERGY RESEARCH from page 1

“You can’t stick it in any ordinary box. And frankly, it’s not so much what this high temperature gas will do to the box, but rather that if that high-temperature plasma comes in contact with any physical boundary, it cools so quickly that the reaction is extinguished and the ‘fusion fire’ goes out,” explained Baker.

That’s one of the qualities that makes fusion inherently safe. If the reaction becomes unstable, it basically cools down and shuts itself off.

The next step in fusion research is building a bigger reactor in order to get closer to the point where the reaction generates more energy than must be injected into the plasma to heat it to fusion temperature. Japan, Russia and Europe are collaborating in an effort to build the next-generation reactor; the US dropped out when the project became too expensive (four to five billion dollars), says Baker).

Bringing those costs down to a level where fusion energy could be an affordable energy source requires more research.

“In a nutshell, I think fusion research is far enough along that one could say it’s doable in terms of just basic physics,” says Baker. Now “it’s about pushing the physics further, not just to do the basic fusion conditions, but to do them practically and efficiently so that the device doesn’t have to be so big and require such strong magnets.”

Even though practical fusion energy may be too far off to solve the current energy crisis, researchers are already realizing practical benefits from their research. Plasmas play an important role in information technology, especially since this ‘fourth’ state of matter is essential to the steps associated with manufacturing wireless, computer and Internet devices and semiconductor chips.

In other energy research at UCSD, scientists and engineers are

- Learning how to burn fossil fuels more cleanly, efficiently and safely
- Exploring alternative energy technologies
- Building more energy-efficient buildings

Jacobs School Research Offers Hope to Coastal Bluff Dwellers

EVERY YEAR, A FEW MORE PEOPLE DIE and a few more homes are destroyed as the ocean relentlessly erodes the picturesque San Diego coastal bluffs. In response, structural engineers at the Jacobs School are embarking on a three-year study to determine the best ways to stabilize these fragile cliffs. The study will culminate in a comprehensive, publicly accessible guidebook.

“It’s obvious that a major problem exists, but repairs are typically only approved in emergency situations because of concerns over damaging the bluffs or destroying the natural beauty of the coastline,” says Scott Ashford, project leader and professor of geotechnical engineering. “Therefore, one of our major goals is to pinpoint the most efficient and effective ways to resolve this growing crisis, while maintaining the environmental integrity of the landscape.” Digital aerial photographs and extensive computer analysis will be used to identify, examine and evaluate existing mitigation methods over time.

This quarter-million-dollar endeavor is sponsored by a Sea-Grant from the National Oceanographic and Atmospheric Administration.



Professor Charles Tu (r), chair of the ECE department, and assistant to the chair, Sylvia Flores at the EUREKA conference.

EUREKA Event Exceeds Expectations

Approximately 90 people attended the 2nd Annual EUREKA! (ECE’s Undergraduate REsearch Konference & Assembly) conference in March. The event provided a forum for the presentation and promotion of undergraduate research projects, offered students an opportunity to practice public speaking and presentation skills, and improved student/department/industry relations. Dean Conn presented the opening address, followed by keynote speaker and alumnus Dr. Robert P. Akins ’83, Chairman and CEO of Cymer, Inc. Fourteen posters, representing the work of 42 students, were presented. Student projects were mentored by ECE faculty members (Professors Coles, Das, Guest, Weathers and Wolf) and sponsored by Alliance Pharmaceutical; Cymer, Inc.; Hughes Network Systems; Korteks; SPAWAR; Linear Measurements, Inc.; STMicroelectronics; Unysis and ViaSat. The event was sponsored by the Jacobs School’s Corporate Affiliates Program, and spearheaded by a committee comprised of leaders from various student organizations.

Liver Cells Live on a Silicon Chip

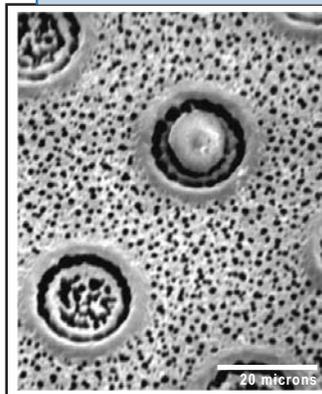
UCSD RESEARCHERS HAVE CREATED SILICON CHIPS that can support thriving liver cells in miniature wells similar to tiny muffin tins.

Keeping liver cells alive outside the body could lead to new treatments for liver disease and methods of testing drug toxicity.

The dime-sized, porous silicon “liver bioreactor” resulted from collaboration between chemists in the Division of Physical Sciences and bioengineers at the Jacobs School of Engineering. Sangeeta Batia, a physician and an assistant professor of bioengineering, and her colleagues suspected that normal liver cells might grow on finely textured surfaces of silicon produced by electrochemical-etching.

“We’re exploring a new generation of devices in which we can maintain cells by controlling the architecture, temperature and chemical environment, and in which we can use sensors located on the same chip to monitor the health of cells,” said Batia.

While cancerous liver cells can be easily grown in culture dishes, normal liver cells are much more discriminating. The porous silicon bioreactor design aids in mimicking the conditions found in the liver by allowing nutrients and chemicals through the cell culture, while filtering out larger particles such as bacteria and viruses.



Modern Composite Materials Replace Steel and Concrete in California Desert Bridge Project

A UC SAN DIEGO-GOVERNMENT RESEARCH PROJECT has resulted in the development of cutting-edge technology that has been applied to a new highway bridge on State Route 86 near the Salton Sea. The state-of-the-art Kings Stormwater Channel Bridge, which officially opened on May 18, is unique in that it is primarily composed of glass and carbon composites.

"This project could open the door for a complete rethinking of what engineers consider as structural materials for buildings and bridges," said Professor Frieder Seible, the project's designer, and chair of the Jacobs School's department of Structural Engineering (www.structures.ucsd.edu/).

Several of the bridge's main components contain no steel rebar. Instead, the girders and deck supports are structural shells — tubes made of lightweight carbon fiber-reinforced polymers (CFRPs) which are filled with concrete at the construction site.

The advantage of using composites over traditional materials is that detailed, timely, and costly rebar work can often be eliminated. In addition, composites do not corrode like steel rebar, are up to five times lighter than steel, and can be installed without the use of heavy construction equipment.



Caltrans, who partnered with UC San Diego and DARPA (Defense Advanced Research Projects Agency) on this important transfer of materials and technology from the defense industry to the civil sector, is anxious to monitor the performance of these new materials.

"The Kings Stormwater bridge provides Caltrans with the performance and durability data required for acceptance of advance composite materials in bridge design and construction," explained Jim Roberts, Chief Deputy Director of Caltrans. "These fiber reinforced polymer materials, especially the carbon fiber composites, are ideally suited for harsh and adverse environments and are expected to reduce maintenance and extend the service life of bridges."

UC San Diego Researchers Study Internet Attacks

USING A NEW TECHNIQUE, UC SAN DIEGO network researchers from the Jacobs School and the San Diego Supercomputer Center (SDSC) have analyzed the worldwide pattern of malicious denial-of-service (DoS) attacks against the computers of corporations, universities, and private individuals. The attacks disable Web servers on the Internet by overloading them with messages, which usually contain false source addresses to conceal the locations of the attackers. But in a clever twist, the researchers used key features of these messages' forged signatures to detect and track the attacks.

"We believe that our research provides the only publicly available data quantifying denial-of-service activity in the Internet," said David Moore, a senior researcher in the Cooperative Association for Internet Data Analysis (CAIDA) program at SDSC. Moore and Jacobs School computer science professors Geoff Voelker and Stefan Savage have devised a new technique called "backscatter analysis" that gives an estimate of worldwide denial-of-service activity. Their research enables network engineers to understand the nature of recent attacks and to study long-term trends and recurring patterns of attacks.

The researchers collected and analyzed three week-long data sets to assess the number, duration, and focus of attacks, and to characterize their behavior. In these three time windows, they observed more than 12,000 attacks against more than 5,000 distinct targets, ranging from well known e-commerce companies such as Amazon.com and Hotmail to small foreign Internet service providers and even individual personal computers on dial-

up connections. Some of the attacks flooded their targets with more than 600,000 message packets per second.

"We were a bit surprised by what we found," Voelker said. "First, a significant percentage of attacks are directed against home machines, users with dial-up and broadband modem connections. Some of these attacks — especially those against cable modem users — can be pretty severe, with rates in the thousands of packets per second. This suggests that minor denial-of-service attacks are frequently being used in personal vendettas."

"We also were surprised at the diversity of commercial targets," Moore explained. "We expected to see attacks on high-profile Internet sites, including aol.com, akamai.com, amazon.com and hotmail.com — and we did. But we also saw attacks against a large range of smaller and medium-sized businesses."

The majority of victims (65%) were attacked only once, and many of the remaining victims (18%) were attacked twice. Most victims (95%) were attacked no more than five times. But a handful of sites were attacked quite often. In the trace period, one host was besieged 48 times by attacks that lasted from 72 seconds to five hours (at times simultaneously). Five victims were attacked 60 to 70 times, and one unfortunate victim was attacked 102 times in the course of a week.

A summary of the researchers' methods and results was presented on May 21 at the spring 2001 meeting of the North American Network Operators' Group (NANOG) in Scottsdale, Arizona.

Web Watch

Research Review

"A Blueprint for the Information Infrastructure" The Jacobs School of Engineering is pleased to provide you with the exciting talks that took place at our Annual Research Review on February 23, 2001. We had an extraordinary line-up of speakers all discussing the wireless extension of the Internet and how it will be applied to work ranging from personalized medicine to monitoring our civil infrastructure. Each speaker's talk and slide presentation is available for viewing on our website.

Visit: www.soe.ucsd.edu/news_events/RR2001_talks/

Triton Ticket System Goes Global

The Triton Ticket System, an Internet-based ticketing system for concerts, shows, sport, and similar events has been licensed to Record.de (www.record.de), a company based in Munich, Germany.

Jacobs School Computer Science Professor Bennett Yee developed the technology. Yee received his Ph.D. in computer science from Carnegie Mellon University and bachelor's degrees in mathematics and computer engineering from Oregon State University. He joined the Jacobs Schools Department of Computer Science and Engineering in 1996. Prior to this, he spent a year at Microsoft as a cryptographer and software design engineer.

Yee's research focuses on issues in computer security. His primary interests are currently secure coprocessor applications, mobile agent security (or lack thereof), electronic commerce, and cryptographic protocol design.

Record.de has obtained exclusive rights to all European countries and successfully demonstrated the ticketing system at a trade show this past August.

The Triton Ticket System has also been licensed to NEC (Tokyo, Japan) for commercial use in Asian countries.

Visit: <http://philby.ucsd.edu/triton/>

Powell-Focht Hall Construction

You can follow the construction of our new bioengineering building through our webcam. Progress is steady and on schedule for occupancy in the Fall of 2002.

Visit: www.soe.ucsd.edu/friends_donors/bioeng_hall.html





Sia Nemat-Nasser Elected to National Academy of Engineering

SIA NEMAT-NASSER, PROFESSOR OF MECHANICAL AND AEROSPACE ENGINEERING, has been elected to the National Academy of Engineering (NAE), www.nae.edu. This is one of the highest professional distinctions accorded an engineer, and the Jacobs School faculty now includes 16 members of the academy.

Nemat-Nasser directs UCSD's Center of Excellence for Advanced Materials (CEAM), www.ceam.ucsd.edu. His research focuses on understanding how materials respond to thermo-mechanical loads and how they may fatigue or otherwise fail over time. He has studied the materials used to construct space laboratories to determine how well they would withstand meteor impacts, and examined how polymer composites – long used for stealthy aircraft and now being developed for civil infrastructure – stand up to wear and tear.

In addition, Nemat-Nasser is developing novel materials such as extremely strong and lightweight ceramic-metal-polymer composites. His most recent work includes ionic-polymer-metal composites, which are molecularly driven soft actuators and sensors. A thin strip of this composite flaps under a small alternating electric potential, and produces a voltage when suddenly bent.

Much of Nemat-Nasser's work is done in the experimental and computer facilities of the CEAM. This state-of-the-art research facility includes gas guns that can launch projectiles at speeds of over 1000 meters per second; high-speed cameras that can capture events up to 100 million frames per second; flash X-ray machines for high-speed radiography; facilities capable of heating materials to 1000 degrees Celsius; holographic facilities that use lasers and optics to see how materials respond to stress and strain; and a full complement of machines capable of characterizing small and large fibers.

Nemat-Nasser is Editor-in-Chief of the journal *Mechanics and Materials*. He has published more than 400 papers in top journals and has delivered some 500 lectures throughout the world. He is chairing the upcoming 2001 Mechanics and Materials conference, to be held in San Diego June 27 to 29.

UCSD Professor Named President of the Electrochemical Society

Jan Talbot, professor of chemical engineering and materials science was recently elected president of the Electrochemical Society (ECS). Founded in 1902, ECS has become the leading society for solid-state and electrochemical science and technology, with 8,000 member scientists and engineers in over 75 countries. Talbot's research interests include electrodeposition, electrophoretic deposition of phosphors in the processing of advanced materials, and chemical mechanical polishing. While at the Jacobs School, Talbot has been instrumental in developing JSOE's Chemical Engineering Program, of which she is the director.

Q & A with Fran Berman

Director of the San Diego Supercomputer Center (SDSC), NSF's National Partnership for Advanced Computational Infrastructure, and Professor of Computer Science and Engineering at U.C. San Diego.

Fran Berman took over the reins from Sid Karin, founding director of the San Diego Supercomputer Center (SDSC) and the National Partnership for Advanced Computational Infrastructure (NPACI). Karin has assumed a new role as Senior Strategic Advisor to the SDSC director. As director for the past 16 years, Karin transformed SDSC from a resource for high-performance technology to a national computational science and engineering laboratory. Having shepherded SDSC through this evolution, Karin requested the opportunity to return to hands-on computing and communications research and development.



Q: What is your background?

A: I've been a professor of computer science since 1979 and I've been at UC San Diego since 1984. My research for the past two decades has been in parallel and distributed computing. For the last decade I've focused on "grid computing" which refers to programs that run on networked resources (computers, data archives, remote instruments, etc.). My research involves the design, development and implementation of adaptive techniques for running programs in dynamic, distributed, multi-user grid computing environments. These environments are extremely complex, and scheduling programs to achieve performance involves a number of very difficult problems.

Q: As the new director, how will you continue to strengthen SDSC's connections with UCSD and with the new CAL-(IT)²?

A: SDSC is building bridges to campus through our research, collaborative and educational activities. We are also partnering with CAL-(IT)² to develop a vision of computing which will take users from sensors to supercomputers. SDSC staff are collaborating with researchers at SIO, UCSD departments, Salk, TSRI, the Preuss School and will be part of the new Sixth College activities. We are looking to increase and strengthen our connections with campus, the UC system, and with the San Diego region over the next years.

Q: Where would you like SDSC to be five years from now?

A: I would like SDSC to maintain its role as a "national treasure" and its leadership in high-end computing, data-intensive computing, grid and cluster computing, the computational biosciences and the environmental sciences. I would like for us to be well-integrated with campus and the local biotech region as well as with national and international activities in the biosciences. Most important, I would like us to continue making a difference in U.S. science and technology.

Q: What are SDSC's current strengths on which you will build to reach your vision?

A: SDSC has tremendous national impact on computational science and engineering through our collaborations and efforts in many areas. We are nationally prominent in data-intensive and high-performance computing as well as the biosciences. We are building collaborations and strength with campus and SIO in the environmental sciences and computer science and engineering, and these collaborations will be crucial over the next 5 years. Our partnership with Cal-IT² is important for both organizations and will provide a solid foundation for UCSD activities in a wide variety of areas.

Faculty Honors

Sid Karin will be recognized as "Entrepreneurial Supporter of the Year" by the San Diego Business Journal at STARCOM 2001 for his pioneering efforts as founding director of the San Diego Supercomputer Center.

Abe Singer (SDSC) has been named "Private Sector Investigator of the Year 2000" by the High Technology Crime Investigation Association (HTCIA) for his technical and intelligence support to high-technology investigators within various law-enforcement agencies in San Diego.

Robert Bitmead (MAE) has been elected as a 2001 Distinguished Lecturer of the Control Systems Society of IEEE.

Sutanu Sarkar (MAE) has been awarded the Friedrich Wilhelm Bessel Research Award by the Alexander von Humboldt Foundation.

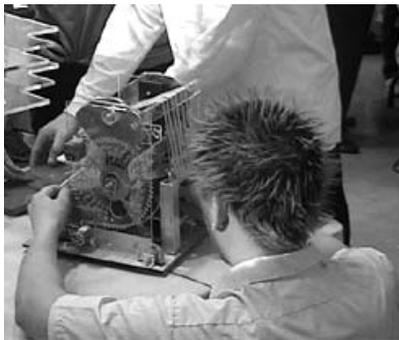
Vlado Lubarda (MAE) has been elected to the Montenegro Academy of Arts and Sciences. Lubarda has just completed an advanced text book titled *Theory of Elastoplasticity* to be published in July by CRC Press.

Mechanical Engineering Students Show Off Skills in Robot and Design Competitions

FAMILY, FRIENDS, STUDENTS AND LOCAL MEDIA turned out to watch teams of mechanical engineering students compete in the "Robot Book Return Contest," which was part of the MAE Design Day. Each of the 10 teams designed and built customized robots to compete in the head-to-head event. The objective: to return as many "books" to the mini-library as possible during a 60 second period.

Each group had a unique strategy. One team even created a second, smaller robot that attempted to block opponents while its larger version returned books. The contest, which is the brainchild of mechanical engineering professor Nate Delson, enables students to apply what they have learned during the design MAE3 class in a fun environment.

The MAE Design Day culminated in a presentation of student company-sponsored design projects. Scott Herrick, Ryan Lane, and Gary Gray created a prototype portable, wireless Internet-browsing device for Sony, utilizing the company's memory



stick. The goal of the project was to create a consumer device, priced under \$500, with full browser and e-mail capabilities. The group's lightweight, ergonomic design features two speakers, thumb controls, a rechargeable battery good for 20 hours, a head-phone jack, two USB Ports and an on-screen keyboard.

Another group (Mahir Abraham, Demian Boettcher, Kei Kusumoto, Quoc Le, and James Pingel), sponsored by Hewlett-Packard, created an inkjet wall printer. The device prints directly on walls using an 8.5-by 11-inch print zone. It could be used to print company logos and posters, or decorate a home.

Other projects were sponsored by Nokia (automatic antenna deployment), Formula SAE (fingertip shift mechanism), and Dr. Diane Rosenberg (ob-gyn umbilical cord clamp/cutter tool).

For more information and images, visit www.mae.ucsd.edu/mae3/winter2001/mae3wn/www/contest/book_return_contest.htm.

Wind it up...stretch it out...ready! Action!

New Secure File Transfers on the Internet

SECURE FTP, A STUDENT PROJECT at UC San Diego's San Diego Supercomputer Center (SDSC), is a frequently downloaded new file-transfer client. Secure FTP gives users a simple way to have a secure connection while transferring files over the Internet. Distributed as a freeware, Secure FTP combines security through strong encryption with ease-of-use and portability to run on almost any platform supporting Java.

"We noticed a lack of security in basic FTP, so we decided that a more secure solution was needed," said Gary Cohen '98, now of the computer security firm Glub Tech. He developed Secure FTP with classmate Brian Knight '00. The work was supervised by Sid Karin, former SDSC director and Jacobs School professor of computer science and engineering, and Tom Perrine, SDSC manager of security technologies.

The software is rated in the top five percent of submissions by Java review service JARS.com. Version 1.0 was released in September 2000, and has been downloaded more than 8,500 times. Visit www.jars.com/listing/jars_top5_002.html to download Secure FTP.

Cal-(IT)² Sponsors Summer Research Internships

The California Institute for Telecommunications and Information Technology [Cal-(IT)²] is offering 10-20 summer research positions to undergraduates on the model of NSF's Research Experience for Undergraduates program. Work will take place over a 10-week period with a projected stipend for each student of approximately \$5,000.

The purpose of this program is to give students valuable experience in the research world, give them opportunities to work with faculty in a new way (through non-classroom experience), and encourage them to seriously consider graduate school and research careers.

The program is expected to conclude with a poster session at the end of the summer, at which all students will be called upon to present posters in short presentations reporting on their experience. They are also likely to be asked to contribute short pieces on their work for a final report on the program. Award announcements will be included in the next issue.

Quick Study

Bioengineering Student Ranked Among Top 100 in the Nation

Mehrdad "Doc" Khaleghi, a Jacobs School bioengineering/premedical student, was named by USA Today as one of the top 100 college students in the nation. Khaleghi was selected from among 638 candidates nominated by faculty members of their respective institutions.

Khaleghi, 20, serves as president of the associated student body at UC San Diego, is a UC Regents' Scholar and a Robert C. Byrd Scholar. He was awarded research grants by the American Heart Association and the Howard Hughes Medical Institute. During the summer of 2000, he conducted clinical research trials on chronic heart failure patients. Previously, Khaleghi served as an assistant researcher at Scripps Research Institute.

A senior in Revelle College, Khaleghi maintains a 3.65 grade point average and plans to attend medical school.

Jacobs School Sees Boom in Applications and Admissions

UC San Diego admitted 16,310 freshman for Fall 2001 (second highest in the UC system). The group is one of the most academically prepared in the school's history, with a mean GPA of 4.04 and average SAT score of 1304. The Jacobs School mirrored this trend as its numbers soared as well:

- increased 10% to 6,674 
- increased 21% to 1,252 
- increased 12% to 7,926 

The quality of Jacobs School applicants admitted also increased. The average freshman GPA rose to 4.21 and the average SAT score reached 1339. Over 17 percent of all UC San Diego applicants are seeking admission into Jacobs School majors. Computer Science remains the most popular major with 2,593 freshman and 726 transfer applicants. Electrical and Computer Engineering is the second most popular major with 1,361 freshman and 238 transfer applicants.

Tau Beta Pi Chapter Dedicates Bent Symbol

The Bent is the official symbol of Tau Beta Pi, one of three national engineering honor societies, and perhaps the most prestigious. On February 22, Dean Conn dedicated the UC San Diego chapter's bronze replica, and said, "I am very proud to dedicate this Bent and welcome it as part of the Jacobs School's permanent décor. It will forever represent our commitment to greatness and that of our students." It is located just outside of Engineering Building I.



CAP CORNER

Corporate Affiliates Program

> Welcome to the following companies who joined CAP in the last four months: **ATA Engineering, Linear Measurements, Inc. and Prisa Networks.** This brings our total CAP membership to 53 companies! *If you would like information about CAP, contact Kelly Briggs at (858) 534-2329.*

> CAP members still interested in finding summer interns should contact Marina Hayden in Engineering Student Services (858) 822-3780.

> Many thanks to outgoing CAP Executive Board chairman Currie Munce '89 of **IBM.** Munce is the first alumnus of the Jacobs School to serve as chairman. Alan Chow, VP and general manager of **Teradata Development** division of **NCR** is our incoming chairman. Vice chair for 2001-2002 will be announced this fall.

> Stephen L. Baum, Chairman, President and Chief Executive Officer of Sempra Energy, parent company of **SDG&E,** recently shared his perspectives on how to bring electricity supply and demand back into balance at fair prices. His talk was titled, "Fixing Supply and Demand for Power in the United States: Answers That Can Work." The lecture, sponsored by UCSD's Jacobs School of Engineering, Graduate School of International Relations & Pacific Studies (IR/PS), and Center for Energy Research can be seen on UCSD-TV. *For scheduling information, go to www.ucsd.tv/index.asp.*

> CAP Upgrades Library Privileges. The CAP member's borrowing privileges to the UCSD libraries have been enhanced to include the ability to renew books. Now members will be able to place holds on items and renew books on-line without the wait.

For more information: http://libraries.ucsd.edu/services/checkout.html#Renewing_material.

If companies need additional library services such as document delivery or research from a professional librarian, the PLUS Information Services has been developed to meet those needs. For more information about the PLUS Information Service contact their office at 858-534-8622 or plus@ucsd.edu or <http://ucsd.edu/plus>.

> **Mark your calendars!**

Important CAP dates to remember:

September 24, 2001

Spirit of Solar/CAP annual cruise.

October 11, 2001

Fall '01 CAP Executive Board meeting.

Raytheon Helps Sponsor Study Onboard United States Navy Ship

THE COMMUNICATION NETWORKS OF TODAY demand far more than just capacity and faster transmission. They also require mobility and installation flexibility for applications of voice, video, and data communications. Jacobs School electrical and computer engineering graduate students recently conducted research on wireless local area networks (WLAN). The project is a collaborative effort between the School, the Navy Postgraduate School, the State of California (CoRe program), Raytheon Company's Naval & Maritime Integrated Systems (N&MIS) business unit in San Diego, and San Diego's very own Naval Amphibious Ship, the USS Rushmore (LSD-47).

This university-military-industry collaboration will potentially form the backbone of future wireless network communications on board ships; thus applying San Diego's strengths in wireless communications to endeavors of national defense and commercial applications.

The WLAN industry standard is the IEEE 802.11 specification (wireless Ethernet adopting spread spectrum techniques), and has been widely accepted because it permits wireless communications to areas where physical wiring is difficult, impractical, or extremely costly. The wireless communication is accomplished by installing

access points at remote locations, which send and receive encrypted and compressed wireless data to the wired backbone network from specified mobile users using PDA's, laptops and cellular phones.

Within a shipboard environment, Raytheon is currently evaluating shipboard wireless local area networks (WLAN). Data transmissions between mobile shipboard users is through the WLAN access points, and is strongly influenced by the RF propagation characteristics of the compartments, superstructure, and the maritime environment.

The research performed is a crucial part of the WLAN evaluation process because the determination of the signal propagation characteristics is fundamental to any shipboard design and implementation. Wireless communication systems that use the results of this research will form the backbone of future wireless network communications onboard ships.

This project has been funded as part of a research agreement with Raytheon. Matching funds were provided by the State of California in the context of the CoRe Program. Raytheon is a member of the Jacobs School's highly successful Corporate Affiliates Program (CAP).

San Diego Receives High Marks for Business Innovation

SAN DIEGO HAS EARNED A "STAR" in the area of technological innovation, according to findings in the new Clusters of Innovation Initiative.

The study is part of the Council on Competitiveness' Clusters of Innovation project that seeks to define best practices for successful clusters throughout the nation. A cluster is a geographic concentration of competing and cooperating companies, suppliers, service providers, and associated institutions, including government and universities. Results show particularly successful clusters in the San Diego's biotechnology/pharmaceuticals and communications industries.

Among factors boosting the region's economic growth, are considerable federal support for research and development, as well as a high level of state support for UC San Diego. Other assets include strong "entrepreneurial attitudes" in the academic community. The Jacobs School's dynamic CAP program has undoubtedly been a key developmental component as it cultivates relationships with industry.

More information on the study is available at <http://ucsdnews.ucsd.edu/newsrel/general/cocclusters.htm>.

Students Put Software Donation to Good Use

RATIONAL SOFTWARE CORPORATION donated 151 licenses for its Rational Rose 2000 Enterprise Edition product to UC San Diego. This software, with a retail value of \$850,495, is used for modeling and design during software development.

"This donation makes it possible for students to learn modern software engineering techniques with state-of-the-art tools," says Computer Science and Engineering Professor Bill Howden, who arranged for the donation.

One of the more important principles in software engineering is that software systems must be analyzed and designed before they are built. This is especially important for object-oriented software, where systems involve complex interactions between different objects and subsystems.

"The Rational Rose tools facilitate this process, and their availability to the students is therefore invaluable," says Howden. "These tools are well established and well developed, and they are actually used in industry."

Cymer Endowed Chair Established

CYMER, INC., THE WORLD'S LEADING supplier of excimer light sources used in semiconductor manufacturing, has established an endowed chair at the Jacobs School. The chair, funded through a donation of \$750,000, will be titled "High Performance Dynamical Systems Modeling and Control," and will be awarded to a distinguished member of the School's academic staff demonstrating leadership and expertise in the field.

Cymer was co-founded in 1986 by alumni Bob Akins (1974 B.A., Physics; 1983 Ph.D., ECE), its chairman and chief executive officer, and Rick Sandstrom (1972 B.A., Physics; 1979 Ph.D., ECE), senior vice president and chief technical officer. "Rick and I are very proud to be in a position to give something back to UC San Diego. The Jacobs School of Engineering is, without question, one of the finest engineering schools in the nation," noted Akins. "This

kind of industry support for our universities is crucial to their ability to continue to attract high-caliber faculty and extremely motivated students. In addition, funding from high technology companies such as Cymer can help to further advance enabling, cutting-edge technologies that are themselves key to the future of our advanced global economy."

Sandstrom added, "We hope the research generated by our endowment yields overall advances in this field of study, as well as to the future technologies Cymer can commercialize to enable the semiconductor industry. We also hope that over time, the endowment will encourage more new scientists and engineers from the Jacobs School to join our Cymer team to help us maintain our technology leadership moving forward."

"We'd like to thank Cymer and two of the university's alumni, Bob and Rick, for

this wonderful gift in support of the Jacobs School of Engineering," said Bob Conn, Dean of the Jacobs School. "Endowed chairs are crucial to the part of our mission that includes recruitment and retention of the very best faculty. They are also important to corporations such as Cymer in supporting some of the basic research pertinent to Cymer's future."

Cymer, Inc. is the world's leading supplier of excimer laser illumination sources, the essential light source for deep ultraviolet (DUV) photolithography systems. DUV lithography is a key enabling technology, which has allowed the semiconductor industry to meet the exact specifications and manufacturing requirements for volume production of today's advanced semiconductor chips.

Cal-(IT)² Update

AMCC, Ericsson, Intersil, QUALCOMM and **SAIC** have provided the first round of corporate support for the \$300 million California Institute for Telecommunications and Information Technology. Cal-(IT)² is a collaborative partnership between UC San Diego and UC Irvine, one of four institutes funded through Governor Gray Davis' California Institutes for Science and Innovation program. It is funded by a \$100-million grant from the state, which must be matched 2-1 by private-sector support.

Cal-(IT)²'s overarching mission is to extend the reach of the current information infrastructure throughout the physical world. One of Cal-(IT)²'s key projects is developing new environmental monitoring infrastructure that can collect data from a wide variety of sensing devices, communicate to a central archive facility, and visualize and analyze these data in a control room. The data will provide crucial information about the health of the civil infrastructure, the potential damage from earthquakes, levels of water pollution and snow-pack depth and drinking water supply.

AMCC, Ericsson, Intersil, QUALCOMM and SAIC are member of the Jacobs School's Corporate Affiliates Program (CAP).

For more information about Cal-(IT)², see www.calit2.net.

Jacobs School of Engineering Giving Opportunities

Financial support allows the Jacobs School of Engineering to fund many important activities including scholarships, fellowships, new research initiatives and the School's faculty recruitment efforts.

Your support represents the financial underpinnings of the Jacobs School.

To put it simply - *every gift counts.*

There are a variety of ways to support the School:

- Annual Fund - show your appreciation for the increasing value of your degree by investing in academic excellence.
- Matching Gifts - Double your support of the Jacobs School by taking advantage of your company's gift matching program.
- Special Gifts - Support a specific cause or program.
- Planned Giving - Secure the future by turning appreciated assets into an income for yourself and others while enjoying tax savings.

Go to https://soeadm.ucsd.edu/dev_events/giving.html and click on the link to make a gift to the Dean's Discretionary Annual Fund.

To receive information about other giving opportunities please contact Kelly Briggs via e-mail at kbriggs@ucsd.edu, phone (858) 534-2329, or FAX (858) 534-0351.

Slaughter Leads National Charge to Advance Women and Minorities in Engineering

AFTER A FOUR-DECADE CAREER in government and academe, having received many of the most prestigious awards bestowed on engineers and educators, John Brooks Slaughter (1971 Ph.D., Engineering Science) has one more important battle to fight.

He is President and CEO of the National Action Council for Minorities in Engineering (NACME), an organization dedicated to increasing representation of successful African American, American Indian and Latino women and men in engineering, technology and science-based careers.

"This is the capstone of my career," says Slaughter, who has served as the Director of the National Science Foundation, President of Occidental College, and Chancellor of the University of Maryland.

"Our most pressing issue is that we as a nation are producing fewer and fewer engineers. There were fewer graduates with a B.S. in engineering in 1999 than there were in 1990, and that is an alarming statistic because the need for engineers is growing," says Slaughter. "A subset of this problem is that we still are not doing a very good job of filling the pipeline with minority students, in large part because underrepresented students do not have the kind of elementary and secondary school preparation that makes it possible for them to become engineers."

As the head of NACME, Slaughter is offering solutions with successful initiatives such as the Engineering Vanguard Program and the Math is Power campaign. Through Vanguard, NACME targets and recruits students from under-served communities. These students are provided intense academic preparation during high school followed by full tuition and housing scholarships at selected universities.

"Retention rates for students in Vanguard are significantly higher than average retention rates for non-minority students in engineering," says Slaughter.

Math is Power is a savvy major-media advertising campaign designed to persuade young people to take the appropriate math and science courses that will prepare them for college and for high-paying careers. NACME cites that only 12 percent of all American students and six percent of minority students graduate from high school with the courses they need to be eligible for science or math-based majors in college.

Slaughter is also active on education policy issues. He is a strong supporter of the proposal by UC President Richard Atkinson to eliminate the SAT I as a requirement for entrance to the University of California. Atkinson outlined his plan in a speech at the American Council on Education Conference in February.

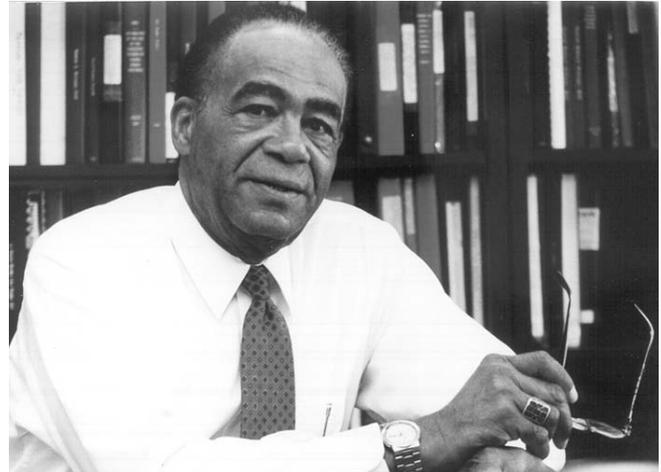
"I think it was a courageous step and the right step," says Slaughter. "I've long thought that the SATs should not be used as rigidly as they are by most institutions to make admissions decisions because the SATs are about as good as a coin flip, particularly for minorities and women."

Slaughter is no stranger to achieving results. During his 11-year tenure as President of Occidental College in Los Angeles, fully 50 percent of new faculty hired were men and women of color.

"We showed that it is possible to increase the diversity and equality of opportunity, while at the same time improving the College's overall excellence," says Slaughter. Occidental has

been ranked first in the nation for diversity by *US News and World Report*.

Slaughter jokes that people often asked him why an engineer was president of a liberal arts college: "I told them that engineering training provides you with a disciplined way of approaching problem solving. You learn to gather information, test alternatives, and choose the optimum solution from among a set of options. It's the kind of education that's appli-



"Engineers as a professional group must demonstrate more concern for the issues of underrepresentation of minorities."

cable not just to solving problems of electronic circuits, but also problems having to do with people, finances, and the myriad of things that can occur in a university president's office."

An accomplished engineer in his own right, Slaughter is a member of the National Academy of Engineering and a Fellow of the IEEE. He is an expert in digital sampled-data control systems. Much of his early seminal work was done from 1960 to 1975, as an engineer with the Navy Electronics Laboratory in Point Loma and as a UCSD graduate student working with his mentor and friend, Professor Harold Sorenson.

"Though my work in the Navy, we had access to equipment and computers that were not generally available at that time," says Slaughter. "We were working with large weapon systems that were operated through somewhat cumbersome electro-mechanical systems. Our team demonstrated that by introducing a digital computer into the system, we were able to make dramatic improvements in the way in which mechanical systems would respond. Our solutions required much less machinery and were much more reliable and cost-effective than traditional mechanical controls."

Slaughter credits individuals at UCSD for inspiring and encouraging him to enter academics: "I was greatly benefited by having faculty at UCSD who were genuinely interested in helping me be successful," says Slaughter. "I remember in particular Professor Alan Schneider who played a pivotal role in my becoming interested in pursuing a Ph.D."

Alumni Association Honors Jacobs School Seniors at UC Day

IN MARCH, JACOBS SCHOOL SENIORS **Benjamin Lynch** (Electrical Engineering & Physics) and **Luis Alberto Rodriguez** (Mechanical Engineering) were honored for their undergraduate research at UC Day. The two-day event, held in Sacramento, is sponsored by the Alumni Association of the University of California and commemorates the very best in UC research across all disciplines.

Lynch's research attempts to better understand solar wind and its effects by using multiple antennas to observe a coherent radio source, and watch how that signal is disturbed as it passes through the wind. The earth is constantly bathed in the solar wind. When solar eruptions hit earth, they can cause severe damage to any electronics in space, as well as ground-based infrastructures like communication satellites and electric power grids.

"The ultimate long-term goal is to understand solar physics well enough to predict and prepare for solar storms, but we're a long way off," said Lynch. "We don't really understand the calm, normal solar wind let alone the violent transients associated with solar storms." He will attend graduate school at the University of Michigan in space and planetary physics.

Rodriguez's research is aimed at better understanding laryngoscopy. This medical procedure provides a secure airway in an emergency by passing a tube through the mouth and into the lungs. His objectives were to compare expert and novice users to identify the crucial skills for successful laryngoscopy. He also used the force and motion measurements from human patients to identify the mechanical properties of the human anatomy

that affect laryngoscopy in order to develop an advanced training mannequin.

"The ability to successfully perform a laryngoscopy is highly dependent on operator skill," said Rodriguez. "Experienced physicians have failure rates of <0.1 percent, while less-experienced paramedics may have failure rates of 10-33 percent, which can lead to death or brain injury." Over the summer, Rodriguez will be an intern at the Ford Motor Company in Michigan, and then will attend the University of Wisconsin-Madison to pursue a Ph.D. in robotics.

Visit www.alumni.ucsd.edu/ for more information on UCSD Alumni services, or the Jacobs School of Engineering Alumni web page at www.soe.ucsd.edu/alumni/

Alumni Updates

1984 Wendy Coulson Grande, B.S., Chemical Engineering. Grande is currently developing zinc-air fuel cells at Metallic Power, Inc. in Carlsbad, California.
E-mail: wendy.grande@metallicpower.com

1986 Timothy Liem, B.A, Bioengineering. Liem has left his position as an assistant professor of surgery and radiology at the University of Missouri School of Medicine after four years to move to Portland, Oregon. He will begin a practice in vascular and endovascular surgery.

1991 Antonio Liu, B.A., ECE. Liu is the new chief of neurology at the White Memorial Medical Center in Los Angeles, California.
E-mail: aliumd@yahoo.com

1993 Mark Yuen, B.S., ECE. Yuen has joined GCT, a development stage communication IC company in Santa Clara, California. He is involved in the firm's business/strategic planning and finance. After obtaining his degree in electrical engineering from the Jacobs School, Yuen attended the Anderson School of Business at UCLA and worked for Merrill Lynch and LSI Logic.
E-mail: yuen_mark@hotmail.com

1998 Judy Alvariz, M.S. ECE. Alvariz is currently with STMicroelectronics where she is focused on low-power designs and embedded systems. She is engaged to Victor Gallardo '98 B.S., CSE and will tie the knot in July. Congratulations Judy and Victor!
E-mail: judy@engineering.com

1999 Mariusz Olszewski, B.S., Bioengineering/Pre-medical. Olszewski is attending the Uniformed Services University School of Medicine in Silver Springs, Maryland.
E-mail: mariusz_olszewski@hotmail.com

Please take a few moments to update us on your recent activities and/or new address.

E-mail to: soecomm@soe.ucsd.edu -or- Updates on the Web: www.soe.ucsd.edu/alumni/class_notes.html

Name _____	Class of _____		
Degree _____	Major _____		
What's New With You? _____ _____			
Address _____	City _____	State _____	Zip _____
Phone _____	E-mail _____		
<p>Send to: Alumni News, Jacobs School of Engineering 9500 Gilman Dr. • La Jolla, CA 92093-0403</p>			

Companies listed are members of the School's Corporate Affiliates Program. Visit the Corporate Jobs page at www.soe.ucsd.edu for direct links to detailed employment opportunities.

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ATA Engineering, Inc.

www.ata-e.com
e-mail: jeff.young@ata-engineering.com
11995 El Camino Real #200, San Diego, CA 92130
ATA Engineering has immediate openings for mechanical and aerospace engineers for thermal and structural analysis, design and testing.

e.Digital Corporation

www.edig.com
e.Digital provides R&D services to leading electronics companies to link portable digital devices to PCs and the Internet.

ENCAD, Inc.

www.encad.com/jobs
e-mail: jobs1@encad.com
6059 Cornerstone Ct. West, San Diego, CA 92121
ENCAD delivers high quality digital imaging solutions to a worldwide market. Entry-level and experienced software, firmware and electrical engineering positions are available in San Diego.

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www.ericsson.com/cdmasystems
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Internship opportunities - send resumé to:
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Ericsson is the world's largest maker of mobile networks and the third biggest handset supplier.

Hughes Network Systems

www.hns.com/careers/careers.htm
Hughes Network Systems is a world leader in communications technology.

IBM Corporation

www.ibm.com/whywork
At the forefront of technological advancement, IBM spans the world of Information Technology. Visit our Website to view employment opportunities.

Mitsubishi Wireless Communications, Inc.

mitsubishiwireless.com
10071 Barnes Canyon Road, San Diego, CA 92121
e-mail: jobs@cmtsd.me.com; fax: (858) 457-3902
Mitsubishi Wireless Communications, Inc. is currently looking for self-motivated employees with qualified experience in any of the following engineering areas: RF, ASIC, DSP, software, test.

Motorola

www.motorolacareers.com
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NCR Corporation

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Nokia Mobile Phones

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SAIC, a diversified high technology research and engineering company, offers a broad range of expertise in technology development and analysis, computer system development and integration, and technical support services. Entry-level and program management engineering and software positions are available.

Sony Technology Center-San Diego

www.sonyjobs.com
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e-mail: Jobs@am.sony.com; fax: (877) 822-8703
Sony Technology Center-San Diego has openings for an associate hardware development engineer and associate software development engineer.

TRW

www.trw.com/careers/
Human Resources
One Rancho Carmel, San Diego, CA 92128
e-mail: resumes@rc.trw.com; fax: (858) 592-3108
Software, communications systems, digital circuit design, RF circuit design, mechanical design, manufacturing and hardware/software test engineers. Desired degrees - EE, CE, CS, Math, Applied Physics, ME.

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www.websense.com/company/jobs
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