SUMMER 2001 | Vol.1, No. 2

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ENGINEERING @ MARYLAND

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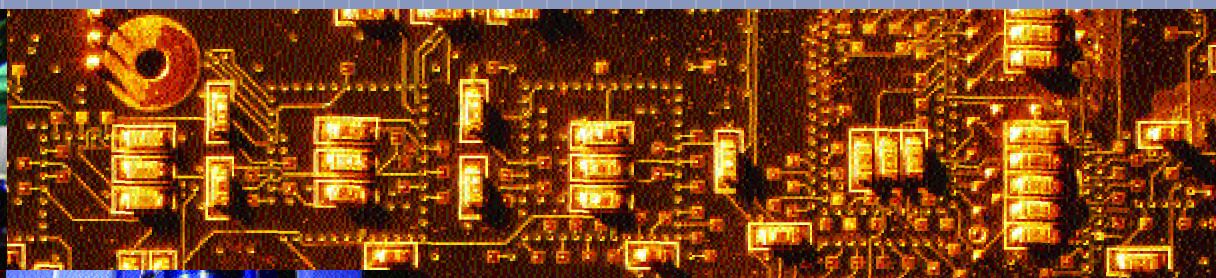
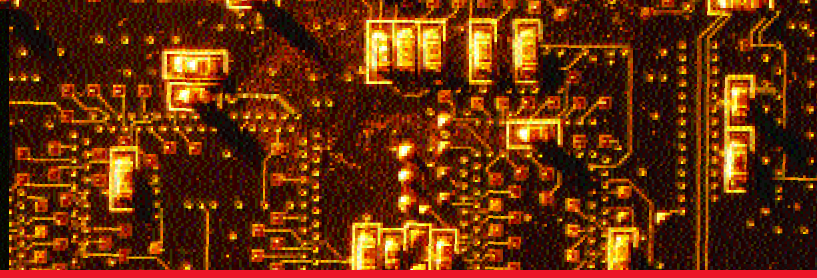
Tracking Success with Young Entrepreneurs





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A. JAMES CLARK SCHOOL OF ENGINEERING ▪ University of Maryland

STORIES

DEPARTMENTS

Publisher
A. James Clark School
of Engineering

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Dean

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Engineering @ Maryland is published twice a year for alumni and friends of the A. James Clark School of Engineering and the Glenn L.Martin Institute of Technology at the University of Maryland.

Letters to the editor and alumni notes are welcome. Please send them to *Engineering @ Maryland* Editor, Engineering Dean's Office, 1137 Glenn L.Martin Hall,University of Maryland,College Park,MD 20742. Information can be sent by fax to 301.314.9867 or by e-mail to ckennedy@accmail.umd.edu

Dear Alumni and Friends:

TWICE A YEAR, IN DECEMBER AND MAY, IT IS MY HONOR to participate and lead the commencement ceremonies for the A. James Clark School of Engineering. Graduation marks the start of a rewarding engineering career for many of our talented graduates; for others, it signifies an advanced degree or continuation of their research.

Regardless of what the future holds for this spring's 550 engineering graduates, whether it's designing computer chips for Intel or developing the next generation of space vehicles for NASA, they have one thing in common: they are all valued members of the Clark School of Engineering alumni family.

I sincerely hope our newest graduates remain in touch with their alma mater as they move forward in their lives and in their careers. We want to keep them, and you, aware of all of our good news. This includes our significant research efforts and major research grants we receive every year. It also includes news of our faculty who are nationally recognized for their important work that spans every discipline in engineering, exemplified this past April by seven of our junior faculty who received the prestigious National Science Foundation Early CAREER Award.

Other good news showcases the quality and diversity of our educational programs. For example, graduate programs in the Clark School are collectively ranked 18th by the most recent *U.S. News & World Report* listings among all public and private institutions in the nation. Among publicly supported institutions, we are ranked 11th.

I expect that our current engineering students who are very bright, very talented and very diverse will also be heard from in the future. Last fall's 664 engineering freshmen boasted an average GPA of 3.8 and SAT scores of 1291, while this year's incoming freshmen come to us with an even higher average SAT score of 1308. We expect these students to excel in their academic work while at the Clark School, taking full advantage of the many opportunities provided through programs such as cooperative education, Women in Engineering, Gemstone Honors and the College Park Scholars program.

In this issue of *Engineering@Maryland*, we follow a group of engineering undergraduates in their first year in the Hinman Campus Entrepreneurship Opportunities (CEOs) program, the nation's first living learning entrepreneurship program based in a high technology environment. Launched last September with generous support from engineering alumnus Brian Hinman '82, it sets a new benchmark and innovative model for educational programs for today's universities. This program brings together a cross-disciplinary group of undergraduates who work together for two years with the aim of developing a business plan for a startup company. With the majority of these undergraduates coming from the Clark School of Engineering and the Smith School of Business, we fully anticipate many of these concepts to seed successful companies in the future.

Besides providing a unique and excellent educational experience, we hope that the Hinman CEOs program will promote a culture of entrepreneurship and interdisciplinary partnerships. I recently visited with some of our very talented and successful alumni in Silicon Valley. I am proud to see firsthand how the entrepreneurial spirit of Clark School graduates has flourished in this environment and influenced their work. We are committed to expanding upon this foundation of entrepreneurial spirit within all of our engineering programs at Maryland.

These are very exciting times for the Clark School of Engineering. As a renowned leader in engineering education, we can have a great influence on the future of engineering. I invite you to be a part of making the A. James Clark School of Engineering become the best school of engineering.

Nariman Farvardin, *Dean*

newsOFNOTE

BAE SYSTEMS Supports New Labs

A suite of four, state-of-the art facilities for computer engineering research and education,collectively called the BAE SYSTEMS Laboratories, is now fully operational in the Department of Electrical and Computer Engineering.

Funded in part by a generous gift from BAE SYSTEMS North America, the suite includes two graduate-level research labs and two undergraduate project labs.

One graduate-level facility, the systems and computer architecture laboratory, is the department's first facility dedicated to the exploration of new computer architectures.Research in the lab includes the study of DRAM technologies, memory organization,control speculation, instruction-level parallelism hardware, multi-threaded architectures,memory prefetching and compilation for desktop and embedded systems.The lab is equipped with high-end workstations and software for computer architecture study and simulation.

An embedded systems research laboratory, also for graduate students, allows inquiry into the design, implementation and application of embedded processors.The lab includes ultra-fast workstations,development tools for Texas Instruments DSP processors and software for modeling and simulating of heterogeneous embedded systems.

A computer engineering instructional laboratory, for undergraduate use, is used primarily to teach the upper-level microcomputer laboratory course. Students taking the course work in small groups on hardware-oriented experiments involving the application of microprocessors and programmable logic to typical problems of low-level control and data acquisition. A separate computer engineering project laboratory engages teams of undergraduate students in senior-level projects in computer engineering. ■

Attending dedication ceremonies for the BAE SYSTEMS laboratories are: (back row, from left) Steve Strine, BAE college recruiter; Steve Marcus, chair of electrical and computer engineering; Nariman Farvardin, dean; C. D. Mote, Jr., university president; Ken Aubrey, BAE group manager of employment; (front row, from left) Paula Sandin, BAE director of marketing communications; Mark Ronald, BAE president and CEO; Bruce Hamilton, BAE technology services sector president; and Bob Hastings, BAE corporate communications.

Nortel Scholarships Help Boost IT Education

Beginning in fall 2001,Nortel Networks will give a big boost to students studying electrical and computer engineering by establishing the Nortel Networks Scholars Program at the University of Maryland.

The program will support 10 undergraduate and three graduate students in the Clark School who are studying electrical,computer and telecommunications engineering.Funded by a $100,000 donation from Nortel,the undergraduate scholarships are for three years,while the graduate fellowships are for two years.

"This program attracts the best and brightest students to the Clark School.It enables these talented students to concentrate on their studies instead of worrying about part-time jobs to cover their financial needs," says Nariman Farvardin, dean of the Clark School.

The University of Maryland and Nortel Networks have a history of successful endeavors, including the joint development of a main component of the V.34, the standard for full-duplex modems sending and receiving data across phone lines at up to 28,800 bps.

Nortel Networks is a member of the Department of Electrical and Computer Engineering's Industrial Affiliates Program, which promotes ongoing relationships between the university and its industry partners.

"Our relationship with the University of Maryland is important to us," says Milan Vlajnic, an advanced network architect with Nortel Networks. "The Clark School is one of the very best schools in producing graduates with a strong core competency in communications and digital signal processing."

Vlajnic adds that Nortel Networks has a long-term history of success in recruiting outstanding graduates from Maryland, and then providing them a rewarding career. ■

Check It Out @ www.eng.umd.edu

This past March,the Clark School of Engineering unveiled a new look to its Web site. The new site features easy online access to complete and current information on Maryland's engineering program and has user-friendly icons that lead to each of the Clark School's academic departments.Current news stories,employment opportunities,academic programs and upcoming events are just a click away.

Dan Carafelli, director of Internet and business services in the Engineering Research Center, led the effort to revamp the site. "Schools and colleges today depend on informative and easy-to-use Web sites to showcase their research and faculty, as well as recruit the best students," he says.

One interesting aspect of the Web site is that it constantly changes its appearance. "It's not a static site—there is a different image on the home page each time a user logs on," says Linda Martin,director of the university's Office of Internet Communications.

Linda Martin and Glen Dimock, a senior in aerospace engineering, designed the main and secondary page templates to attain a high technology image that more closely represents engineering at Maryland.

Eric Schurr and Rebecca Copeland, publications specialists in the Clark School, wrote much of the text for the Web site and continue to keep it up-to-date. ■

Governor's Institute Promotes Information Technology Learning

The Maryland Governor's Institute for Technology—a five-week residential program that began this July—is designed to attract academically talented high school students interested in information technology to the University of Maryland. The new outreach program emphasizes current developments and ideas in information technology as they relate to business,government,education and society. The institute is funded by a $250,000 grant from the state.

Students accepted into the program can choose between two tracks: computer science, taught by faculty from the College of Computer, Mathematical and Physical Sciences; or electrical and computer engineering, taught by faculty from the Clark School of Engineering."We expect that most of these high school students will continue with their interest in information technology, and many of them may eventually end up at the Clark School," says Lisa Kiely, director of undergraduate academic and administrative matters in the Department of Electrical and Computer Engineering.

Both the computer science and computer engineering options include lecture and discussion groups,team projects and field trips. Guest lecturers will include university professors, representatives from leading area industries, as well as speakers from professional associations,the media and federal agencies.

Student teams studying under Clark School faculty will work on project-oriented courses that examine areas of optical communications, telecommunication networks, signal processing, real-time systems, and embedded systems and robotics. They also will have the opportunity to participate in current undergraduate research projects with Clark School students studying telecommunications,computer engineering and microelectronics.

The Governor's Institute for Technology also has a parallel program for teachers from the same participating schools. This allows high school educators to introduce cutting-edge IT concepts into their home schools, rejuvenating science curriculums and further establishing connections between the university and Maryland's high schools. ■

McClellan Is Named Assistant Dean for External Relations

Dennis McClellan joined the Clark School of Engineering in February as assistant dean for external relations.In this new position, McClellan will develop a comprehensive program of external communications and alumni and corporate relations.

McClellan says that he plans to "recruit the best team possible to assist the Clark School in attaining its strategic priorities."

"Dennis and I are committed to excellence across the board for Maryland's engineering program, and we look forward to keeping our alumni and friends well aware of our many successes," says dean Nariman Farvardin.

McClellan says that his primary objectives are to "create a community within the school,and build on the strong relationships we have with our constituents as well as provide opportunities for philanthropic support."

For the past two years, McClellan was director of development in the Department of Medicine at Johns Hopkins University School of Medicine in Baltimore where he was responsible for a $15 million annual fundraising program.Prior to that,McClellan was director of development of academic programs at the schools of medicine and nursing at Georgetown University Medical Center.

DENNIS McCLELLAN

McClellan received his bachelor's degree in psychology at Furman University in Greenville, S.C. ■

Alumnus of the Year Connects with the World

RAM MUKUNDA

RAM MUKUNDA refers to his student years at the Clark School of Engineering as his "foundation building years." Mukunda, founder and CEO of Startec Global Communications, says the University of Maryland is where he learned the basic skills for conquering the engineering and business worlds.

"The undergraduate and graduate programs at Maryland prepared me well," says Mukunda, who earned a bachelor of science degree in 1979 and a master of science degree in 1981, both in electrical engineering. "When I graduated, I had offers from many companies, who had immediate faith and interest in me."

Mukunda was honored at the Maryland Alumni Association Awards Gala in April as the Clark School's Distinguished Alumnus of the Year. He was chosen by the engineering alumni chapter board of directors from a pool of nominations received from fellow alumni and Clark School faculty.

According to Mukunda, these same Clark School faculty pushed him as a student to explore different areas and disciplines other than his major of electrical engineering. "Many of the Clark School faculty worked in a mixed arena themselves," he says, "and [they] were involved in mathematics, finance and business."

Mukunda's undergraduate degree included a dual major in mathematics, and upon graduating from Maryland, he took the advice of his professors and determined that his academic background could be applied in careers other than engineering. He found employment on Wall Street as a fixed income analyst, and then a strategic advisor at Intelsat, an international satellite consortium in Washington, D.C.

But the greatest test to Mukunda's skills came when he left his job at Intelsat, sold his home, and put all his assets and energy into starting his own telecommunications company. In forming Startec, Mukunda saw an untapped opportunity to provide international long distance service to the ethnic Indian community in the Washington, D.C., region. Based in Potomac, Md., Startec offers telecommunications services in 30 cities in the United States, Canada and Western Europe.

In February of this year, Startec launched the second phase of its corporate plan: a digital global service for various ethnic communities that offers Internet, voice and data transmission service. Ethnic groups in the United States with ties to Iran, Turkey, India and other Middle East countries are now linked through Web sites and homepages provided by Startec. These Web sites showcase daily headlines from local Middle East newspapers, along with chat rooms, recipes and other cultural touches.

Although Mukunda's entrepreneurial spirit has literally taken him around the world, he still retains a strong commitment to his alma mater. In addition to serving on the Clark School's Board of Visitors and the Department of Electrical and Computer Engineering's Advisory Council, Mukunda's company recruits strongly from the Clark School of Engineering and the Smith School of Business. "I know that these students are going to be well prepared, and have a firm grounding in the business and engineering worlds," he says.

Mukunda views the greater Baltimore–Washington, D.C., region as fertile ground for progress and excellence in high technology endeavors. "We can create our own Silicon Valley in this region—that same sort of opportunity exists right here with the entrepreneurial programs and talent within the engineering and business schools at Maryland."

—Patricia Granata

REINHARD RADERMACHER

Radermacher Inducted into Innovation Hall of Fame

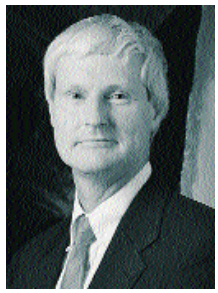
THIS PAST MAY, Reinhard Radermacher, professor of mechanical engineering and director of the Center for Environmental Energy Engineering at the University of Maryland, was inducted into the A. James Clark School Innovation Hall of Fame.

The Innovation Hall of Fame, begun in 1985 by alumnus Stan Berman '50, recognizes Clark School of Engineering alumni and faculty who have made significant technical contributions to society through engineering innovation.

Radermacher was chosen for the Innovation Hall of Fame for his work in environmental and energy systems applications. He is an expert on alternative refrigerants that do not deplete the ozone layer and minimize global warming, and has more than 20 years of research experience in areas that include absorption and vapor compression heat pumps; alternative refrigerants; and designing cooling, heating and power systems for buildings. Radermacher's work includes three books, more than 100 publications, nine patents and five licenses. The Center for Environmental Energy Engineering that Radermacher initiated in 1991 conducts research in distributed energy conversion systems that meet environmental and economic goals.

Radermacher received his Ph.D. from the Munich Institute of Technology in Germany and worked for two years under a NATO fellowship at the National Institute of Standards and Technology before joining the University of Maryland. ■

We encourage you to nominate candidates for the Innovation Hall of Fame 2002. Please visit our Web site at www.eng.umd.edu for more information, and to complete an online application.



WILLIAM W. DESTLER

Former Dean William Destler Appointed Provost

William W. Destler, dean of the Clark School of Engineering from 1994–1999, was recently named provost and senior vice president for academic affairs at the University of Maryland.

Destler, now second-in-command at the university, has both programmatic and administrative responsibility for all academic programs. The provost's office is responsible for undergraduate studies and admissions, and all deans report to the provost.

After earning his Ph.D. from Cornell University, Destler arrived at Maryland in 1973 as a research associate. He reached the rank of full professor of electrical engineering in 1985, and was chair of electrical engineering from 1985 to 1994, when he became dean of the Clark School. ■

Clark School Names New Director of Communications

The Clark School of Engineering recently named Cyndy Kaufman as its new director of communications. Kaufman will coordinate a comprehensive communications and marketing effort for Maryland's engineering program.

"We want to produce the highest quality communications, both in print and on the Web," says Kaufman. "We also plan to significantly increase our efforts to keep our many constituencies informed about the specific strengths that define and distinguish the Clark School of Engineering as one of the best engineering programs in the nation."

Before joining the Clark School, Kaufman held a variety of customer communications and industry relations positions with Freddie Mac, a Fortune 100 and stockholder-owned corporation chartered by Congress that supports mortgage lending. Prior to her seven-and-one-half years with Freddie Mac, she spent more than 18 years in student affairs and higher education administration at four-year public and private universities and colleges.

CYNDY KAUFMAN

Kaufman earned a master of science degree in counseling from St. Cloud State University in Minnesota and a bachelor of arts degree in psychology from Central Connecticut State College. ■

A Mighty Effort to Double Maryland's IT Grads

As part of the Maryland Applied Information Technology Initiative (MAITI), the University of Maryland received a $2 million grant from NASA last fall to expand its information technology resources.

The primary goal of MAITI [pronounced "mighty"] is to double the number of statewide graduates in information technology-related programs by the year 2004.

A major portion of the NASA grant was directed toward the Clark School of Engineering, where the funding helped complete a new embedded systems research laboratory in electrical and computer engineering; in mechanical engineering, two design informatics labs were added; and in chemical engineering, the IT capabilities of the department were significantly enhanced. ■

facultyNEWS

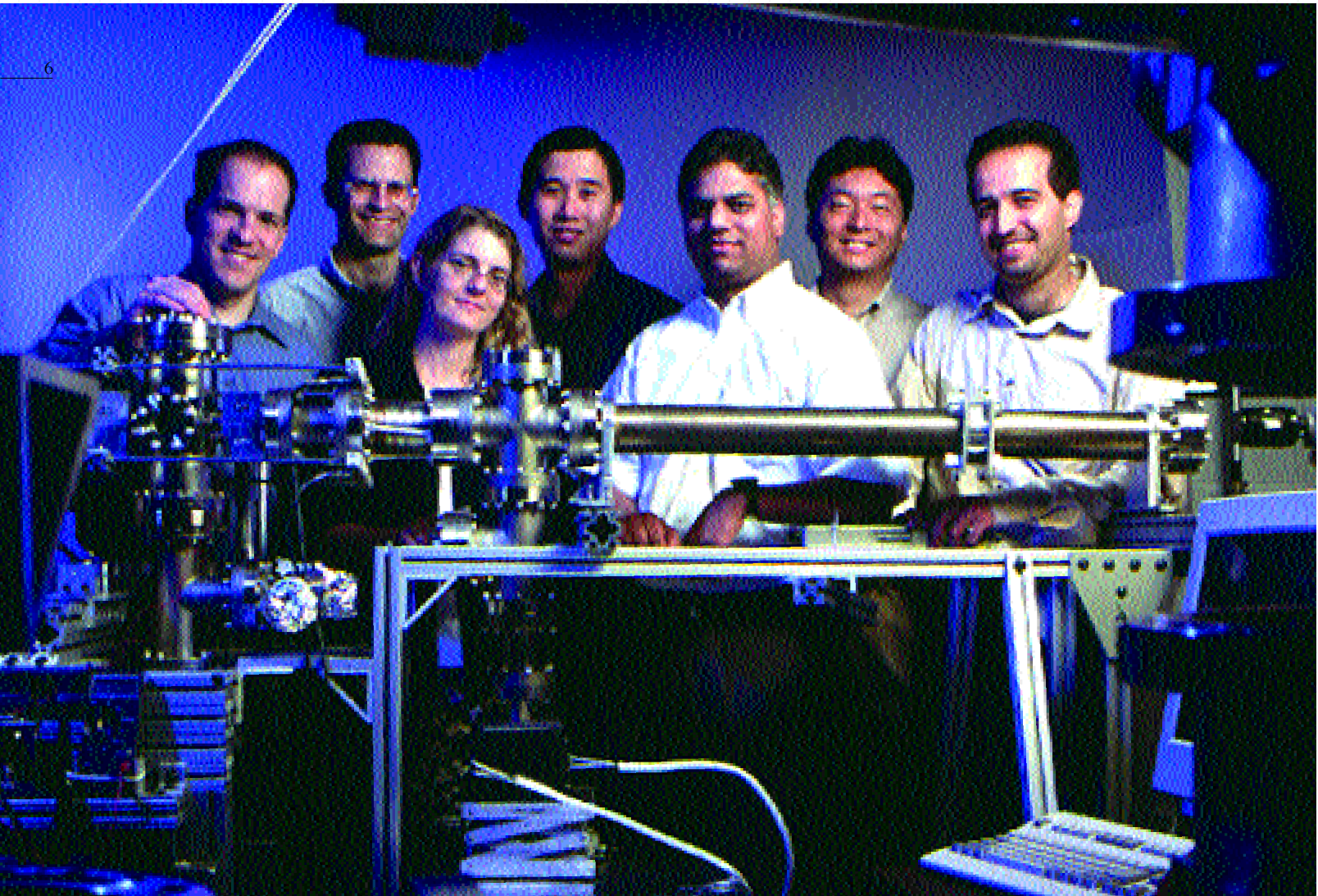
Seven Junior Faculty Receive the NSF Early CAREER Award

THIS MAY, AN UNPRECEDENTED SEVEN junior faculty in the A. James Clark School of Engineering received the prestigious Early CAREER Award from the National Science Foundation. The award is presented annually to junior faculty members who submit research proposals for projects and also demonstrate innovative ideas for education. Each proposal is reviewed by the NSF, and those chosen for CAREER Awards receive five years of funding for their research.

"This significant number of awards reflects the substantial effort we have made in the last few years to recruit the best and brightest in young faculty," says Nariman Farvardin, dean of Maryland's engineering program. "Normally, we are proud to announce each year that the Clark School has two or three CAREER award recipients, so the size of this year's group is impressive."

Clark School of Engineering faculty selected to receive the Early CAREER Award are:

- **Steve Buckley**, assistant professor of mechanical engineering, for his research in real-time, in-process methods for sizing and compositional analysis of fine particulate matter. These real-time detection methods are a key component of efforts to minimize particulate emissions, which have been recently identified as a major environmental health hazard.
- **Sheryl Ehrman**, assistant professor of chemical engineering, for the development of a process for making functional porous materials from nanoparticles.
- **S. K. Gupta**, assistant professor of mechanical engineering, for developing a new molding process and decision support tool that makes it possible to manufacture multi-material parts in a cost-effective manner.



- **Babis Papodopoulos**, assistant professor of electrical engineering, for the investigation of the performance limits and development of an algorithmic framework for resource-efficient encoding communication and fusion of measurments in wireless networks of distributed sensors and actuators.

- **Eric Seagren**, assistant professor of civil engineering, for his work *in situ* bioremediation, a remediation alternative for soil and groundwater contamination, and the impact of subsurface heterogeneities *on situ* bioremediation.

- **Ichiro Takeuchi**, assistant professor of materials science and engineering, for developing a combination materials synthesis methodology in order to drastically accelerate the rate at which new and improved electronic thin film materials are discovered.

- **Donald Yeung**, assistant professor of electrical and computer engineering, for his work in improving the performance of memory systems. ■

Clark School of Engineering faculty who received the NSF Early CAREER Award are (from far left) Steve Buckley, Eric Seagren, Sheryl Ehrman, Donald Yeung, S. K. Gupta, Ichiro Takeuchi and Babis Papodopoulos. Pictured at University of Maryland Electronic Ring (UMER) injection section.

Professional Recognition and Honors

The following are but a few examples of professional recognition for the faculty in the Clark School of Engineering for their teaching excellence, exemplary research and professional achievement:

Stuart Antman, professor of mathematics who has a dual appointment with the Institute for Systems Research, was recently named a Distinguished University Professor, the highest honor bestowed on faculty at the university. Antman is known worldwide for his research in mechanics and solid matter, specifically in the area of mathematical elasticity.

Inderjit Chopra, the Alfred Gessow Professor of Aerospace Engineering, received the ASME Adaptive Structures and Material Systems Prize. Chopra, who also is director of the Alfred Gessow Rotorcraft Center, earned the award for significant contributions to the advancement of the sciences and technologies associated with adaptive structures and material systems.

Anthony Ephremides, professor of electrical and computer engineering and Institute for Systems Research, received the 2000 Fred W. Ellersick Milcom Award for the "Best Paper in the Unclassified Technology Program." The award, sponsored by the IEEE Military Communications (Milcom) Conference Board in conjunction with the IEEE Communications Society, was awarded to Ephremides for a paper titled "Algorithms for Bandwidth-Limited Energy-Efficient Wireless Broadcasting and Multicasting." Also, Ephremides recently received the Kirwan Faculty Research and Scholarship Prize. This prestigious university award—which carries an honorarium of $5,000—recognizes a faculty member for a highly significant work of research,scholarship or artistic creativity completed within the last three years.

Jim Gentry, professor of chemical engineering, received the 2000 David Sinclair Award from the American Association of Aerosol Research.The award recognizes sustained excellence in aerosol research and technology by an established scientist still active in their career.

S. K. Gupta, assistant professor of mechanical engineering, received the Office of Naval Research Young Investigator Award in 2000.He also received Society of Mechanical Engineering's Robert W. Galvin Outstanding Young Manufacturing Engineering Award for 2001.

Mark Lewis, professor of aerospace engineering, was appointed to the Air Force Scientific Advisory Board.The board provides a link between the Air Force and the nation's scientific community to promote the exchange of the latest scientific and technical information that can enhance the accomplishment of the Air Force mission.

Hung C. Lin, professor emeritus of electrical and computer engineering, was recently elected to the Academia Sinica, the most prominent academic institution in the Republic of China.Lin was recognized for his invention of the BiCMOS circuit,widely used in tens of millions of computer CPU chips. Founded in 1928, the Academia Sinica currently has almost 200 members,including six Nobel Laureates.

Glenn Moglen, assistant professor of civil and environmental engineering, received the Outstanding Contribution to GIS in Maryland award this past May at the 14th Annual Geographic Information Sciences Conference.

Fred Mowrer, associate professor of fire protection engineering, was appointed president-elect for 2001 of the Society of Fire Protection Engineers. This commences a three-year term in which Mowrer will serve as the SFPE professional society's future president in calendar year 2002.

James Quintiere, the John L.Bryan Professor in Fire Protection Engineering, won the Borealis Corp. award and international challenge competition for his mathematical predictions of flame spread with electrical cable materials.

R.Ramesh, professor of materials and nuclear engineering, and physics, received the prestigious Alexander von Humboldt

continued on page 17

The Material World

From the nickel-based super alloys of jet engines to the ultra-pure glass that is the backbone for high-speed fiber optic networks,new materials have contributed greatly to the scientific and technological advances that transformed our world in the second half of the 20th century. Now, as materials scientists and engineers try to gain even more control over the material world,they are promising to radically transform our lives yet again.

"Within the next 15 years,materials science and engineering projects will result in a whole bandwidth of new, rewarding technologies that will impact fields such as communications,health, environment and transportation," says Ramamoorthy Ramesh, a professor in the Clark School's Department of Materials and Nuclear Engineering and associate director of the Materials Research Science and Engineering Center, or MRSEC.

Maryland's MRSEC is part of the National Science Foundation's network of 29 Materials Research Science and Engineering Centers across the country that explore innovative materials and stimulate research and education within the field of materials science. Noting Maryland's strength in materials research, the NSF announced last fall a major grant to be shared between Maryland's MRSEC and Rutgers, the state university of New Jersey. The joint center will receive $10 million over the next five years,of which approximately $9 million will go to Maryland.

"Researchers on our campus are exploring novel uses of thin film metal oxides,studying the dynamics of surfaces and developing novel techniques to probe extremely small structures called nanostructures," says Ellen Williams,professor of physics at Maryland and director of the joint center. In addition to basic research, the center will take on educational outreach initiatives and foster greater collaboration with private industry.

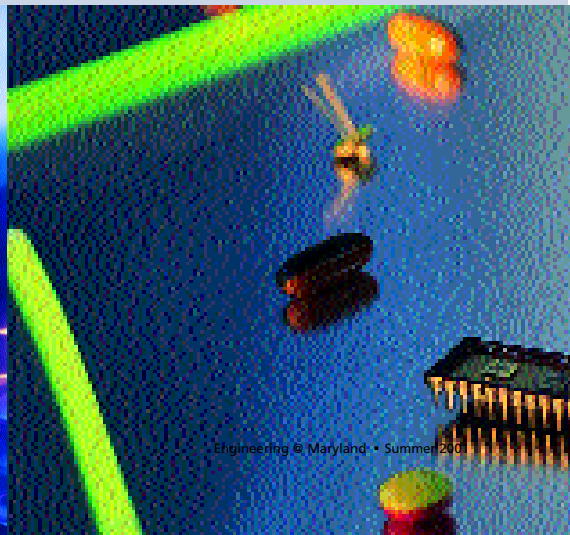
At Maryland's MRSEC, more than 20 faculty members and research associates and assistants are working on materials science and engineering projects,from fabricating and manipulating the properties of nanostructures to improving the electrical,magnetic and optical properties of materials for sensors,process integration and computer and microelectronics memories.

Ramesh's research—supported by the NSF and by industry leaders like Telecordia,Motorola and IBM—is focused on enhancing the random-access memory of computers. Random-access memory, better known as RAM, is the driver behind most computer functions, facilitating the commands and communication within and between various programs and computer operating systems.

"Integrated circuit memory chips have become increasingly important as personal computers and computerized equipment have become mainstream in today's society," Ramesh says.Currently, dynamic random-access memory, or DRAM,is the hard-core fast memory that all personal computers use. DRAM however, suffers from a need to be periodically refreshed and from the loss of information in the case of a power failure or a system crash. Traditional DRAMS use dielectric materials like silicon dioxide that are nonconductors of direct electric current, to provide support functions such as read and write commands."For years, researchers have been looking for new ways to make a non-volatile memory that is fast like the DRAM, but continues to store data after the chip has been powered down," Ramesh says."And one way to capture this magical memory is with ferroelectric materials."

Ramesh and his research team have been working on the ferroelectric memory solution for about 10 years. Typical to the field of materials science and engineering, their biggest breakthrough came about by accident."Our original assumption was that to make a non-volatile memory with ferroelectric materials, we had to make a

Ramamoorthy Ramesh (below), professor of materials and nuclear engineering.



Department of Defense Supports Critical Research

ENGINEERING RESEARCH closely tied to the Department of Defense (DoD) continues to flourish at the Clark School of Engineering. Last fall, in support of interdisciplinary projects that are deemed critical to national defense interests, the DoD announced significant research awards to Clark School faculty members.

Three research teams in the Clark School received Multi-disciplinary University Research Initiative, or MURI, awards for FY2001. These highly competitive awards average $1 million per year over a three-year period, with two additional years of funding possible. One project, led by Victor Granatstein, professor of electrical engineering, will investigate the threats and opportunities associated with the introduction of microwave pulse energy into modern and future electronics. Manfred Wuttig, professor of materials science and engineering, leads another project that will identify and enhance the design and performance characterization of new classes of hybrid smart materials. A third research effort, led by P. S. Krishnaprasad, professor of electrical engineering, will develop mathematical foundations to support the integration of control and communication technologies.

The DoD also announced that six University of Maryland faculty members—four of them from the Clark School—have received grants of at least $50,000 to continue research in the fields of mechanical engineering, aerospace engineering and physics. The grants came through the Defense University Implementation Research Project, or DURIP, which helps to fund equipment purchases for defense-related research. The four engineering faculty are: Balakumar Balachandran, associate professor of mechanical engineering; Donald L DeVoe, assistant professor of mechanical engineering; Ashwani Gupta, professor of mechanical engineering and director of the Combustion Laboratory; and Norman Wereley, associate professor of aerospace engineering. The other winners are Wolfgang Losert, assistant professor of physics; and John Rodgers, associate director of the Institute for Research in Electronics and Applied Physics.

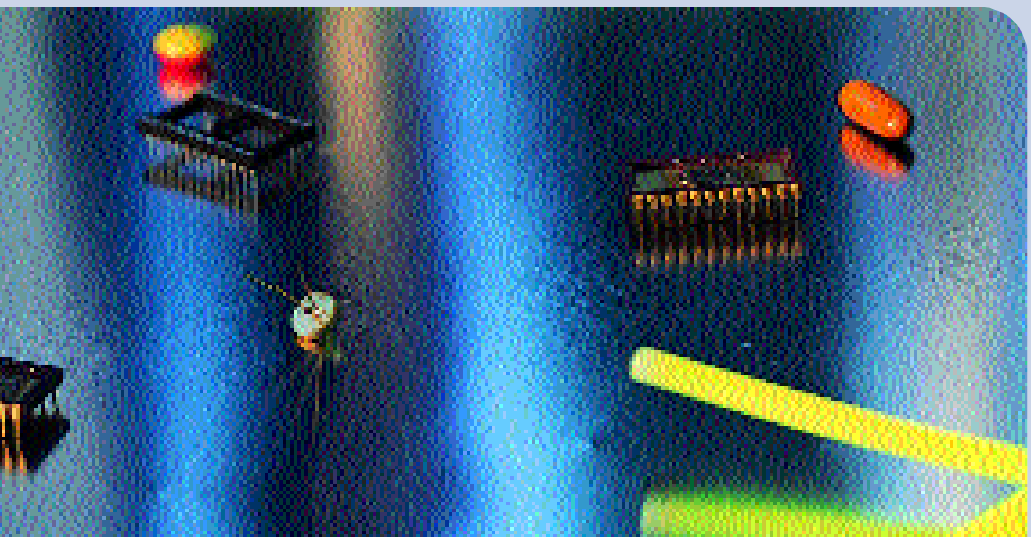
Additionally, a research team led by John Baras, who holds the Lockheed Martin Chair in Systems Engineering, received $4 million from the DoD to investigate ways to lessen the threat of physical or cyber attacks on critical information infrastructures. Baras and his team will examine distributed immune systems for wireless networks. Funding for this highly competitive award comes from the DoD's University Research Initiative. ■

film of a ferroelectric single crystal so that there wouldn't be variations in properties across the film," adds Ramesh. "We thought this would fix the problem of fatigue, but it turns out that it was not the answer."

But in the process of trying to make a single crystal film,Ramesh introduced something that others had not.Instead of using typical metals like aluminum, platinum or gold to make a three-component capacitor, Ramesh used a conducting oxide metal yttrium barium copper oxide, or YBCO. "We put the YBCO first and last.Then all of a sudden the fatigue went away," says Ramesh.

Now Ramesh and his team are addressing the development and fabrication issues of ferroelectric random-access memory, or FRAM."Some of the issues that we're trying to work out are understanding what happens to the properties of the materials as we approach the micro- and nanoscale and how to actually fabricate devices at these tiny scales," he says.

Ramesh has already been awarded 16 patents related to his FRAM research, and he is working with the university's Office of Technology Commercialization to transfer the FRAM technology from the laboratory to the manufacturing stage. "There is a lot of university and industry competition out there, including the big [integrated circuitry] companies like Toshiba,Hitachi and Samsung," Ramesh says."Because what we're designing here is a low-powered, non-volatile memory that could eliminate both the DRAM and the hard drive, drastically change the architecture of a computer and revolutionize microelectronics equipment of tomorrow, it has become a race to market."—*Megan Michael*



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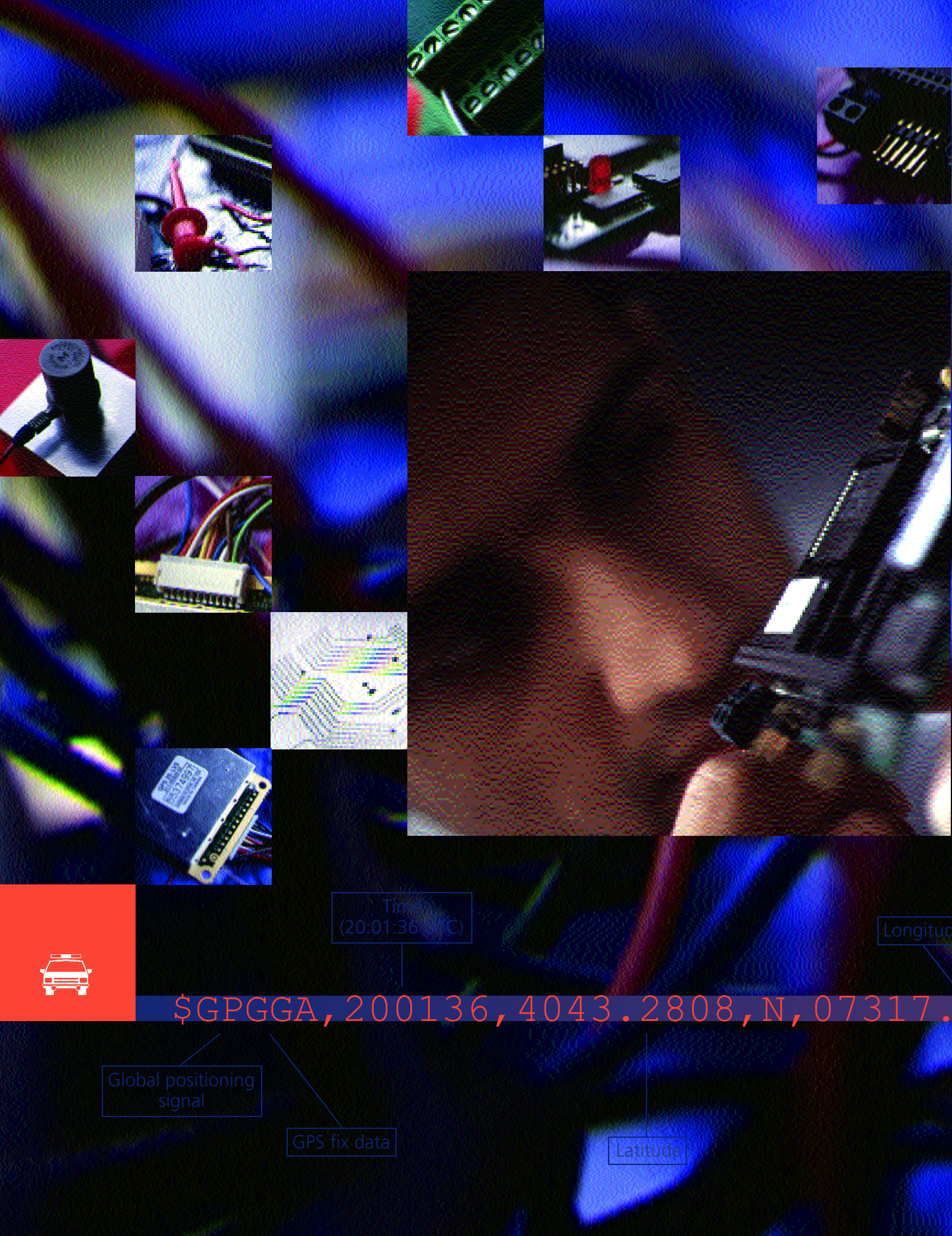
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tracking success with young entrepreneurs

STORY BY PATTY HENETZ • PHOTOGRAPHS BY JOHN T. CONSOLI

EVERY DAY ACROSS THE COUNTRY, LAW ENFORCEMENT OFFICERS TRANSPORT SOME 100,000 PRISONERS TO AND FROM COURT APPEARANCES OR TO OTHER SECURE FACILITIES. WITH ONLY 20,000 OR SO OFFICERS TO GUARD THEM DURING TRANSIT, ESCAPE ATTEMPTS ARE INEVITABLE.

Developing a new global-positioning device that helps police keep track of prisoners in their charge might at first seem an odd project for a group of entrepreneurial University of Maryland Honors students.But that has always been the way of the entrepreneur: to find a need and fill it.

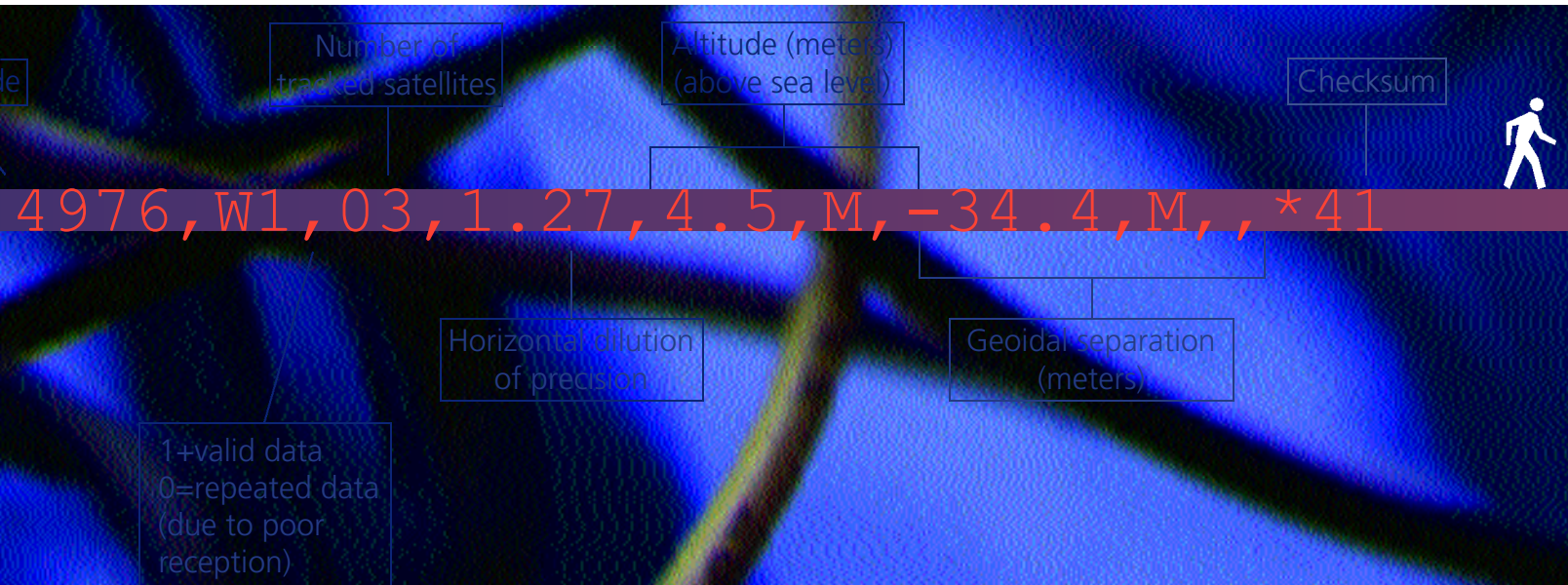
Such a tracking device, aptly called the Guardian,is currently under development by 16 Honors students,the majority of whom first teamed up together in the university's groundbreaking Gemstone program during their freshman year at Maryland. Gemstone is a special interdisciplinary Honors program that integrates technological and social issues into research projects that span all four years of a student's undergraduate education.

Twelve of the students on the team are majoring in the sciences (seven in engineering programs),and the remaining four have majors that include marketing,finance, economics and political science in various combinations. All of them share an interest in mobile computing and wireless technology.

In the fall of 1999,at the start of their sophomore year, the Gemstone team was searching for new ways to use Global Positioning Satellite (GPS) technology. Team member Rob Sherman invited his father, Bruce P. Sherman, assistant sheriff with the Montgomery County Sheriff's Office, to speak to the group.The elder Sherman explained to the students that the county's new jail would be built far from the courts, requiring constant prisoner shuttles on I–270—thus raising concerns about security. Sherman gave the group a history of transporting prisoners in the county, while also laying out for them certain public safety needs and other security issues to consider. "He was trying to help us figure out a practical way to use GPS technology to assist the Sheriff's Office," says team member Adam Lutz,an electrical engineering and mathematics major.

Since the Gemstone team's main interest was global computing, the idea of tracking escaped prisoners via satellite seemed like an excellent application for the technology.

As envisioned, the Guardian device would use a location-detection unit (LDU) that would include a GPS receiver and a cellular digital packet data wireless transmitter, ensuring virtually nationwide coverage. It would involve a system of 12 space satellites and existing wireless telephone antennas that would transmit accurate and rapid location data to a data center, where a customized map would display precise locations,updated in real-time.



Law enforcement agencies could manage the display of data at a data center, which can exist virtually anywhere. Alarms could be set for individuals or groups, to alert officials when a prisoner leaves a group, or when a parolee or individual under a court restraining order enters a restricted area.

While the Gemstone team had an idea and a purpose, what they lacked was support,financial and otherwise.

ENTER THE HINMAN CEOs PROGRAM

Timing *is* everything.In the fall of 2000,the University of Maryland launched the Hinman Campus Entrepreneurship Opportunities (CEOs) program, a first of its kind living-learning experience for upperclass undergraduates wanting to start their own business in a high-tech environment.The concept was first introduced two years earlier by the former engineering dean, and now university provost, William Destler.

Destler envisioned entrepreneurial undergraduates collaborating on projects that might progress to the Clark School's Technology Advancement Program, an internationally acclaimed incubator for technology-based companies.Bill Destler soon found a willing partner to catapult his concept into reality—Brian Hinman, a 1982 Clark School alumnus and successful high-tech entrepreneur—donated $2.5 million to establish the program.

The inaugural class of Hinman CEOs started last fall; of the 87 students participating,there was an almost even mix of engineering and business majors,along with a smaller number of students from the social sciences,life sciences and liberal arts. The 2001–02 class of Hinman CEOs has 108 students,including 34 engineering majors from the Clark School.

David Barbe, professor of electrical and computer engineering and executive director of the university's Engineering Research Center, jointly shares the Hinman CEOs directorship with Robert Baum, assistant professor and director of academic programs in entrepreneurship in the Smith School of Business. Barbe points out that Brian Hinman,in helping to establish the program, wanted it to attract students with entrepreneurial spirit.Hinman also wanted the program to create a sense of community and impact the way students thought about their careers and destinies, that in turn, would help them start businesses right out of school.

It seems that the Gemstone students who were struggling to find support for their Guardian project were just the type of enterprising spirits that Brian Hinman had in mind.

Karen Thornton,associate director and manager of the Hinman CEOs program, remembers being intrigued by the Gemstone team's project."The [Guardian] team was unique in that rather than writing a senior paper [a requirement for Gemstone],they wanted to create their own company," says Thornton.

The students who originally set out in their freshmen year in Gemstone would remain together, as a team, and enter the next phase of their educational experience as Hinman CEOs.

Building a sophisticated global tracking device, of course, requires resources. As Hinman CEOs, the team has received seed funding to purchase a GPS receiver, flash disk and an embedded computer board.Thornton further assisted the team by getting Motorola to donate a part that the students needed that would have cost them more than $1,200.But perhaps of greatest significance is that the Guardian team now has access to technology, facilities and mentoring that most young entrepreneurs can only dream of.

HIGH-TECH LIVING ... HIGH-TECH LEARNING

The majority of students in the Hinman CEOs program live and work together in one of the university's living-learning residence halls, Garrett Hall.In spring 2002, they will move to a new residence hall now under construction on South Campus.

Corporate sponsor Avaya is providing the Hinman CEOs—both in Garrett Hall as well as the new residence hall—with state-of-the-art amenities such as voice, data and video communications capability for each resident's personal computer; wireless access that allows the end-user to connect to the wired data network anytime, anywhere in the residence hall or on campus; and group video systems and viewstations that allow the students to conduct professional briefings and consultations with potential partners anywhere in the world from the residence hall's three conference rooms.

"It [the building currently under construction] is going to have a technological component that's probably superior to most small companies when they are just starting out," says David Barbe. "It will be well-equipped to support the types of meetings and facilities these budding entrepreneurs will need."

Each week,speakers educate the students on some aspect of company-building; for example, one speaker, an attorney, explained the principles of intellectual property and how to protect it. The students also receive two levels of mentoring. Karen Thornton and graduate students provide first-line advising;the program also is building a database of mentors both on and off campus.

Another key component of the Hinman CEOs program is a business plan competition, held for the first time in April and open to the full University of Maryland community as well as anyone who graduated from Maryland within the past five years.

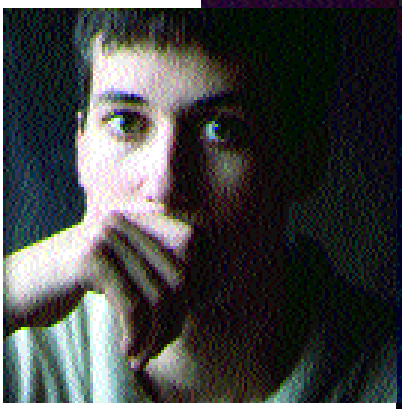
Realistically, it is not expected that the business competition's $50,000 first prize will go to undergraduate students vying against other entrepreneurs with more experience and education. Nonetheless, all of the Hinman CEOs are strongly encouraged to enter the competition. "We view it as a learning process," says David Barbe. "Winning the prize is not necessarily the goal. Our goal is for the students to learn. You learn more when you sweat a little bit."

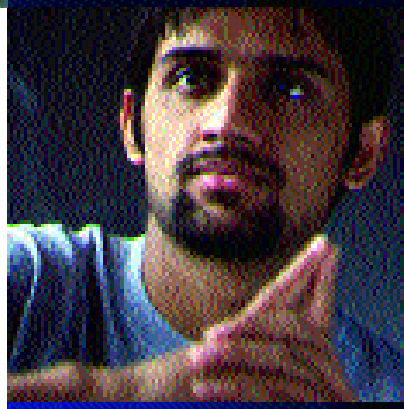
Which is exactly what Guardian team members were doing in early April at one of their thrice-weekly meetings in the Indoor Wireless Laboratory in A.V. Williams Hall. The students were under intense pressure to have a prototype of their product ready in time for the business plan competition. The lab sessions were also crucial for helping them put together a business plan to incorporate their technology.

Just what have these bright young entrepreneurs received from the Hinman CEOs program so far? "This has added a whole different perspective I never would have gotten in a classroom," says Adam Lutz.

And while their Gemstone team was already a cohesive unit before joining the Hinman CEOs program, other student entrepreneurs on the team see room for further collaboration. "The program is good for connections," says electrical engineering major Chinmay Hegde. "The opportunity is here to network with people who have skills you don't possess. You can hook up with them and get ideas floating. Even if you come in without an idea, you can pick one up."

Once those ideas start flying, Hinman CEOs can expect full support from the faculty and mentors who keep the program going. "In the university, you have all these dreams and maybe you never really unleash them until you graduate," says computer engineering major Tia Gao. "But the Hinman CEOs program lets you unleash your dreams right now, when you feel the most daring. There is nobody here who will say, 'That's a bad idea. Don't do it.'" ■





(Clockwise from above) Adam Lutz, electrical engineering and mathematics; Tia Gao, computer engineering; and Chinmay Hegde, electrical engineering.

IN JUNE OF 2001, THE 16 STUDENTS WHO ARE DEVELOPING THE GUARDIAN TRACKING DEVICE, ALONG WITH THEIR FACULTY MENTOR, OFFICIALLY BECAME TRX SYSTEMS INC. LOOK FOR UPDATES IN FUTURE ISSUES OF *ENGINEERING@MARYLAND*.

CALCE Research:

MAKING ELECTRONICS RELIABLE AND COST EFFECTIVE

IN 1985, WHEN THE U.S. ARMY ASKED the University of Maryland to update a handbook for predicting the failure rate of electronic components, it seemed at the time a fairly straightforward request.

The Military Handbook for Reliability Prediction of Electronic Equipment, better known as MIL–217, was viewed as the international standard for the electronics industry. The goal behind MIL–217 and its commercial equivalents was to ensure that components like transistors, diodes, resistors, capacitors and switches used in electronic systems could operate for long periods of time under demanding conditions.

Story by Tom Ventsias • Photographs by John T. Consoli

After reviewing the document,however, Maryland researchers concluded that MIL–217—and the testing procedures behind it—were basically flawed."The methods in place [in 1985] were statistically oriented," says Peter Sandborn,associate professor of mechanical engineering in the A. James Clark School of Engineering. "[The Army] would ship 100,000 circuit boards, and after a period of time, would see how many came back with problems." From that information,he says, the U.S. military built a model to determine how many circuit boards would fail.

The major shortcoming of MIL–217 was its inability to address the fundamental root-cause of *why* and *how* electronic components and assemblies would fail over time. Consequently, the models generated by MIL–217 were inaccurate, inapplicable as a predictive tool for new technologies and not well-suited for improving product design.

Researchers at Maryland offered an alternative.

With research and input from across academic disciplines, faculty in the Clark School started to push for a new process called "physics of failure analysis." Based on the fundamental physics of specific failure mechanisms for each individual component—that is, how it is built,how it operates and under what conditions it fails—new models could be created to predict aging,degradation and failure over time. Using this same physics of failure knowledge, Maryland researchers soon developed new software that could "virtually"qualify, via computer simulation, electronic components for field use.

These new ideas would form the basis for one of the largest research centers within the Clark School of Engineering.

The Computer-Aided Life-Cycle Engineering (CALCE) Electronic Products and Systems Center, established in 1986,is now an internationally recognized leader in reliability assessment of electronics based on physics of failure analysis. CALCE has grown into a consortium that has received almost $45 million in research support in the past 15 years,and the center currently employs more than 100 faculty, research staff and graduate students from almost every engineering discipline.

Much of the research at CALCE is driven by the 50-plus industrial partners who make up the CALCE Consortium. A virtual who's who of leading electronics, aviation,automotive, semiconductor, computer and telecommunication companies such as Nokia,Microsoft,DaimlerChrysler, etc.,the consortium promotes research in areas that have an across-the-board impact on industry.

Current research at CALCE focuses on applying physics of failure knowledge for complex tasks such as designing electronics for reliability;accelerated testing;life consumption monitoring; supply chain management and parts obsolescence modeling;

reliability of MicroElectricalMechanical Systems (MEMS) technology; the role of electromagnetic interference in the design of electronics;and developing new environmentally friendly materials such as lead-free solders.

Getting It Right the First Time

In today's fast-paced electronics industry, where getting a product to market on time is imperative, the use of physics of failure reliability modeling and virtual qualification significantly shortens the time interval between product development design iterations.

"A month late to market on a mobile phone can be a financial disaster," says Peter Sandborn.But that's exactly what can happen if a manufacturer builds a phone and things start to fail in the initial production phase. Or worse yet,Sandborn says,if a company ships "bad"phones with inherent design flaws,not only do expenses increase dramatically by having to cover warranty costs, but the potential loss of customers can be extremely damaging."There are big negative ramifications if these things go wrong," he says,"and a very positive outlook if engineers can get it right the first time."

Helping design engineers "get it right"in the early stages of product development is a large part of CALCE's mission. CALCE provides the tools and expertise to incorporate reliability in the design stage, rather than using repeated trial and error iterations with prototypes,or finding out there are significant design flaws when a product is already in its production phase.

For instance, physics of failure software developed at CALCE for analyzing circuit cards and components was used by General Motors to reduce the development time on a body control module by more than 10 percent and increase its first-pass success rate by more than 60 percent.

CALCE methodologies and software have saved more than $80 million in U.S. military programs; several million dollars on Westinghouse radar systems;and more than $1 million on a Honeywell engine control module. Numerous commercial suppliers are now working with CALCE to qualify new technologies; demonstrate the reliability of new hardware; and troubleshoot existing warranty returns and field failures.

"With the scope, volume and time-to-market factor in the electronics industry today, there are a lot of people who are very interested in the types of problems that we are working on here at CALCE," says Sandborn.

A Smart Approach to Testing

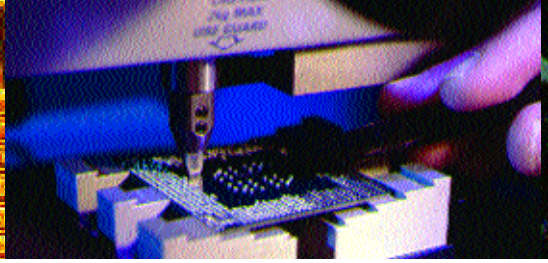
CALCE has earned much of its international recognition for its breadth of expertise in developing accelerated life-cycle testing methodologies for electronic parts and assemblies. Most integrated circuit boards or electronic assemblies are tested in the prototype stage to see if they will meet their expected life-cycle. For electronic components used by the military or the aerospace industry, almost all of them need strict certification by agencies such as the Federal Aviation Administration.

Using state-of-the-art laboratories, researchers at CALCE have developed accelerated test methods that can effectively put years' worth of wear and damage on an electronic component—under controlled conditions—in just a few days or weeks."It is a deceptively complex thing to do," says Abhijit Dasgupta, professor of mechanical engineering."First, you need to understand what are the *relevant* aging mechanisms.There's no point in designing an accelerated test that will stimulate failures that the product won't ever experience in the field—but it's still done [in industry] all the time."

After determining the relevant testing factors, researchers at CALCE will create conditions of high temperature, high humidity, vibration, shock and impact,electrical stresses and even high pressure or radiation if the electronics are to be used in avionics or spacecraft.

In CALCE's high altitude chamber, researchers have represented changes in air pressure from sea level to 60,000 feet in the same time frame it takes for an F-16 jet fighter to climb to that level."Companies who install a lot of electronic equipment on an aircraft—British Aerospace and Honeywell, for example—come to us to understand the effects of this type of environmental change on electronic failures," says Chris Wilkinson, a researcher at CALCE.

Accelerated testing can address storage issues as well. Basically, it can answer the question of what would happen if assemblies had to sit in a warehouse in the heart of an industrial district for five years.Far from being a hypothetical question, Sandborn says that researchers in the Clark School have conducted investigations very similar to this. CALCE has a mixed


flowing gas chamber that accelerates exposure to various gases, predicting the type of damage that accumulates with the absorption of pollutants and contaminants over a period of time.

Managing Parts for Industry ... and Maintaining a Standard of Excellence in Academics

Supply chain management is a hot topic nowadays,and CALCE is leading the way in research involving electronic parts selection,parts obsolescence and the life-cycle economics of electronic systems. Parts obsolescence is a major concern for low-volume, long-life electronic systems like those used in modern aircraft and automobiles. One of the largest cost factors in designing a new long-life field system is maintaining an uninterrupted supply of parts.

When Honeywell wanted to build a new engine controller for an aircraft with a 10-year production life, they came to CALCE to optimize their parts selection for reliability and cost. "Due to certification requirements, you can't change microprocessors on an airplane every 12 months like in the PC industry," says Peter Sandborn. With computer-generated models to predict obsolescence of electronic parts, CALCE can advise design engineers which part to place into their system, and also predict when that specific part is likely to need replacement due to failure or obsolescence. Furthermore, highly specialized modeling software developed by CALCE can optimize how, and when, a system affected by parts or technology obsolescence is redesigned and maintained.

While CALCE continually conducts research that benefits industry, it also has a strong academic component, primarily at the graduate level.Graduate programs in specialties such as electronic packaging are available at Maryland and very few other engineering schools. Also, students at CALCE benefit immensely from working in an ISO 9001 certified facility, a model developed by the International Standards Organization that holds organizations and institutions to the highest levels of quality assurance. CALCE was one of the first academic organizations in the world to receive ISO 9001 certification.

"CALCE was established to meet the needs of a growing electronics design and manufacturing industry," says Michael Pecht, the director of CALCE who was recently named the first George E. Dieter Professor of Mechanical Engineering. "We have grown significantly in 16 years, and can readily offer the latest resources and tools to help engineers assess,mitigate and manage risks in electronic products. Our goals are straightforward:to offer the highest quality research environment to our sponsors;to provide the world's best knowledge base for building reliable, competitive electronic systems; and to educate the next generation of leaders and engineering professionals who will carry CALCE methodology and research to a higher level." ■

CALCE Consortium

To remain at the forefront of technology and methodology advancement, says director Michael Pecht, CALCE will continue to establish broad connections throughout the entire value chain associated with the development and manufacture of electronic systems. Each year, members of the CALCE Consortium identify 30 to 40 research projects for researchers at CALCE to investigate. The results are shared with all of the consortium members, who can also access sophisticated software developed at CALCE.

American AirLiquide
Avici Systems Inc.
BAE SYSTEMS
B&G
Boeing
Celestica
CIENACorp
Corvis Corp.
Daewoo Electronics
DaimlerChrysler
Delphi Automotive Systems
EADS CCR
Ericsson Radio Systems
ERS
General Dynamics Information Systems
General Motors (NAO)
Honeywell
ILTAM
InterCon Systems Inc.
Israeli MoD
Laboratory for Physical Sciences (NSA)
LG Electronics
Lockheed-Martin
Lucent Technologies
Matra BAe
Microsoft
MTI
Naval Surface Warfare Center
NASA Goddard Space Flight Center
Nokia
Northrop Grumman
NSA
Philips
QualMark
Raytheon Systems Co.
Rockwell Collins
Sandia National Labs
Schlumberger Oil Drilling Services
Seagate Technology
Smiths Industries
Sonix
Sun Microsystems
Tatung
Teradyne Corp.
Thomson Consumer Electronics
TRW Aeronautical Systems
TRW Automotive
UK DERA
UK Ministry of Defence
U.S. AMSAA
Visteon Automotive Systems

For more information on CALCE, go to www.calce.umd.edu

Professional Recognition and Honors

continued from page 7

Foundation Senior Scientist Award. These awards are given based on the excellence and worldwide reputation of the candidate's research. In connection with this award, Professor Ramesh will be spending time at the Max Planck Institute for Microstructure Physics in Halle, Germany.

Gary Rubloff, professor of materials and nuclear engineering and director of the Institute for Systems Research, received the Gaede-Langmuir Award for 2000. This award recognizes outstanding discoveries and inventions in the sciences and technologies of interest to the American Vacuum Society.

Ichiro Takeuchi, assistant professor of materials and nuclear engineering, received the Ralph E. Powe Junior Faculty Award for 2000.

The following faculty members were recently chosen as fellows in various professional and academic organizations:

William Bentley, professor of chemical engineering, was elected Fellow of the American Institute for Medical and Biological Engineering.

Richard Calabrese, professor of chemical engineering, was elected Fellow of the American Institute of Chemical Engineers.

Kyu Yong Choi, professor of chemical engineering, has been elected to membership in the Korean Academy of Science and Technology. This is in addition to his election to the National Academy of Engineering of Korea last year.

Prakash Narayan, professor of electrical and computer engineering and Institute for Systems Research, was elected Fellow of the IEEE for his contributions to Shannon Theory and its application to the evaluation of the reliability of communication channels.

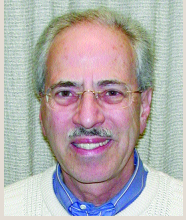
Jon Orloff, professor of electrical and computer engineering and Institute for Research in Electronics and Applied Physics, was elected Fellow of IEEE for his contributions in ion beam technology. He was also elected Fellow of American Academy for the Advancement of Science.

Patrick O'Shea, associate professor of electrical and computer engineering and Institute for Research in Electronics and Applied Physics, was elected Fellow of the American Physical Society for his pioneering experiments in the development of the physics, technology and applications of high-brightness ion and electron beams, and free-electron lasers.

Gregory Nusinovich, senior research scientist at the Institute for Research in Electronics and Applied Physics, was elected Fellow of the American Physical Society and Fellow of the IEEE for fundamental contributions to the theory of gyrotron oscillators and amplifiers and cyclotron autoresonance masers.

Fred Schmitz, professor of aerospace engineering, was elected Fellow of the American Institute of Aeronautics and Astronautics for his contributions in the field of rotorcraft acoustics.

Jan Sengers, professor emeritus of chemical engineering, was elected Honorary Fellow of the International Association for the Properties of Water and Steam (IAPWS). ■



STEVEN SPIVAK

Engineer's Career Far from Over

STEVEN SPIVAK may have retired from the university on March 1 at the age of 58, but it is a retirement in name only.

The former chair of the Department of Fire Protection Engineering (FPE) recently published a reference book on international standards. As part of his "retirement," Spivak intends to expand his role as a consultant on consumer fire safety and step up his activities in the many professional organizations he is involved with, including his work as director of the American National Standards Institute (ANSI).

"Today, there are many people who move into challenging new careers when they retire from one aspect of their professional life," says Spivak.

The second person to head FPE since its inception in 1956, Spivak says his seven-and-a-half-year tenure moved the department through an important transition period. "I followed Professor Emeritus John L. Bryan, who served [as chair of the department] for almost four decades."

The Clark School's Fire Protection Engineering program is the only program in North America that is accredited by the Accreditation Board of Engineering and Technology (ABET). Maryland's program also is unique in offering a bachelor's degree in FPE. The program currently boasts 90 undergraduates, 40 graduates and more than 800 alumni.

"We have an unbelievable network of alumni," says Spivak. "One of my challenges and accomplishments was to maintain the close relationships between faculty, students and alumni, a strong tradition built by Professor Bryan."

Spivak's new book, *Standardization Essentials: Principles and Practice*, was co-authored with F. Cecil Brenner, who died two years ago. Written as a primer, it defines common terms, clarifies descriptions, describes how standards can both restrain and stimulate global trade. It also focuses on consumer safety standards and reveals how national and international standards both compete and harmonize with each other. The book has been endorsed by the American Society for Testing and Materials (ASTM).

The ASTM also announced that Spivak will receive its prestigious William T. Cavanaugh Memorial Award. The award, granted annually to a person or persons of widely recognized eminence in the voluntary standards system, is the society's highest honor. ■

THIS ARTICLE IS REPRINTED IN PART FROM *OUTLOOK*, THE UNIVERSITY OF MARYLAND FACULTY AND STAFF WEEKLY NEWSPAPER.

alumni+students

Engineering Undergraduate Has the Right Stuff

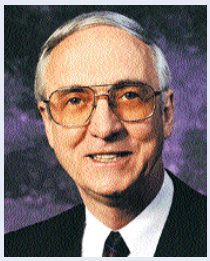
Clark School of Engineering undergraduate Sadie Michael is one of only 16 students chosen nationally to attend the NASA Academy at the Goddard Space Flight Center this summer.

An aerospace engineering major, Michael won a spot on the team through a highly competitive process that included writing three essays on NASA projects.She will work with other students and a principal investigator-mentor to develop lightweight UV mirrors for use on the Hubble Space Telescope. Specifically, her student team will look for characteristics in lighter and cheaper materials to be used on space mirrors applications.

"I want to meet as many people and learn as much as possible at NASA," says Michael, who adds that her eventual goal is to be an astronaut in NASA's space program.

At the University of Maryland, Michael is in the College Park Scholars program, where she is a member of the program's Science, Discovery and the Universe (SDU) initiative. Through the SDU program, which engages students in practical and philosophical aspects of scientific discovery, Michael landed an on-campus internship at the Composite Research Lab. She says her work at the Maryland lab gave her a solid foundation for the project she will undertake at NASA. ■

Notable Alumni



GORDON R. ENGLAND

Gordon R. England, EE '61, became the 72nd Secretary of the Navy in May following his confirmation by the U.S. Senate. Nominated to the position by President Bush, England brings more than 30 years of experience as a leader in the defense and technology industries to his new duties as leader of the Navy/Marine Corps Team.

Prior to his nomination, England served as executive vice president of General Dynamics since 1997.

England outlined four key areas that he would address as Secretary of the Navy. "My agenda is to substantially improve our combat capability, enrich the lives of our people, swiftly incorporate technology across our total operation, and dramatically improve our business practices," England said during his confirmation hearings before the Senate Armed Service Committee.

England began his business career as an engineer, working on the Gemini Space Program that paved the way for the manned flight to the moon in the 1960s. During his career, England also served as president of General Dynamics aircraft division in Fort Worth and as president of General Dynamics land systems division. ■

MING-TEH HSU

Ming-teh Hsu, Ph.D., NE '74, recently received the Abram Z. Gottwals Award from the University of Maryland Alumni Association. The annual award honors an alumnus who provides service and promotes the welfare of the university and the alumni association over a period of years.

Hsu serves as vice president of the University of Maryland's Taiwan Alumni Club, helping to promote a close association between the university and this important alumni club chapter.

He is president of Taiwan Secom Co., the largest business and home security company in Taiwan. Hsu was instrumental in computerizing the company's operational system and establishing a fiber-optical computer network that covers the entire island.

Previously, Hsu worked for more than a decade at nuclear energy companies in the United States, including six years as a senior engineer with the Bechtel Corp. Hsu's expertise was in the pipe-break thermal-hydraulic analysis of nuclear power plants, and he has published and presented numerous papers both in the *Nuclear Science Journal* and at American Nuclear Society meetings. ■

Alumni Notes

Abdulmalik A.Alghamdi, Ph.D., ME '95, was a visiting assistant professor at the University of Maryland last summer. Since 1996, he has been an advisor for graduate students in mechanical engineering at King Abdulaziz University in Jeddah,Saudi Arabia,where he also is active in conferences and research projects.

Robert A. Cerbone , ME '95, has joined the Telecommunications Development Fund as an associate. The Telecommunications Development Fund is an early-stage venture capital firm that invests in companies developing cutting-edge technologies in wireline and wireless voice and data communications and casting environments.

James E. Crawley, CE '67, was promoted to senior vice-president of Turner Collie & Braden Inc. He is a former vice president of Daniel,Mann, Johnson & Mendenhall.Crawley has more than 33 years of experience in planning, design,construction and program management of major infrastructure and mass transit systems.He is a member of the American Society of Civil Engineers and the American Public Transportation Association.

Kristina L. Dodson, ChE, '97, is pursuing a master's degree at Johns Hopkins University in Rockville, Md. She is a validation engineer at Celera Genomics in Rockville.

Stanley M. Finger , Ph.D., ChE '75, was elected chairman of the board of the American Autoimmune Related Diseases Association (AARDA), a national nonprofit voluntary health agency. He is a registered Environmental Manager and is listed in *Who's Who in Engineering*. Finger is president of Environmental Consulting and Investigations in Reston, Va.,and senior consultant to Geo-Centers Inc. In addition,Finger is a member of the

continued on page 20

NASA astronaut Paul Richards (left) M.S., ME '91, talks with university president C. D. Mote, Jr. (center) and Raymond LaPlaca (right), chair of the University of Maryland College Park Foundation. Richards was on hand for Maryland Day 2001, which drew more than 60,000 visitors to the university this past April.

Two Alumni Elected to the National Academy of Engineering

Two Clark School of Engineering alumni were recently elected to the National Academy of Engineering, an independent, nonprofit institution that provides engineering leadership in service to the nation.

Alumni **Seth Bonder** ME '60, and **Lloyd M. Robeson** Ph.D., ChE '67, join more than 2,200 other senior engineering professionals who come from business, academia and government to contribute their skills and expertise for projects focused on the relationships between engineering, technology and the quality of life.

Bonder is chairman, chief executive officer and founder of Vector Research Inc., of Ann Arbor, Mich. The company develops information systems and decision models for government agencies, including the Department of Defense and the Department of the Treasury. Bonder was elected to the academy for his technical and organizational leadership in military and civilian operations research.

Robeson is a principal research associate at Air Products and Chemicals Inc., in Allentown, Pa. Before joining Air Products in 1986, he spent almost 20 years at Union Carbide. Robeson was elected to the academy for his significant scientific and technological contributions in polymer blends and engineering polymers. ■

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Johns Hopkins University part-time environmental engineering faculty. He is also vice chair and treasurer of AARDA's Mid-Atlantic Affiliate, which offers information to autoimmune disease patients and health professionals.

Leo J. Jennings, ME '86, joined Pepper Hamilton L.L.P. as of counsel resident in the Washington, D.C., office. Jennings is a patent attorney, and will be working with one of Pepper's large technology clients giving opinions on their patents, protecting their inventions and pursuing infringers. Jennings previously was of counsel at Venable, Baetjer, Howard & Civiletti L.L.P. in Washington, D.C.

Robert A. Pattishall, AE '69, received the 2000 American Institute of Aeronautics and Astronautics von Braun Award for Excellence in Space Program Management. Pattishall received the award for revolutionizing the National Reconnaissance Office's (NRO) Advanced Technology Enterprise, expanding collaboration, enhancing customer focus and demonstrating new capabilities to exploit intelligence collection from space. Pattishall was the director of the advances systems and technology and the directorate of the NRO until his retirement from the CIA and NRO in February 2000.

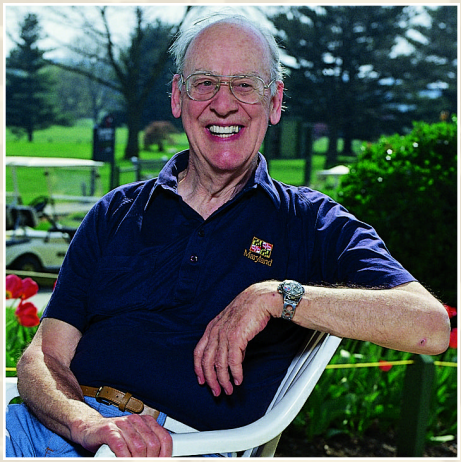
Paul Pendorf, M.S., AE '68, started a new buyout company, AMT II Corporation, for the aerospace/defense and composites industry. AMT I was sold to Cytec Industries in a tax-free stock deal in 1998. ■

NEWS FOR ALUMNI NOTES

We want to hear from you! Now you can go online at **www.eng.umd.edu** *and let us know what you're doing—promotions, awards and address updates. Better yet, include your e-mail address and we'll keep you informed about the latest research, awards and successes of the Clark School of Engineering.*

ENGINEERING THE FUTURE

Forward Thinking



JAMES E. CROCKETT '49

IN 1939, with the threat of war looming large on the horizon, the future of the country—and indeed the world—seemed very uncertain. David and Josephine Crockett, however, looked forward into their future and realized one thing that *was* certain: their three sons would have a quality college education.

With that in mind, David Crockett moved his family from Hagerstown,Md., to College Park, so that Joseph,David Jr. and James could all attend the University of Maryland. The brothers studied together at Maryland during the early 1940s, but like many of their generation,each had to delay completing their college education to serve during the war.

James Crockett completed two years of pre-law before leaving Maryland for a four-year military commitment. When he returned to the university, he made the choice to change his major to civil engineering.

Now age 79,Crockett remembers the era well:"Jimmy Clark (for whom the engineering school is named) and I were in some of the same classes,and back then, there were less than 20 civil engineering students in our entire class, most just back from the war."

Upon graduation in 1949, Crockett set out into what would become a very successful career. "President Eisenhower was very big on his new highway program, so it was a good time to be a civil engineer," he says. By 1961, Crockett had founded, and would serve as its president until retirement,Crockett Associates, P.A.The company provided expert consultation on surveying and land subdivision issues, water supply treatment, and wastewater collection and treatment projects.

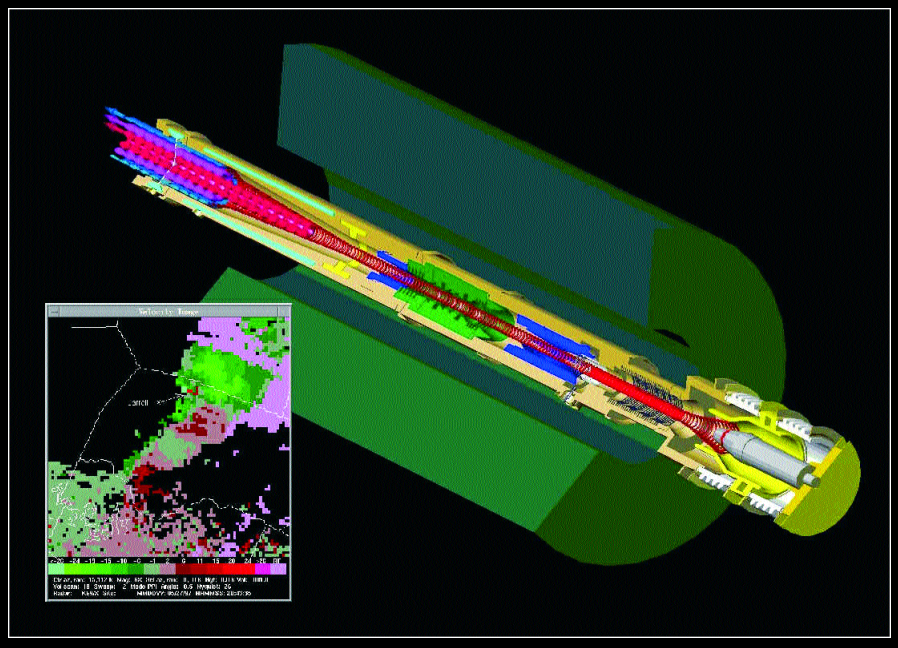
Near the end of his career, James Crockett—a forward thinker like his father—carefully planned the establishment of an endowment to be funded upon his death using assets accumulated through his IRA. This type of charitable gift is an efficient tool to minimize the taxes due on retirement plan assets.Crockett realized that by directing his income this way, he could use the full value of his earnings to honor his parents.

Crockett's generous gift will establish the David T. Crockett and Josephine R. Crockett Endowed Scholarship in Civil Engineering. "I hope the scholarship helps worthy civil engineering students get through,the same way my parents made sure I got through"says Crockett.He has also made financial arrangements to establish the James E. Crockett Environmental Engineering Lab.

"I had a wonderful experience at the University of Maryland," says Crockett."Without the school, and my parents' foresight, I wouldn't have had the success I've achieved. I hope this scholarship keeps the memory of my parents alive."

TO LEARN MORE ABOUT USING IRAs FOR CHARITABLE CONTRIBUTIONS, OR FOR CONFIDENTIAL INQUIRIES ABOUT OTHER PLANNED GIVING ARRANGEMENTS, PLEASE CALL OR WRITE:

Bob Harrison, Gift Planner, University of Maryland, College Park, Maryland 20742 ■ 301.405.0320 ■ **rharris1@accmail.umd.edu**



Research by the Charged Particle Beam Group in the Institute for Research in Electronics and Applied Physics (formerly the Institute for Plasma Research) has established Maryland as one of the top research universities in the areas of high power microwaves, fast-wave vacuum electronics (including gyrotrons), intense relativistic particle beams and advanced accelerator concepts. Pictured is a cross-section of a millimeter wave electron tube that helps researchers improve high-resolution Doppler radar systems.

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1137 Glenn L.Martin Hall
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