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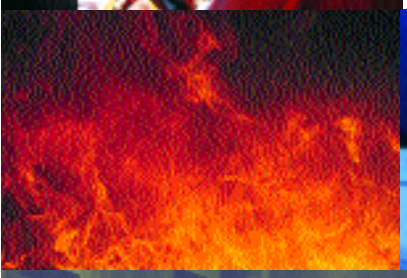
E@M

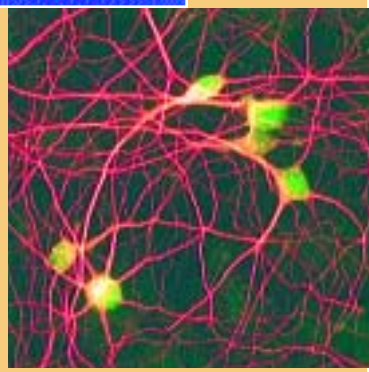
ENGINEERING @ MARYLAND



New Knowledge to Safeguard National Security

INSIDE

A. JAMES CLARK SCHOOL OF ENGINEERING ▪ University of Maryland



STORIES

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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:

WE ARE LIVING THROUGH UNUSUAL TIMES. We have weathered a tremendous storm this past year. The horrifying events of September 11 damaged our country's sense of well-being and many of us still struggle to understand the implications for the future. Our industry, and in fact, many of our faculty were called upon that day, and the days and months that followed, to provide the resources and expertise that our government and industries needed to rebuild and create a better and more secure future. For some of us, it was an extension of current research; for others, it was a call to look at new challenges and their solutions. In this issue of *Engineering@Maryland,* we'll inform you about the role Clark School faculty play in America's new focus on national security and counter-terrorism, new research initiatives that are being undertaken, as well as research that was well under way before September 11, which becomes even more critical now.

You'll read about our new strategic plan that charts the path for the Clark School over the next five years. This strategic plan builds on the successes of the past, reflects significant changes that have occurred within the university, reaffirms our commitment to excellence, and sets forth the action steps that are important for our progress as one of the nation's premier colleges of engineering.

You will also read about: the extraordinary success of the Clark School in attracting a diverse and talented group of new faculty; a significant gift from Robert Fischell for the establishment of an innovative fellowship program in biomedical instrumentation; the success of our faculty in obtaining a large number of highly competitive major block grants that propels our research into some very exciting new fields; the remarkable success of our students in team-based competitions; and the establishment of a new program funded by the National Science Foundation to support research opportunities for female undergraduates.

There is a tremendous amount of energy and excitement in the Clark School. With hope for a renewed economy and the promise of a more secure and peaceful future, we are preparing our students to play a role in global economic development and to succeed in unlimited opportunities in industry, government and the engineering profession. At the same time, we continue to expand and strengthen our research programs and intensify our activities in technology transfer and regional economic development.

I hope that *E@M* keeps you informed and connected to the university and the Clark School. In fact, there are two ways for you to stay connected. First, you can keep us up-to-date by going online at **www.eng.umd.edu/alumni**, and completing the alumni update form when you are promoted, receive an award, or you need to update your address. Second, you can join the Terp Alumni Network, a new online community that is free and open to all College Park alumni. This virtual alumni community featuring permanent e-mail and an online directory will keep you abreast of the university as we zoom into the future.

The Clark School of Engineering invites you to come along.

Nariman Farvardin, *Dean*

newsOFNOTE

Hinman Exhibit Unveiled

Brian L.Hinman was honored at a special ceremony held last October to recognize Hinman's addition to the Clark School's Innovation Hall of Fame gallery. The Hall of Fame, located in Glenn L.Martin Hall, recognizes Clark School alumni, faculty and friends who have made significant contributions to society through engineering innovation. Hinman,a 1982 Maryland graduate with a degree in electrical engineering, was chosen for induction to the Hall of Fame in 2000.He began his distinctive record of successive technical innovations at age 22,when he co-founded PictureTel Corp.,which developed the world's first real-time implementation of motion compensation and transform coding of video images.Seven years later, he co-founded Polycom Inc.,and led the development for the first practical, full-duplex speakerphone, which is the standard for conference rooms around the world. In 1998, Hinman co-founded 2Wire Inc.,which specializes in home networking products for distributing broadband content throughout the home. Two years ago, Hinman made a generous donation to his alma mater that launched the successful Hinman Campus Entrepreneurship Opportunities (CEOs) Program,the nation's first living-learning entrepreneurship program based in a high-technology environment. ■

(Below) Brian Hinman '82 with Dean Nariman Farvardin

Young Engineer Earns Coveted PECASE Award

GUPTA

SATYANDRA K. GUPTA, assistant professor of mechanical engineering, was recently selected to receive a Presidential Early Career Award for Scientists and Engineers, or PECASE.

The PECASE program recognizes outstanding scientists and engineers who, early in their careers, show exceptional potential for leadership at the frontiers of knowledge. Twenty researchers funded by the National Science Foundation are selected for the award each year. Gupta and other PECASE recipients will be honored in a ceremony later this spring.

In receiving the PECASE award, Gupta was recognized for his work in the innovative use of information technology for improving the decision making process in manufacturing. Specifically, Gupta has developed spatial reasoning algorithms for the automated design of molds used for manufacturing geometrically complex heterogeneous objects. This research can be applied in the areas of mechanical assembly, micro-electromechanical systems, mold manufacturing, sheet metal bending and solid freeform fabrication.

Gupta received a Ph.D. in mechanical engineering from the Clark School in 1994, the year he also received the Best Paper Award at the American Society for Mechanical Engineer's Computers in Engineering Conference. He returned to the engineering school in 1998 as an assistant professor in mechanical engineering with a dual appointment in the Institute for Systems Research.

In addition to the PECASE award, Gupta has been recognized for his exemplary research with the 2001 National Science Foundation Faculty Early Career Development (CAREER) Award, the 2000 Office of Naval Research Young Investigator Award, and the 2001 Society of Manufacturing Engineer's Robert W. Galvin Outstanding Young Manufacturing Engineer Award. ■


BAR-COHEN


DI MARZO


MARCUS

New Chairs Bring Extensive Experience to Three Departments

The Clark School of Engineering recently named three new department chairs, each of whom brings a wide breadth of research, teaching and leadership skills to their new positions.

Avram Bar-Cohen, who will lead the Department of Mechanical Engineering, comes to Maryland from the University of Minnesota,where he was professor of mechanical engineering,professor of technology management and director of the Center for the Development of Technological Leadership. He also held the H.W. Sweat Chair in Technological Leadership. Bar-Cohen's primary research interests are in thermal design and optimization of electronic packaging configurations and manufacturing processes; thermofluid modeling of boiling;and two-phase flow and technology forecasting and management.Bar-Cohen received his doctorate in mechanical engineering from the Massachusetts Institute of Technology.

Marino di Marzo, who now leads the Department of Fire Protection Engineering,has served as a professor of mechanical engineering at the University of Maryland since 1981.His areas of expertise involve fire and heat transfer, fire and nuclear safety, as well as related analyses in fire safety engineering. His research interests include transport phenomena in change of phase;extinguishing and fire retardant agents for large fire applications;and thermal hydraulics for nuclear reactor safety. He has extensive experience working with the Building and Fire Research Laboratory and the National Institute of Standards and Technology, as well as the U.S. Nuclear Regulatory Commission. He earned his doctorate in mechanical engineering at The Catholic University of America.

Steven Marcus, who chairs the Department of Electrical and Computer Engineering,is a professor of electrical engineering with a joint appointment in the Institute for Systems Research. Marcus served as acting department chair for one year before his appointment. His research interests are in the areas of control and systems engineering;analysis and control of stochastic systems; Markov decision processes; stochastic and adaptive control;and discrete event systems, with applications in manufacturing,acoustics and communication networks. Marcus joined the Clark School in 1991,and served as director of the Institute for Systems Research until 1996.In 2001, he received the University of Maryland's Distinguished Scholar-Teacher Award. Marcus received his doctorate in electrical engineering from the Massachusetts Institute of Technology. ■

$1M Program Boosts Women in Engineering

A new program to help women pursue majors and careers in the often male-dominated science, math, engineering and technology fields was recently announced in the Clark School of Engineering. The Research Internships in Science and Engineering program, or RISE, is a two-level, team-based educational intervention program that seeks to boost the number of women entering and making careers in these high-tech fields.

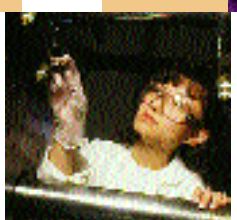
Linda Schmidt, associate professor of mechanical engineering, working with Janet Schmidt, director of student research at the Clark School, was instrumental in developing the RISE program.

The program is supported by a $900,000 grant from the National Science Foundation, with an additional $100,000 in funding provided by the Clark School. "We think this strong financial support is a real comment on the significance of this program," says Paige Smith, who as director of the Clark School's Women in Engineering Program will administer the program.

Prospective women engineers and scientists involved with RISE can attend an on-campus orientation during the summer before their freshmen year in college. The two-week course addresses challenges to barriers that many women face. These include the "chilly climate" that women often find in high-tech environments, the shortage of women role models and mentors, and lack of numbers, or "critical mass," among female students and faculty in high-tech fields.

During the latter half of a student's college experience, when career options and graduate education are being considered, RISE will invite selected women students to participate in an intensive summer research internship where they will work on all-female teams. The program will offer mentoring support from a female faculty member and RISE-affiliated graduate students, team training and exposure to cutting-edge research.

Central to the entire program, Smith says, is that all of the participants, from undergraduate students to graduate assistants and faculty members, are paid for their efforts and extensively trained in mentoring and teamwork. The first RISE student class will arrive on campus in summer 2002. ■



Charting a Plan for Excellence

Internal and external factors occurring during the past decade have altered the breadth and direction of the engineering program at the University of Maryland. The internal changes include a decidedly upward swing in the quality and diversity of engineering students now attending Maryland; the external factors have involved new areas of engineering research that 10 years ago were nonexistent.

A fairly large group of engineering constituents recently developed a comprehensive strategic plan to effectively meet these new challenges and take advantage of the momentum within the A. James Clark School of Engineering and the Glenn L. Martin Institute of Technology.

The plan, *Toward Higher Levels of Excellence: A Five-Year Strategic Plan for Engineering*, focuses on a series of initiatives essential for the continued advancement of Maryland's engineering program, says Nariman Farvardin, dean of the Clark School. "This plan determines how we are going to channel our energy and our resources to achieve a higher level of excellence as one of the nation's top engineering schools," he says. "There are specific areas within the school where we have become recognized leaders … so we need to build on these, as well as develop new programs that compliment these areas."

The Clark School is considered a national leader in systems engineering, telecommunication networks and rotorcraft technologies, Farvardin says, and is recognized for excellence in the broad area of microelectronics and semi-conductor materials.

While all of this is good news, there is still a strong push to continually advance Maryland further into the top tier of engineering schools nationwide.

Farvardin cites four engineering programs that Maryland benchmarks their performance against: UC–Berkeley, the University of Michigan, UCLA and the University of Illinois at Urbana–Champaign. "These schools all have excellent engineering programs," he says. "And these are the schools that we identify in the plan as our peer institutions."

Development of the new strategic plan began in the fall of 2000, when a core group of Clark School faculty and administrators met for a two-day brainstorming session. After a series of meetings with department chairs and directors, whom Farvardin identifies as "the individuals who provide leadership to the Clark School," a draft of the plan was written. This initial draft was then presented to all the engineering faculty, staff members, student representatives, the Engineering Board of Visitors and various alumni. The results of their input were extremely beneficial, Farvardin says, "partly because we received a lot of constructive input, which resulted in an improved plan. But equally important, was that one of the primary objectives of this process was to make the strategic plan a summary of the shared values from our Clark School community."

A core group of the Engineering Board of Visitors, led by board chair James Redifer '58, '71, was deeply involved in developing the new strategic plan. This core group included George Creel, a retired senior vice president with Baltimore Gas & Electric Co.; Robert E. Fischell '53, '96, a world renowned physicist and inventor of medical devices (see story, page 16); Malcolm O'Neill, chief technical officer with Lockheed Martin; and Buno Pati '86, '88, a successful entrepreneur from Silicon Valley who currently leads Numerical Technologies Inc.

"I think this group really represented a very broad, but focused, spectrum of interests and direction for the betterment of the engineering program at Maryland," says Redifer, a retired vice president of engineering and manufacturing for aerospace engineering with Westinghouse (now Northrop Grumman).

The Board of Visitors felt it very important that there be a strong element of customer focus incorporated into the strategic plan. "First we saw the students and their parents [as customers]," Redifer says, "then the state of Maryland … as well as the business community of the state, which is both a receiver of our graduates, and also a cooperative partner in the research activities of the university."

Redifer says that the board clearly determined that "students come first. By placing student education first on the list of objectives, we were stating unequivocally that the students [in the engineering program] were our highest priority."

The plan also calls for developing cross-disciplinary groups in highly specialized areas of research. The Clark School is already moving forward with research in small smart systems, information technology, intelligent transportation systems, nanotechnology and bioengineering. "We decided that instead of trying to do a little bit of everything in research," Redifer says, "that we would choose a few focused areas of research that would match up well with the needs of the area's economic and research community … and then do them very well."

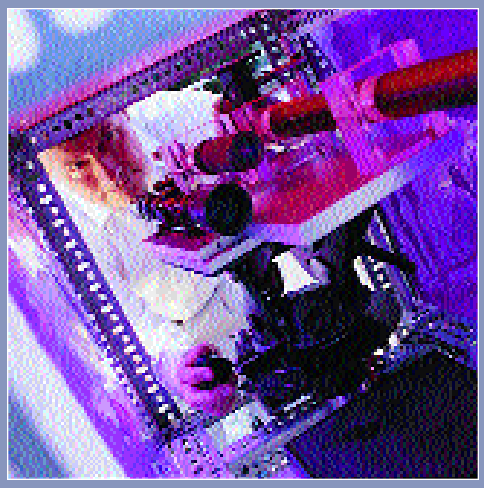
Also high on the list of new priorities, says Dennis McClellan, assistant dean for external relations in the Clark School, is a need to "clearly communicate our successes with our alumni and corporate partners." This effort is already under way with a revamped Web site, new alumni publications for each department and a broad distribution list for *Engineering@Maryland*, the school's news magazine.

There also is a much stronger effort to reach out to Maryland engineering alumni. "Our alumni are very important to us," McClellan says. "Their accomplishments as successful engineering alumni from Maryland … are really a measure of the quality of the engineering program. And the Clark School of Engineering appreciates their [alumni] involvement." —*Tom Ventsias*

To download a complete version of the strategic plan, go to www.eng.umd.edu

Initiative 1

Continue to strengthen our educational programs with the goal of providing an outstanding education to our students and attracting the finest students to our programs.



Initiative 2

Build a culture of excellence in research and scholarship while expanding the impact of the research program by emphasizing specialty topics of large potential.

Initiative 3

Establish and maintain a modern infrastructure conducive to achieving the high quality research and educational aspirations of the college.

Initiative 4

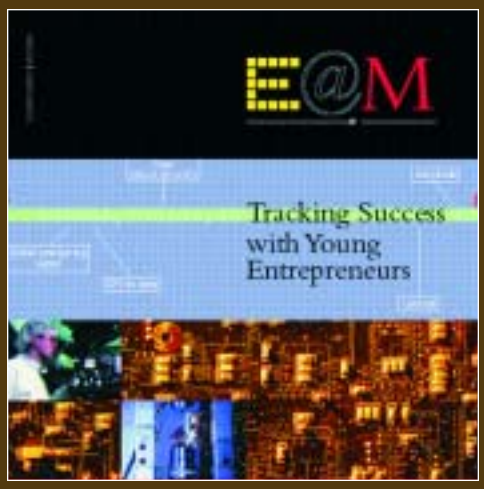
Ensure a college environment that promotes diversity and fosters a spirit of collegiality among the faculty, staff and students.

Initiative 5

Establish a strong external relations program to significantly increase philanthropic support to fulfill the college's educational and research goals.

Initiative 6

Expand the college's outreach and and service programs in continuing and extended education, industrial partnerships, entrepreneurships, technology transfer and economic development.



facultyNEWS

Principal investigators (from left) Rama Chellappa, John Baras and Reza Ghodssi lead teams of Maryland researchers working with the Collaborative Technology Alliances program, which integrates private industry, military and academic research to help solve technological barriers faced by the U.S. military.

Faculty Earn Slots on All Five Collaborative Technology Alliance Teams

Fifteen researchers from the university—all but one affiliated with the Clark School—were recently named to five multidisciplinary research groups working within the Army Research Laboratory's Collaborative Technology Alliances program.The program is designed to put the best and brightest to work solving technological barriers faced by the U.S. military and employs a variety of funding mechanisms that support and leverage programs in academia and private industry.

The five competitive awards were announced last fall, with projects ranging in value from $49 million to $76 million."These significant awards allow us to advance in five new areas of research at Maryland," says Clark School Dean Nariman Farvardin.

The 15 Maryland researchers will collaborate with faculty from other major universities across the country, including MIT, Georgia Tech, University of Illinois, Johns Hopkins,Rensselaer Polytechnic Institute and Penn State. Each team is led by scientists associated with major industry leaders like Northrop Grumman, General Dynamics, BAE Systems,Honeywell and Motorola.

Dean Farvardin says he is especially proud that Maryland was the only academic institution in the nation to have its faculty named to all five research teams."This is a confirmation that Maryland's engineering program has reached a point where it can compete with the very best,and win," he says. ■

The five research areas (with University of Maryland faculty listed) are:

Advance Decision Architectures Alliance

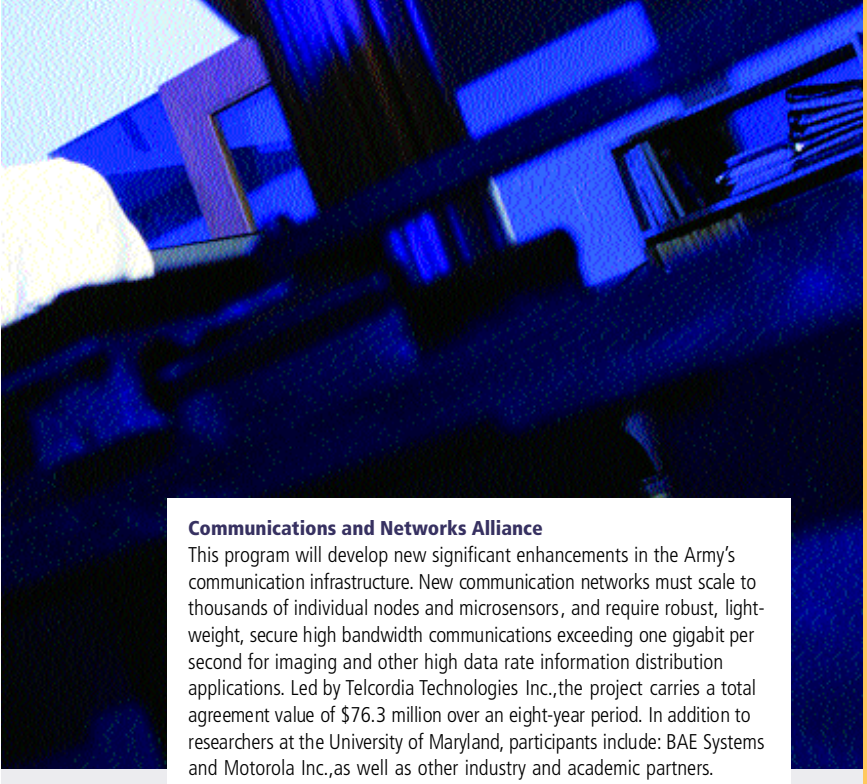
This research initiative provides Army warfighters with proof-of-principle solutions to conducting military operations on the 21st century digitized battlefield. Key to developing these integrated tools is a well-defined software architecture based on open commercial standards and compliant with the evolving Defense Information Infrastructure and Common Operating Environment.Analytical tools and a distributed collaboration architecture will be developed that can filter information essential to automated analysis and intuitive presentation.Led by Micro Analysis & Design Inc.,the project carries a total agreement value of $56.3 million over an eight-year period. In addition to the University of Maryland,other participants include:Klein Associates Inc.,SA Technologies Inc.and ArtisTech Inc.

University of Maryland faculty are **Rama Chellappa**, electrical and computer engineering,and computer science (Maryland Principal Investigator);and **V.S. Subrahmanian**, computer science and Institute for Systems Research.

Advance Sensors Alliance

Research within this team focuses on developing affordable sensors that provide the Department of Defense with continuous situation awareness, rapid precise discrimination and targeting of all threats in all environments. Research activities include electro-optic smart sensors, advanced radio frequency concepts and microsensors. Led by BAE Systems, the project carries a total agreement value of $61.2 million over an eight-year period. In addition to the University of Maryland, other participants include: Northrop Grumman Corp.,Quantum Magnetics and General Dynamics Robotics Systems.

Faculty from Maryland include **Rama Chellappa** (Maryland PI); **Shuvra Bhattcharyya**, electrical and computer engineering; **Mario Dagenais**, electrical and computer engineering; **K.J. Ray Liu**, electrical and computer engineering; and **Shihab Shamma**, electrical and computer engineering.Professors Liu and Shamma also hold appointments in the Clark School's Institute for Systems Research.



Communications and Networks Alliance

This program will develop new significant enhancements in the Army's communication infrastructure. New communication networks must scale to thousands of individual nodes and microsensors, and require robust, lightweight, secure high bandwidth communications exceeding one gigabit per second for imaging and other high data rate information distribution applications. Led by Telcordia Technologies Inc.,the project carries a total agreement value of $76.3 million over an eight-year period. In addition to researchers at the University of Maryland, participants include: BAE Systems and Motorola Inc.,as well as other industry and academic partners.

Faculty from Maryland include **John Baras** (Maryland Principal Investigator), electrical and computer engineering; **Anthony Ephremides**, electrical and computer engineering; **K.J. Ray Liu**, electrical and computer engineering; **Haralabos Papadopoulos**, electrical and computer engineering; **Armand Makowski** electrical and computer engineering; **Virgil Gligor** electrical and computer engineering; **Carlos Berenstein**, math; and **Nicholas Roussopoulos**, computer science. Each of these Maryland faculty members also holds either a dual or joint appointment in the Clark School's Institute for Systems Research.

Power and Energy Alliance

This project addresses overall reductions in battlefield usage of fossil fuels and compact power battery requirements, which in turn enables substantial reductions in the deployment and logistic support footprint for the Army of the future. Research includes novel compact power sources that are not electrochemical in nature, soldier portable fuel cell systems, logistics fuel reformation and power conditioning and efficient energy conversion for platform mobility. Led by Honeywell International Inc.,the project carries a total agreement value of $49 million over an eight-year period.In addition to the University of Maryland,other participants include Motorola Inc.; SAIC;Honeywell Engines & Systems, Environmental Control Systems; United Defense;as well as other industry and academic partners.

Participants from the University of Maryland include **Reza Ghodssi** (Maryland PI),electrical and computer engineering and Institute for Systems Research.

Robotics Alliance

This alliance will enhance critical robotics technology that is essential for unmanned ground elements of the U.S. military. Areas of research include advanced perception for autonomous mobility; intelligent control architectures and tactical behavior; and modeling, simulation and experimentation.

Led by General Dynamics Robotics Systems Inc.,the project carries a total agreement value of $66 million over an eight-year period. In addition to the University of Maryland, other participants include BAE Systems; Signal Systems Corp.;SRI International; as well as other industry and academic partners.

University of Maryland faculty are **Larry Davis** (Maryland PI), computer science and University of Maryland Institute for Advanced Computer Studies;and **Rama Chellappa**.

Associate Dean Retires after 35 Years of Service to Students

REGAN

THOMAS REGAN has committed his entire academic career to teaching. "There are certain kinds of professors who live for research … but Tom lives to teach," says Janet Schmidt, director of student research in the Clark School of Engineering.

Regan, who came to Maryland in 1966 after earning his Ph.D. degree from Tulane University, retired last fall as professor of chemical engineering and associate dean for undergraduate affairs of the Clark School. During his tenure, he is credited with significantly increasing the number of women and underrepresented minority students in engineering at Maryland.

Although he retired from the Clark School, Regan will continue to impact the lives of students through his work with the Engineering Coalition of Schools for Excellence in Education and Leadership, or ECSEL. Regan has served as ECSEL's executive director for the last four years.

The coalition consists of Maryland, Howard University, Morgan State, Penn State, CCNY, MIT and the University of Washington, and is sponsored by the National Science Foundation.

The most visible accomplishment of ECSEL at Maryland was the establishment of a new course, "Introduction to Engineering Design," or ENES 100. This required course for all engineering freshmen introduces students to the process skills associated with engineering design. Working in teams, students define their design requirements, and then manufacture, assemble and quantitatively test products. "This has had a major effect on how we approach educating students, particularly freshmen. Tom deserves the credit for this success," says Tom McAvoy, former chair of the Clark School's chemical engineering department.

"Improving engineering education was an idea whose time had come. And Tom Regan was the right person to move that idea forward," says Carol Colbeck, an associate professor with the Center for the Study of Higher Education at Penn State who just finished a 10-year evaluation of ECSEL.

Regan has received countless national and campuswide awards for his teaching skills. When asked about this, he mentions the educators in his own life, from Sister Mathew in the sixth grade to his academic advisor at Tulane University, who showed him how to be a good teacher. "If I use what I learned from them," he says, "then maybe, I can help one of my own students look inside and find and fulfill their own potential." —*Lisa Gregory*

New Directors Named


BAZ

Amr Baz , professor of mechanical engineering, was recently named director of the Center for Small Smart Systems. The center's mission is to develop very small, highly integrated systems for next-generation applications using innovative approaches to material,information and energy utilization.Baz has an exemplary record of accomplishments in the broad area of smart structures and is a Fellow of the American Society of Mechanical Engineers,as well as associate editor of both the *Journal of Vibration and Control* and the *Journal of American Institute of Aeronautics and Astronautics.*


SMITH

Paige Smith recently joined the Clark School as director of the Women in Engineering Program. As director, Smith will lead a comprehensive program for recruiting and retaining women to the field of engineering.One objective in the Clark School's new strategic plan is to increase undergraduate women enrollment to 25 percent,thereby exceeding the current national average.The key to achieving this strategic goal, Smith says,is by creating a supportive environment within the engineering program,and presenting young women with opportunities to learn more about the engineering field. Smith currently is a doctoral candidate in industrial and systems engineering at Virginia Tech, where she earned a master of science degree in industrial and systems engineering and a bachelor of science degree in engineering science and mechanics.

Katepalli Sreeni vasan has joined the university as director of the Institute for Physical Science and Technology, or IPST. Sreenivasan is one of the world's premier researchers in fluid dynamics


SREENIVASAN

and turbulence, and as director of IPST, will facilitate interdisciplinary research in chaotic dynamics,chemical physics, optical physics, space and upper atmospheric physics,scientific computation and statistical physics.In addition to his being named director, Sreenivasan has received appointments as a Distinguished University Professor and as the Glenn L.Martin Professor of Engineering.He also is a professor in the Departments of Physics and Mechanical Engineering.

Sreenivasan comes to Maryland from Yale University, where he was the Harold W. Cheel Professor and chair of the Department of Mechanical Engineering, with joint appointments in physics,applied physics and mathematics. He has a long list of prestigious awards and prizes that include membership in the National Academy of Engineering, a Humboldt Fellowship, Guggenheim Fellow, the Otto Laporte Award in Fluid Dynamics from the American Physical Society, and election as a Fellow in the American Physical Society and the American Society of Mechanical Engineers.Sreenivasan received his doctorate in aerospace engineering from the Indian Institute of Science.


WALLACE

James Wallace , professor of mechanical engineering, was named director of the university's Gemstone program. Gemstone is an interdisciplinary program that integrates technological and social issues into research projects spanning all four undergraduate years.Before assuming his new role with Gemstone, Wallace was director of the university's College Park Scholars program. His research interests include turbulent fluid flow, and the impact of science and technology on society. He received his undergraduate and master's degrees in engineering from Georgia Tech, and a doctorate of philosophy degree from Oxford University.

Other faculty news:


PERTMER

Gary Pertmer , associate professor of nuclear engineering, was recently named associate dean for education in the Clark School.As associate dean,he is responsible for the overall undergraduate educational mission of the school of engineering,and oversees the Engineering Student Affairs Office, the Center for Minorities in Science and Engineering, the Women in Engineering Program,the Engineering Co-op and Career Services Office and Special Programs.A faculty member at Maryland since 1978, Pertmer's research interests include the scientific areas of fluid flow and heat transfer as applied to nuclear safety. He received his doctorate in nuclear engineering from the University of Missouri-Columbia.


RUBLOFF

Gary Rubloff has completed his five-year tenure as director of the Institute for Systems Research, or ISR. He will return to full-time academic life as a professor with a joint appointment in ISR and the Department of Materials and Nuclear Engineering. His research interests include solid-state physics,surface physics and chemistry, interfaces,semiconductor materials and processing science and technology, process diagnostics and modeling and manufacturing science. Rubloff earned his doctorate in physics from the University of Chicago in 1971.After a long career in private industry, mainly with IBM, he joined academia in 1993 as associate director of the National Science Foundation's Engineering Research Center for Advanced Electronic Materials Processing.Rubloff joined the University of Maryland in 1996 as professor of materials and nuclear engineering. He has published more than 130 papers and holds 16 patents and six IBM Invention Achievement Awards. ■

NEW FACULTY

The Clark School of Engineering provides a rigorous course of undergraduate and graduate study in a wide range of disciplines. Representing the best in scholarship and research, these new faculty members joined the Clark School this academic year:

Mikhail Anisimov is professor of chemical engineering with a joint appointment in the Institute for Physical Science and Technology. He held various academic positions in Russia and the United States prior to 1994, when he permanently moved to the United States. From 1988–1994, Anisimov headed the Department of Physics at the Oil and Gas Research Institute of the Russian Academy of Sciences. Anisimov is a world-class researcher in the area of chemical thermodynamics, with emphasis on critical phenomena in small molecule systems. He received his Ph.D. in chemical physics from Moscow State University.

Pamela Ashire is assistant professor of electrical and computer engineering with a joint appointment with the Institute for Systems Research. Her research interests include physics of information processing for physical systems, noise theory for electronic and design of sensory information processing systems. She received her Ph.D. in electrical engineering from the Johns Hopkins University.

Michel Cukier is assistant professor of reliability engineering in the Department of Materials and Nuclear Engineering. His research interests include software reliability, security evaluation, intrusion tolerance, distributed system validation, fault injection and software testing. He received his Ph.D. in engineering from the National Polytechnic Institute of Toulouse, France.

Panos Dimitrakopoulos is assistant professor of chemical engineering. His research interests include biofluid mechanics, bio-physics and microrheology. He received his Ph.D. in chemical engineering from the University of Illinois at Urbana-Champaign.

Carol Epsy-Wilson is assistant professor of electrical and computer engineering. Her research interests include speech recognition, speech processing, acoustic phonetics and digital signal processing. She received her Ph.D. in electrical engineering and computer science from MIT.

Ralph Etienne-Cummings is associate professor of electrical and computer engineering with a joint appointment with the Institute for Systems Research. His research interests are in biologically inspired sensory motor systems for robotics. He focuses on computational vision systems and their realization with mixed signal VLSI circuits. He received his Ph.D. from the University of Pennsylvania.

Richard La is assistant professor of electrical and computer engineering with a joint appointment with the Institute for Systems Research. His research interests include networking control of the Internet, congetion control, pricing, rate, resource allocation, and the application in game theory. He received his Ph.D. in electrical engineering and computer sciences from the University of California, Berkeley.

André Marshall is assistant professor of fire protection engineering. His research interests include the study of atomization and sprays, turbulent reactions of jets and plumes, and low emissions combustion systems. He received his Ph.D. in mechanical engineering from the University of Maryland.

Srinivasa Raghavan is assistant professor of chemical engineering. His research interests include polymers, colloids, complex fluids and self-assembly. He received his Ph.D. from North Carolina State University.

Fredric Schmitz is professor of aerospace engineering and the Minta Martin Professor of Aerospace Engineering. Previously, he was director of aeronautics at NASA Ames, and taught at Stanford University for 20 years. His research interests include acoustic noise radiation of rotorcraft as well as trajectory optimization. He received his Ph.D. from Princeton University.

Arnaud Trouve is a visiting associate professor of fire protection engineering. His research interests include expertise in the numerical modeling of turbulent combustion. He received his Ph.D. from Ecole Centrale of Paris, France.

Senner Ulukus is assistant professor of electrical and computer engineering with a joint appointment with the Institute for Systems Research. Her research interests include communication networks, particularly wireless communications. She received her Ph.D. in electrical and computer engineering from Rutgers University.

Min Wu is assistant professor of electrical and computer engineering with an affiliate appointment with the Institute for Systems Research. Her research interests include multimedia data hiding, digital rights management, network resource allocation for multimedia and video processing. She received her Ph.D. in electrical engineering from Princeton University. ■

PROFESSIONAL RECOGNITION AND HONORS

Professional recognition for the faculty in the Clark School of Engineering for their teaching excellence, exemplary research and professional achievement:

John Anderson, professor emeritus of aerospace engineering, was selected to receive the American Institute of Aeronautics and Astronautics' 2002 History Literature Award for his book, *A History of Aerodynamics*.

Hung Lin, professor emeritus of electrical and computer engineering, was elected to the Academia Sinica, the most prominent academic institution in the Republic of China. Lin was recognized for invention of the BiCMOS circuit, which is widely used in tens of millions of computer CPU chips.

Ali Mosleh, professor of materials and nuclear engineering, received the Best Paper Award at the 19th International System Safety Conference held last year. The annual conference draws system safety and risk analysis professionals from all over the world.

Michael Pecht, the George E. Dieter Professor of Mechanical Engineering and director of the CALCE Electronic Products and Systems Center, recently received the Kan Tong Po Award from the United Kingdom Royal Society. As part of this award, Pecht joins the faculty of the electrical engineering department at City University in Hong Kong for the spring 2002 semester.

Ramamoorthy Ramesh, professor of material and nuclear engineering, was named the first recipient of the Clark School Faculty Outstanding Research Award. The award recognizes Ramesh's contributions to the science and technology of materials, especially his landmark contributions to ferroelectrics. In addition, Ramesh was awarded the Alexander von Humbodlt Senior Scientists Prize, Germany's highest research award for senior United States scientists and scholars in all disciplines. Ramesh was elected as a Fellow of the American Physical Society in recognition of his contributions in condensed matter physics.

Eric A. Seagren, assistant professor of civil and environmental engineering, received the 2001 E. Robert Kent Junior Faculty Teaching Award. The award recognizes his contribution to teaching in the classroom and his ability to inspire students.

Mohamad Al-Sheikhly, associate professor of materials and nuclear engineering, was appointed to a panel of the National Research Council that is studying "Ensuring the Safety of the U.S. Mail." The National Research Council is the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities.

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

Eyad Abed, professor of electrical and computer engineering and acting director of the Institute for Systems Research, was elected as a Fellow of the Institute of Electrical and Electronics Engineers.

Sreeramamurthy Ankem, associate professor of materials science and engineering, was elected as a Fellow of the American Society of Metals.

William Bentley, professor of chemical engineering and director of the Bioprocess Scale-up Facility, was elected as a Fellow of the American Association for the Advancement of Science.

Joseph Ja Ja, professor of electrical and computer engineering and director of the university's Institute for Advanced Computer Studies, was elected as a Fellow of the Association for Computing Machinery. ■

STAFF AWARDS

The following professional staff members were recently recognized for exemplary service in support of engineering at Maryland.

Naji S. Hammad, coordinator, engineering dean's office received the 2001 A. James Clark School of Engineering Staff Service Award. Hammad was recognized for his commitment to the school of engineering through dedicated service above and beyond the call of duty.

Maureen Meyer, assistant dean for finance and personnel, received the university's President's Distinguished Service Award last fall. The award, one of the highest given for service at the university, recognizes Meyer's hard work, dedication, loyalty and profound contributions to the Clark School of Engineering and the University of Maryland. ■

New Knowledge to Sa

Story by Kris Antonelli ■ Photography by John T. Consoli

"The methods and mechanisms of warfare have altered radically in recent times, and they will alter still further in the future. The country is singularly fitted, by reason of the ingenuity of its people, the knowledge and skill of its scientists, the flexibility of its industrial structure, to excel in the arts of peace, and to excel in the arts of war if that is necessary. The scientists and engineers of the country, in close collaboration with the armed services, can be of substantial aid in the task which lies before us."

—Vannevar Bush, president of the Carnegie Institute of Washington, *June 1940.*

Virgil Gligor, professor of electrical and computer engineering in the Clark School, points to those words in a newspaper article as he discusses his role in helping to protect national security. "In times of a national emergency, the government goes to academia to get new ideas for steps to take in a crisis," he says. "Since [Franklin D.] Roosevelt, this is what government has done. It has gone to scientists and engineers to look at new aspects of warfare."

The United States is engaged in a new war since the events of last Sept. 11—a war against terrorism that once again requires the expertise of top scientists and researchers to help protect the nation. So it comes as no surprise that the federal government has called on faculty in the Clark School to continue with important research in areas related to defense and national security.

Government officials have also asked Maryland engineering faculty to serve on high-level committees investigating the devastating terrorist attacks of last fall.

Gligor is part of a diverse group of scientists brought together to examine strengths and weaknesses in America's information security and electronic surveillance capabilities. The committee, comprised of both government and academic researchers, will present its findings to a government agency when its work is completed. "This [committee] was attended by scientists who 20 years ago would not have come together," says Gligor, who surmises that competing research interests, combined with a mistrust of government intelligence agencies by some in the private sector, have kept government and academia from collaborating on a large scale since the end of the Cold War. "But Sept. 11 has changed all of that," he says. "It has united everyone together."

Gligor, working with colleagues in the Clark School's Institute for Systems Research, remains involved in other projects that are separate from the government-sponsored committee, yet intrinsically entwined. He is part of a group of Maryland researchers that received $4 million from the Department of

"[Sept. 11] has united everyone together," says electrical and computer engineering faculty member Virgil Gligor (left), who is serving on a high-level government committee looking at ways to protect the nation from terrorist cyber attacks.

afeguard National Security

Defense, prior to last Sept. 11,to investigate the threat of physical or cyber attacks on critical information infrastructures. Gligor's research involves cryptographic protocol analysis and, in particular, message integrity and authentication protocols used in large computer networks. Funding for this project comes from the federal government's University Research Initiative, or URI program, which is designed to enhance engineering research in technological areas that are critical to national defense. The URI award is just one of the many military and defense-related research contracts under way in the Clark School.

For fiscal year '01, sponsored research activities in the school of engineering totaled almost $104 million. According to Clark School officials,almost $55 million,more than half of the total amount,is directly tied to research in defense-related projects with agencies such as the Army Research Lab, the Naval Research Office, the Department of Energy and the U.S. Air Force.

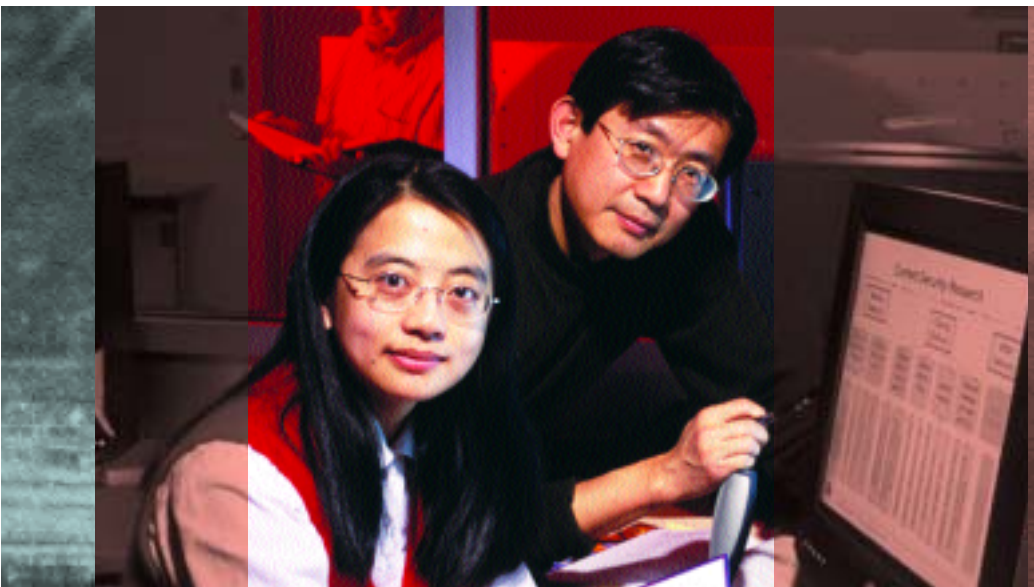
"We have been heavily funded by the Department of Defense for many years," says William L. Fourney, chair of the engineering school's Department of Aerospace Engineering. "Partly due to faculty members who look for research opportunities, and because we do work that the DoD is interested in."

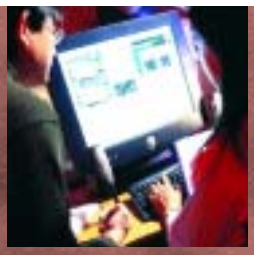
On the other side of the building from Virgil Gligor's office, Ray Liu,professor of electrical and computer engineering with a joint appointment in the Institute for Systems Research,is in his laboratory focusing on improving high-bandwidth digital communications. One new project involves technology that digitally compresses large amounts of data,and then distributes this data to heterogeneous computing platforms (systems that are very dissimilar) in a timely and secure fashion. "We need to be able to communicate securely and efficiently from anywhere in the world,at any time, to any type of computer," Liu says. "And some of this communication must be done through open (and possibly unsecured) channels like the Internet or wireless networks."

As an example, Liu discusses technology used in the recent war in Afghanistan. He points out that high-bandwidth multimedia images—like those taken from unmanned drones flying above the battlefield—were able to reach a large number of different operating platforms quickly, efficiently and with little loss in quality. New technology that Liu is developing will significantly enhance these capabilities,he says. Liu adds that a senior government official,who has seen the design,informed him it is the best idea [in this scientific area] he has seen in the last five years.

Min Wu,a new assistant professor in electrical and computer engineering,collaborates with Ray Liu on much of his current research. Wu is refining areas of digital "watermarking," developing algorithms that allow the digital embedding of a secondary "hidden" image, or watermark,within an original digital image, video or audiotape. She recently patented this new technology, and says that digital watermarks are increasingly important. "You need to know that the document that you have received is,in fact,the original document,without any electronic manipulations done to it," she says. The digital watermark also allows the original sender to track the document while it is being transmitted; this acts as a deterrent against hackers trying to intercept important electronic documents en route. "If a bad guy knows he can get caught [hacking or altering digital documents]," Wu says. "He is less likely to do it."

While Maryland researchers like Virgil Gligor, Ray Liu and





Min Wu (far left) works with Ray Liu in a laboratory in the Clark School's electrical and computer engineering department. Their current research involves new technology that makes it difficult to alter or duplicate sensitive electronic documents.

Min Wu are involved in protecting and enhancing digital communications,other Clark School engineers are sifting through remnants of the World Trade Center in New York,looking for clues as to what caused two of the world's tallest buildings to come crashing down in an avalanche of steel and cement.Fred Mowrer, associate professor in the Department of Fire Protection Engineering, is part of a National Science Foundation-sponsored team collecting structural engineering data and doing damage assessment at both the New York City and Pentagon sites that were struck on Sept.11.

James Milke, also in the fire protection engineering department,is working with a 22-member team assembled last fall by the American Society of Civil Engineers,or ASCE.The ASCE team is conducting a building performance study—trying to determine the cause of the World Trade Center collapse, and looking at why certain buildings in the immediate vicinity that were heavily damaged by fire and falling debris did *not* collapse.

Milke, an expert in determining the effects of fire on steel, says that the ASCE team is looking at many factors,including how high temperatures reached inside the Trade Center towers after each was struck by a passenger jet laden with thousands of gallons of aviation fuel.According to articles published in *The New York Times* last fall,some engineers on the ASCE team thought that lightweight steel trusses holding reinforced concrete floors sagged due to the intense heat from the fires.

Milke cannot specifically comment on what the ASCE group has found so far—the Sept.11 events are part of an ongoing study—but he does say that the fires and damage caused by the terrorist attacks were puzzling in several ways. Usually, in a large fire, steel support structures weaken with increasing temperatures,he explains.At about 1100 degrees Fahrenheit,steel will lose almost half of its strength,which in turn could lead to a collapse. Past studies have shown that an office building fire often generates temperatures between 1500 and 2000 degrees. To protect steel used in very tall buildings like the World Trade Center, steel support columns are often encased in concrete, gypsum board or other sprayed-on material."Protected steel usually doesn't collapse, and the steel framework of the Trade Center towers *was* protected,so that's why we are all looking at why this fire was so different," Milke says.

The ASCE team is working directly with local and federal officials at ground zero in New York, gathering information from a variety of sources,including eyewitness accounts and videotapes of the incident.They are also reviewing computer-generated models of the fires and the twin tower collapses.

Milke says the research and fact-finding mission by the ASCE team is very methodical and disciplined, yet many team members were not immune to the emotional aspects of Sept.11. "You really have a hard time comprehending the extent of the damage, until you see it firsthand," he says."Besides the thousands of civilian deaths … when you realize that more than twice the number of firefighters than are normally lost nationwide in an entire year, were killed in this one, single event … … then it really shows what an incredible loss we suffered."

Most engineers agree that probably no building could withstand the impact from a large commercial jetliner, but Milke says that finding the exact cause, or causes,of the World Trade Center collapse is still important."There will be an ongoing social debate on how extreme events should be considered in the design and operation of buildings," he says."But if we can find the answers on why certain buildings collapsed and others didn't,then we can make recommendations for better structural and fire protection designs for the future."

❖ ❖ ❖

In every department in the Clark School, faculty continue with important research involving chemical and biological sensors, integrated command and control systems for emergency response teams, harbor and ship safety, food and water safety, as well as technology that will track the release of gasses and radioactive materials.The president,and the nation, has asked for new knowledge to protect American interests and American lives … and Clark School engineers are answering that call to duty. ■

—Kris Antonelli,a former veteran reporter with the Baltimore Sun*, is a freelance writer living in Bowie, Md.*

PHOTO BY ANDREA BOOHER/ FEMA NEWS PHOTO

James Milke, associate professor of fire protection engineering, is part of a team assembled by the American Society of Civil Engineers who are looking for answers in the rubble of the World Trade Center in New York.

GLENN L. MARTIN, one of the nation's earliest aviation pioneers, founded his own airplane manufacturing company in 1911 at the age of 25. By the 1930s and 1940s, the Martin Aircraft Co. had grown to become the leading airplane manufacturer in the United States. The company would later merge to become Martin Marietta and is now part of Lockheed Martin.

Martin saw early on in his life the value of research and education in the aeronautical sciences. From the beginning, he continuously hired skilled engineers to design his planes.

The Martin Aircraft Co. provided training and experience to a remarkable number of future aviation manufacturers: William Boeing, Donald Douglas, Lawrence Bell and James S. McDonnell all of whom worked for Martin before forming their own companies.

In 1944—the 50th anniversary of engineering at the University of Maryland—Martin made a gift of $1.7 million to the university to establish instruction and research in the aeronautical sciences. A second gift of $800,000, named in honor of Martin's mother, Minta Martin, was made the following year. This endowment has since grown to more than $60 million, and is a major source of research funding for the A. James Clark School of Engineering.

Visionaries in Engineering Honored

Glenn L.Martin and A. James Clark,two men whose pioneering spirit and philanthropic vision have had a tremendous impact on engineering at Maryland, were recently honored with a set of commissioned oil portraits.

The paintings are currently displayed outside of the dean's office in Glen L.Martin Hall,and will grace the new administrative offices in the Kim Engineering and Applied Sciences building when it opens in 2004.

"We want Mr. Martin and Mr. Clark to be visible to anyone who visits the school of engineering," explains Dennis McClellan, the Clark School's assistant dean for external relations.McClellan says that the portraits allow current engineering students a close-up view of the two engineering giants who serve as role models, and notes that the paintings are historically important, as well.

"Mr. Martin's gift allowed us to build one of the top research programs in the country, and through Mr. Clark's support, expressly designed for undergraduate education, we have the means to pursue new and innovative academic programs that prepare future generations of engineers," McClellan says.

Herbert Abrams, a prominent portrait artist with more than 200 works to his credit, was commissioned to do the painting of A. James Clark.Other portraits by Abrams,including those of former Presidents Bush and Carter, are displayed in the White House, the U.S. Capitol,the Pentagon,the National Gallery of Art,as well as statehouses, museums and major universities across the nation.

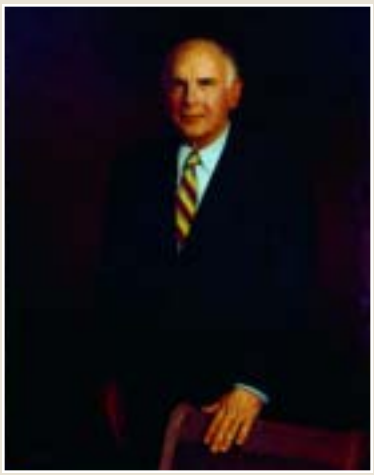
The Clark painting was unveiled in December at a private ceremony at the university president's home. In attendance that evening was Eugene Lunger, a member of the school of engineering's Board of Visitors who worked at Clark Construction for 24 years before retiring last year as executive vice president.Lunger played a key role in having the Clark portrait commissioned when he convinced six current and former Clark Construction executives to contribute in honoring Mr. Clark with the oil portrait.

Noted Virginia-based artist Bradley Stevens recently completed the portrait of Glenn L. Martin, who died in 1956.Stevens used old photographs and other paintings of Martin as the basis of the new portrait. ■

A. JAMES CLARK, a 1950 graduate of the University of Maryland with a bachelor's degree in civil engineering, is chairman of the Clark Construction Group Inc., one of the nation's largest general building contractors. His Bethesda, Md.-based holding company, Clark Enterprises Inc., includes real estate, communications, and commercial and residential construction enterprises. His companies have constructed buildings such as the Lincoln Center, the Library of Congress, the Canadian Chancery and Oriole Park at Camden Yards.

Clark attended Maryland on a state scholarship, paying only for his books, and says that his experience at the university began a lifelong commitment to the school and a deeper appreciation of the value of an education. "If I had not received this almost-free education, I probably would not have been unable to attend college," he says.

In 1994—the 100th anniversary of engineering at the University of Maryland—Clark pledged a gift of $15 million to the school of engineering in support of undergraduate education. Clark's legacy will serve as a source of inspiration and pride to Maryland alumni and citizens of the state of Maryland.



entrepreneurship

Engineering Research Center Promotes High-Tech Success

Despite dire predictions and ample evidence of an economic downturn during the past 18 months, companies that specialize in "hot" new areas of technology are riding the infotech/biotech wave of success that defined much of the 1990s financial boom.

For proof positive that high-tech startups are alive and well in the state of Maryland, one need only to look at the success rate of the Clark School of Engineering's Technology Advancement Program, also known as TAP.

According to Ed Sybert, the TAP director, the university has launched more than 40 new firms in technology, engineering and biotechnology sectors since the program began in 1984. These same startups have garnered more than $334 million in private-sector investments, which in turn, has created roughly 700 new full-time jobs.

"This has had a profound impact upon the economy in the region," says Dean Nariman Farvardin, who adds that TAP is still a relatively young program. "Give it more time, and the impact will become more palpable."

Seventy-five percent of the companies that graduated from TAP are still in business five years later, a success rate that is significantly higher than the national average.

The TAP initiative is just one of the many programs under the direction of the Clark School's Engineering Research Center, or ERC, that provides technical assistance, matching grants for research leading to product and process development, as well as research consortia, with seminars and other activities that promote technology transfer to Maryland-based companies. "We are a first-rate school of engineering, and that is what good engineering schools do … promote a culture of entrepreneurship in the region surrounding the university," says Farvardin.

Specifically, TAP helps startups by offering high-tech laboratory space and equipment, computer support, product analysis and other services. Companies in the program work closely with faculty throughout the Clark School and the Smith School of Business.

"Companies [involved in TAP] can gain access to the technical expertise of our faculty, staff and graduate students as well as to the substantial specialized facilities and equipment at the university," says Herbert Rabin, director of the Engineering Research Center. "At the same time, our faculty benefit from this close coupling with industry by maintaining an exposure to real-world technical problems."

PHOTO BY BEN WOODARD

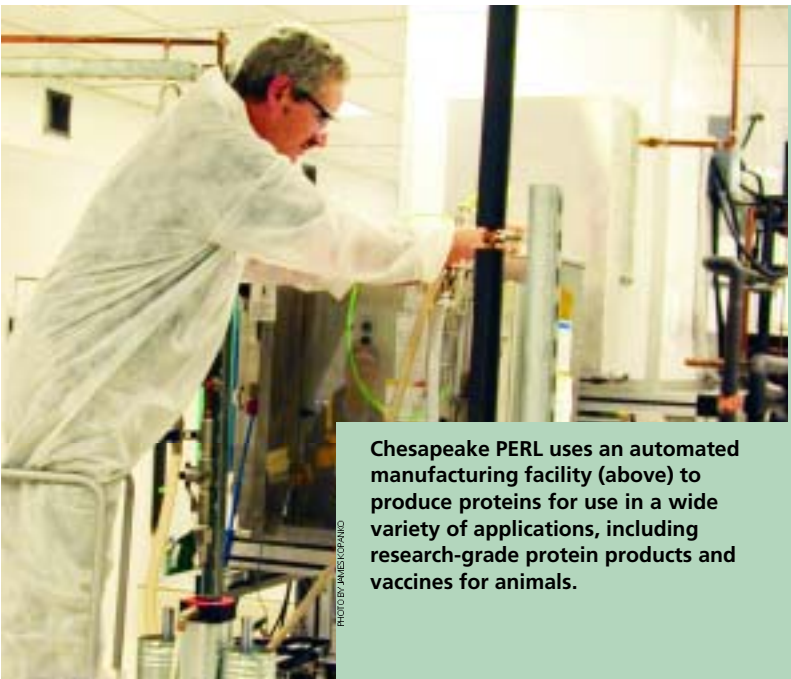


PHOTO BY JAMES KOPANKO

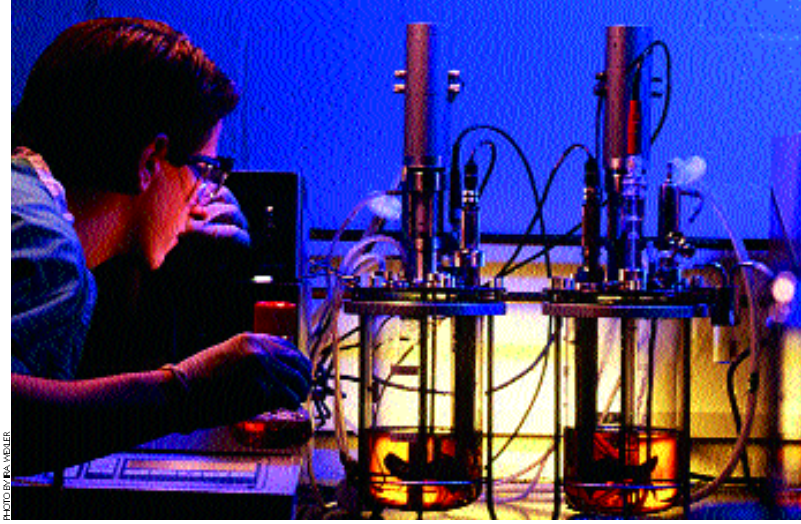
Chesapeake PERL uses an automated manufacturing facility (above) to produce proteins for use in a wide variety of applications, including research-grade protein products and vaccines for animals.

The Technology Advancement Program is a vital component in the Clark School's Engineering Research Center. Here are a few recent success stories:

Chesapeake PERL has received more than $1 million in venture capital along with government grants and corporate loans to bring its cutting-edge technology to market. PERL has attained three exclusive licenses, including one for a full-scale facility donated to the university by E.I. DuPont de Nemours & Co., to pursue the science of protein production. The company also is working with the U.S. Army to make PERL's first protein product—antibodies for detecting toxins and biological warfare agents.

PHOTO BY JAMES KOPANKO

PHOTO BY TOM HAZEL



PHOTOS BY BRIAN MEILER

Biotech startup companies involved in the Technology Advancement Program gain access to sophisticated fermentation and purification equipment located in the Bioprocess Scale-up Facility (left) as well as high-tech tools such as laboratory-scale bioreactors (above).

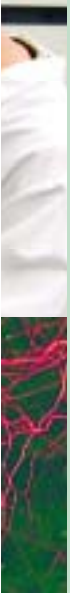
The TAP program was originally housed on campus in temporary trailers. It moved to a new three-story office and laboratory building in 1998, yet it still maintains a long list of startups who are trying to get into the program. The TAP building on campus is currently filled beyond its intended capacity, and university officials are looking to expand the program by locating more laboratory and office space in the near future.

In addition to its extremely successful TAP initiative, the ERC administers other technology transfer programs that benefit the state and surrounding region. For example, the Technology Extension Service provides on-site technical assistance to small and mid-sized companies throughout Maryland. It features highly qualified extension agents in five regional offices who link area companies with university faculty, as well as disseminate technical information and provide general guidance.

The Bioprocess Scale-up Facility—another high-tech resource offered by the ERC—provides expert services in fermentation, separation, purification and product analysis. The facility helped MedImmune Inc., one of the state's most successful biotech firms, in its development of a Lyme Disease vaccine.

Maryland Industrial Partnerships, or MIPS, also adds to the ERC's success by providing state-funded grants to local businesses and by connecting participating companies with researchers and facilities at the University of Maryland and other University System of Maryland institutions. For example, an innovative signal processing technique to significantly increase wireless channel capacity, a new substitute for antibiotics in farm-raised chickens, and a revolutionary drug that prevents the abnormal mucous secretions caused by pulmonary illnesses are just three of 12 university/industry projects recently funded by MIPS.

Dean Farvardin says that while these diverse programs may be administratively separate within the ERC, they all are philosophically tightly coupled with one another. "They [the ERC] are doing a superb job of establishing these connections that identify the University of Maryland as a major force in technology transfer, entrepreneurial activity and in economic development," he says. —*Tom Ventsias*



Neuralstem Biopharmaceuticals was recently recognized as the best incubator company in Maryland by the state's Technology Development Corporation. Neuralstem received the honor for its achievements in product development, revenue generation, company growth and regional economic impact. The biotech startup is an early-stage product development company that is researching new methods to treat debilitating and often deadly diseases that affect the central nervous system, such as Parkinson's and Alzheimer's diseases, as well as treatment of spinal cord injuries. Neuralstem's patented method uses human stem cells to develop renewable sources of neurons, which are the functional units of nervous tissue. Since Neuralstem was founded in 1995, it has grown from two to 45 employees and has raised about $20 million. The company graduated from the university's incubator last fall and recently moved into a 30,500-sq.-ft. facility in Gaithersburg, Md.

By examining stem cell neuron activity (left), scientists at Neuralstem Biopharmaceuticals are helping to develop products to treat and cure neurodegenerative diseases.

IMAGE COURTESY OF CLARAGEN INC.

CC10 is a natural human protein, produced primarily by the lungs, and is coded by a single gene (left). Claragen is testing CC10 in human clinical trials for the prevention of lung disease in premature infants.

Claragen Inc., a 2001 TAP graduate, is finishing up the first human clinical trials for its preventative protein drug for broncho-pulmonary dysplasia, or BPD, a chronic lung disease that affects premature infants. Claragen has developed recombinant human CC10, or Clara cell 10kDa, a genetically engineered form of a naturally occurring protein that tests have shown can help treat BPD. Looking beyond CC10, Claragen is in the process of licensing two technology platforms, one a protein-based treatment for skin disease and cancer; the second a novel class of antibiotics for the treatment of infectious disease.

Robert Fischell: Always Thinking

Robert Fischell —who at age 72 has already experienced an extraordinary career as a noted engineer, physicist,inventor and entrepreneur—says that he is not ready to slow down,and is certainly not ready to retire. In fact,Fischell recently announced plans for three new startup companies that may well have an impact on health and healthcare worldwide.

Fischell spends much of his professional life thinking of new ideas for lifesaving medical devices and systems.He holds almost 200 U.S. and international patents, and is responsible for important medical breakthroughs that include the first implantable insulin pump, as well as a rechargeable pacemaker and highly flexible stents for placement in coronary arteries.

Currently, he is developing an implantable medical device that can detect,within 60 seconds, the occurrence of a heart attack caused by a blood clot.The device will then immediately release medication to dissolve the clot.Called the *Angel Med Guardian*, the device is still in the experimental stage, Fischell says, but he hopes for a commercial release within two years.

This newest business venture features Fischell working with his three sons under the company name of Angel Medical Systems Inc. While it is indeed a family affair, the talent runs deep:one of Fischell's sons has a doctorate in physics,the other is a cardiologist, and the third has an M.B.A.in marketing and finance.

Fischell also is working with one of his sons on new technology that creates alternating electric currents in the brain to help ease migraine headaches.The third new startup venture for Fischell involves a device that can help eliminate scar tissue and adhesions after abdominal surgery.

While Robert Fischell continues to improve healthcare with new technologies and medical devices, he also will have an impact on developing the next generation of bioengineering and biomedical professionals.Last fall,Fischell donated $1.25 million to the Clark School of Engineering to establish a fellowship program that gives graduate students the opportunity to create and design new medical devices or systems.

The Fischell Fellowship in Biomedical Engineering provides awardees with strong support to make their work in bioengineering become a reality. Candidates for the fellowship are sought through a national advertising campaign,and are chosen based on the best concept and plan for creating a new medical device. The awardee receives a competitive stipend and tuition waiver at Maryland.

"The right student for this fellowship is thinking all the time," says Fischell."They are the kind of person who is innovative, with conceptual ideas for products or devices.But most of all, this student must have the burning desire for their idea to become a reality."

A member of the National Academy of Engineering, Robert Fischell's numerous awards and honors include membership in the Space Technology Hall of Fame and being named the 1984 Inventor of the Year. Last December, the University of Maryland honored Fischell with its 2001 Major F. Riddick Jr. Entrepreneurship Award. Fischell gave the $5000 award prize back to the university as additional support for the Fischell Fellowship.

Fischell says he chose the University of Maryland for the fellowship because of its excellent engineering school. Besides the opportunity to collaborate with talented members of Maryland's engineering faculty, Fischell hopes that the graduate student who receives the fellowship takes advantage of other resources,such as the Clark School's Technology Advancement Program, a high-tech incubator that offers support services for early stage companies."This fellowship," he says,"is here to help an innovative entrepreneur obtain a Ph.D. in engineering,and at the same time, give him or her a chance to create a new medical device for the benefit of humankind."

For more information on the fellowship, go to
www.eng.umd.edu/fischell_fellowship

Bioengineering Ph.D. Program to Benefit Statewide Biosciences Research

The state of Maryland, with more than 300 bioscience and biotechnology companies employing almost 20,000 people, is recognized as the country's third-largest biotech cluster, trailing only the San Francisco Bay area and greater Boston.

Maryland has the highest concentration of federal research and development facilities in the United States, with government agencies such as the Food and Drug Administration, the National Institute of Standards and Technology and the National Institutes of Health, all residing within the state.

This mass of federal research facilities, area universities and biotech companies reaches from the I–270 technology corridor across the state to Baltimore and plays a significant role in future medical innovations, disease treatments and genetic discoveries.

In an effort to support research and education in this important scientific field, University of Maryland officials are pushing a new bioscience initiative that spans across several colleges and schools at the university.

This initiative includes plans for a bioengineering program under the auspices of the Clark School of Engineering and its Department of Chemical Engineering.

Nariman Farvardin, dean of the Clark School, says that initial plans for a bioengineering program at Maryland call for developing a Ph.D. curriculum that is taught by faculty from multiple departments in the school of engineering, as well as other campus units.

Farvardin says there are "extremely interesting" research problems that cross the boundaries between basic engineering principles and the biological sciences. "Bioengineering addresses many of them," he says. "With an infusion of resources, for example, we can hire additional faculty and further strengthen research relationships between engineering and the College of Life Sciences."

The Clark School, Farvardin says, is "quite strong" with research under way in metabolic and neural engineering, vaccine development, medical imaging, and the development of biomaterials including biosensors and miniaturized systems with biomedical applications—all these areas of research will compliment the planned program in bioengineering. "We consider this [bioengineering program] an obligation on our part to provide educational opportunities as well as research opportunities for students interested in pursuing bioengineering as a field," he says.

In testimony last year before the Maryland General Assembly, university president C. D. Mote, Jr. noted that 59 percent of all federal support for research is currently in the areas of bioscience and biotechnology. "With due respect to the infocom industry and its key position today, this new century belongs to biology and biotechnology," Mote told the state legislators. "There will be no major research university in this country that is not strong in biosciences."

Over the next five years, Mote stated, the university wants to hire 30 new faculty members into the biosciences. These new hires will be in computational biology, bioinformatics, bioengineering, biological machines, neuroscience, virology and biodiversity.

SEYMOUR WOLF

BY ESTABLISHING an endowed scholarship in bioengineering at the University of Maryland, Seymour Wolf hopes not only to impact the field of engineering, but also humanity itself. "I want to contribute to the field of bioengineering and the manufacture and administration of vaccines and chemicals that could make a difference to us all," says Wolf, a 1942 graduate in chemical engineering from Maryland. "This is one of the things that chemical engineers can do—taking a vaccine from the laboratory to the production phase, and applying engineering applications to the chemical process."

The Seymour and Faye Wolf Endowed Scholarship in Bioengineering is for undergraduate students interested in pursuing a career in bioengineering.

The scholarship is all the more significant as the university pursues a new bioscience initiative that spans across several colleges and schools,including the Clark School and its Department of Chemical Engineering.

Wolf says that this cross-disciplinary relationship between the life sciences and engineering is the right way to go, adding, "I think what's happening in education,and especially the sciences,is that everything has become specialized. We're separating fields that could help one another. That's where bioengineering can be of a great service."

Wolf has spent most of his professional career in the mattress manufacturing business with the Serta Mattress Co. Presently, he is chairman of the board of AW Industries, a licensed manufacturer and distributor for Serta."I have tried to apply the engineering practices I learned at the university to my business," he says.

Wolf remains involved with his alma mater as an active member of the Clark School of Engineering Board of Visitors. "I have always appreciated the opportunities that the university offered me," he says. "Now, I can return some of that."

This is the second endowed scholarship the Wolf's have established.

Team-building Curriculum Gives Students a Winning Edge

Each year, students in the Clark School compete on a national level against students from other engineering schools in team-based competitions. While winning is always good, this experience offers much more than just a chance for awards and accolades. Whether it's designing a future truck, building a human-powered submarine, or submitting an innovative rotorcraft design, students involved in these competitions develop necessary teamwork and project management skills that will remain with them throughout their professional careers.

"Studies show that the most successful engineers are ones that not only have the technical skills, but also the skills to manage people and a group," says Janet Schmidt, director of student research in the Clark School.

Schmidt, working with Linda Schmidt, associate professor of mechanical engineering, is helping to develop the Building Engineering Student Team Effectiveness and Management Systems, or BESTEAMS, a three-year project that is funded by a $400,000 grant from the National Science Foundation.

Faculty and administrators in the Clark School collaborate with faculty from Howard University, the U.S. Naval Academy and Morgan State University on a three-track BESTEAMS curriculum used to teach students how to get the most from their experience working on a team.

Janet Schmidt says that the introductory track focuses on individual and team learning styles, as well as time management. Students in the intermediate track learn self-evaluation skills, group management and communication skills, project organization and decision managing. Finally, in the advanced track, young engineers learn about emotional intelligence and conflict resolution.

The BESTEAMS curriculum is intended to increase the chances that students will not only learn the course material and design a successful project, but also that they have a positive team experience. A good team experience, Schmidt says, is essential in keeping talented students in the engineering field. "Even if the project is designed well and works, if the student had an unpleasant experience on the team they may decide not to stay in the field," she says. "There is a strong need to get students interested in the sciences and technology and keep them there."

According to Schmidt, recent work on the use of teams and collaborative learning was done in physics and mathematics, where there are short-term projects, structured labs and study groups.

Engineering projects are more complex, she says, and usually done in larger groups that work on long-term projects.

Take for example, the Solar Decathlon Team—a 27-member student team that is currently designing and building a 800 sq.-ft. solar-powered house. Each team member is responsible for a particular aspect of the project—from obtaining the household appliances to financing and transporting a completed house to Washington, D.C., where the final competition will be held this summer on the National Mall.

The design of the house must integrate both architecture and technology. To do so requires both engineering and architectural students on the team, who are responsible for making the house aesthetically pleasing and livable. The Solar Decathlon Team began the project in January 2001 and the house will be built this spring on an empty lot near the university's Cole Field House.

Omar Ramahi, an assistant professor of mechanical engineering, is one of the team's faculty advisors. "There are students from different disciplines involved in this, so it is really like a small corporation," he says. "There is a hierarchy and everyone has a position—it is not a loose group.

Engineering students at Maryland play a major role in the design and construction of an 800 sq.-ft. solar-powered house (model shown at left) that will be displayed on the National Mall this summer. Maryland's Solar Decathlon Team will compete against 14 other universities in a competition sponsored by the U.S. Department of Energy.

Communication and project management skills are one part of the new BESTEAMS curriculum developed by Clark School faculty and administrators. Mechanical engineering students (above, from left) Micah Coleman, Andrew Hunt, Robyn Hladish and Melanie Chang are shown discussing details for a solar-powered house during their weekly brainstorming session.

The students are learning how to work together in a group, raise money for the project and make presentations to potential benefactors."

Andrew Hunt,a mechanical engineering undergraduate and the Solar Decathlon project manager, says the project is part of an engineering technical elective course. Hunt adds that although the student team already works well together, they also would benefit from the team-building skills that the BESTEAMS curriculum offers."A lot of us have learned the value of solar energy while working on this project," he adds,"and we've also learned about managing a large project."

Other students in the Clark School also realize the benefits—and the challenges—that working within a team setting brings.

Matt Tarascio, an aerospace engineering graduate student in the Alfred Gessow Rotorcraft Center, relates that as an undergraduate in Australia,he was required to take a course in project management."At [RMIT University in Australia],they started to put more emphasis on the management role. A lot of engineers graduate and do not have good communication skills. You have to be able to communicate your ideas." Also, Tarascio says, time management becomes an issue in a group setting because each member is relying on someone else to get part of the project done. "I think the biggest thing that you learn is that you have to be flexible with other people in the group and give them the time they need to complete the work on schedule," he says.

Last fall, a team of aerospace engineering graduate students led by Tarascio submitted the winning entry in the American Helicopter Society's annual design contest. This was the fourth consecutive year that Maryland has won the competition. Sponsored by Boeing–Philadelphia,the contest required students to develop detailed plans for a vertical takeoff and landing platform with an innovative method of controlling the cyclic pitch of the rotor blades.

Managing a big project is a key skill in today's engineering field, according to Janet Schmidt.Corporations involved in engineering are *demanding* that college graduates not only understand the technical aspects of how to make a project work, but also how to function within a group setting,she says."We are getting a lot of pressure from industry to have graduates with professional skills," Schmidt adds."They need skills in writing reports, presenting the project and group dynamics. They need to identify their best assets and bring them to the group as well as identify the talents of others and then to work together to make it successful." —*Kris Antonelli*

Notable Alumni

KRIZEK

RAYMOND J. KRIZEK was recently named to the National Academy of Engineering. Election to the academy honors those who have made important contributions to engineering theory and practice, as well as those who have demonstrated unusual accomplishment in the pioneering of new and developing fields of technology.

Krizek was named in recognition for his advancements in soil-structure interaction, disposal of waste slurries, mechanical properties of grouted sands and engineering behavior of soils. He currently is the Stanley F. Pepper Chair in Civil Engineering and director of master project management professional degree program at Northwestern University in Evanston, Ill.

Krizek received his master of science in civil engineering from the A. James Clark School of Engineering in 1961. He later received his doctorate at Northwestern University, subsequently joining the civil engineering faculty there. In addition to teaching, Krizek has published more than 300 technical papers and reports and has also testified before Congress in matters related to civil engineering. ■

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.*

In Memoriam

Robert B. Beckmann, professor emeritus of chemical engineering, died on Dec. 7, 2001. Beckmann led of the Department of Chemical Engineering from 1961 until 1966, when he was named dean of the College of Engineering. He served as dean for the next 11 years, returning to chemical engineering in 1977 where he taught until his retirement in 1987. He is credited with affecting the quality of engineering on a national level while serving for two years as president of the Accreditation Board for Engineering and Technology, or ABET. Beckmann received an undergraduate degree from the University of Illinois in 1940 and his doctorate from the University of Wisconsin in 1944, both in chemical engineering. He was named a Fellow in the American Institute of Chemical Engineers in recognition of contributions to chemical engineering education. Other awards include the L.E. Grinter Award for contributions to engineering education and accreditation by the ABET; being named a Fellow of ABET in recognition of exceptional dedication and service to engineering education quality in the United States; and receiving the American Society for Engineering Education Centennial.

Beckmann and his wife, Jean, established the Robert B. Beckmann Scholarship Fund, awarded annually to students in chemical engineering. Those wishing to contribute to this scholarship in honor of Beckmann should contact: University of Maryland, Robert B. Beckmann Scholarship Fund, Chemical Engineering Department, College Park, Maryland, 20742-2111

Charles S. Falkenberg, age 45, died on Sept. 11, 2001 with his wife, Leslie Whittington, and their two daughters, Zoe, and Dana. The family was onboard American Airlines Flight 77 when it crashed into the Pentagon. During the 1990s, Falkenberg was associated with the Institute for Systems Research, involved in research that managed data related to the Alaskan Exxon Valdez disaster. At the time of his death, he was a lead software engineer for ECOlogic Corp. Falkenberg earned both undergraduate and graduate degrees in computer science from the University of Maryland.

Jon Grabowski, age 33, died on Sept. 11, 2001 in the collapse of the north tower of the World Trade Center in New York City. Grabowski earned his undergraduate degree in electrical engineering in 1992 from the Clark School. At the time of his death, he was entering just his second week of work as vice president of information technologies with Marsh & McLennan, located on the 97th floor of the World Trade Center. At his memorial service, Grabowski was described by friends as a bit of a paradox: a math whiz who liked to tinker with cars, a computer technician whose sometimes serious demeanor hid a warped sense of humor, and a good candidate for a basketball team who never played organized sports. He is survived by his wife, Erika.

Khang Nguyen, age 41, died on Sept. 11, 2001 at the Pentagon when Flight 77 crashed into the building. Nguyen, who earned his undergraduate degree in electrical engineering in 1987 from the Clark School, had worked for 13 years with the Defense Information Systems Agency. At the time of his death, he was a systems administrator for a Navy contractor. Nguyen immigrated to the United States with his mother and six siblings in 1981. Here, he was united with his father and two other siblings who had fled Southeast Asia in 1975 at the close of the Vietnam War. Nguyen's father was a former employee of the U.S. Information Services, and used his government contacts to bring the family together. Nguyen is survived by his wife, Tu Nguyen, and a 4-year-old son, An.

William M. MacDonald, age 73, died on Sept. 19, 2001. MacDonald was a physics professor emeritus whose research made important contributions to the understanding of particle physics, plasma physics and space physics. He was an early advocate of super-computer centers in the support of scientific research and computer-assisted physics instruction. In 1967, MacDonald initiated the university's Theoretical Nuclear Physics Research Group, and helped guide it to national prominence.

Turner Timberlake, age 83, died on Sept. 29, 2001. Timberlake attended the university on a 4H-Club scholarship and graduated with honors in 1941 with a degree in mechanical engineering. He served 12 years on active duty in the military and 23 years in the Army reserves. He retired as director of the Research and Development Laboratory at Fort Belvoir, Va. In 1994, Timberlake received the Centennial Medal of Honor, which was awarded by the University of Maryland during its 100th year celebration of engineering.

Alumni Notes

Stephen Liccini, '68 ME, was named project director for Exxon Mobil's major refinery expansion/ modernization in Normandy, France. When completed in October 2004, the project will enhance refinery capacity and product flexibility.

Amir Mirmiran, M.S., CE '86; Ph.D., CE '91 has joined the faculty at North Carolina State University as a full professor, effective August 2001. Previously, Amir was associate professor of civil and environmental engineering at the University of Central Florida in Orlando. He has a U.S. patent on FRP-concrete materials.

Antonio F. Ramis '85 ME was hired by Cannon Design as associate vice president to oversee the firm's engineering practice in Washington, D.C., and throughout the mid-Atlantic region. Prior to joining Cannon Design, Ramis served as a mechanical engineer for the National Institutes of Health.

Lloyd M. Robeson Ph.D., Che '67 received Department of Chemical Engineering Distinguished Alumnus Award 2001 for achieving outstanding prominence in the profession of chemical engineering.

Ermis Sfakiyanudis, CE '91 was recently named new chairman of the Anne Arundel Economic Development Corp. He is currently president of Sigma Engineering Inc. in Annapolis, Md.

Edward Smith M.S. AE '90; Ph.D. AE '92 received the 2001 Lawrence Sperry Award in recognition of his leadership as founder of a national rotorcraft technology center; for pioneering research in aeroelasticity of composite rotors; and for dedication to aerospace engineering education. Smith is associate professor of aerospace engineering at Penn State and is co-director of the Penn State Rotorcraft Center of Excellence.

ENGINEERING THE FUTURE

Forward Thinking

William Crentz, a lifelong Terp fan.

IN 1927, impressed by chemistry in high school and a desire to become an engineer, William (Bill) Crentz became a "day dodger," the nickname for commuter students who drove their family's popular Dodge cars to and from the University of Maryland. "With my family's modest financial situation and the costs of other area colleges, I chose Maryland," he recalls. "It was a reasonable choice for a resident of the District of Columbia."

At that time, the chemical engineering program was not established at Maryland, so Bill designed his own curriculum of general engineering and chemistry courses, completing his undergraduate degree in 1932, and a year later, his master's of science in what was then called Industrial Chemistry. He reminisces that back then, "there was an aloofness between professors and students … they exposed you to knowledge, but the style of their teaching never changed to meet the varying individual needs of their classes." Today, Bill is pleased to see that faculty and students seem to enjoy a closer collegial relationship. And, he adds, "as a result of research funding from industry and government being incorporated into the classroom, it calls for a sense of cooperation between faculty and student that never existed in the past."

Jobs were scarce when Bill graduated. "My first steady job out of college was with the West Virginia Coal Operators Association, compiling statistical data on coal mining costs for [what was then] the Federal National Recovery Administration." This led Bill into a career in coal research when he later transferred to the Bureau of Mines, where he remained until his retirement in 1974.

While serving as assistant director of the Bureau of Mines, Bill's responsibilities included conducting the federal government's energy activities in coal, petroleum, natural gas and the use of oil shale. He was responsible for energy research activities in eight laboratories employing almost 1,000 workers (one of the labs was located at the University of Maryland, College Park campus). Bill also served as the U.S. representative to various international conference committees, a position that required foreign travel to most of the coal-producing nations in the world.

At the National Lutheran Home in Rockville, Md., where he presently resides, there are mementos on display, which Bill received from governments and heads of states. They include the gold medal for a distinguished career in U.S. government service, medals presented to him by the King of Belgium and the government of the Soviet Union, honors from European and Far East countries, as well as awards from the university.

Bill says that for a number of years, that he and his late wife, Jean, had "enjoyed the annual visit to our Florida residence by the university's past president, William E. Kirwan, and members of his staff." Crentz adds that "[these annual visits] continued under the leadership of president C. D. Mote, Jr." Inspired by these two leaders' dedication and vision for the university, Bill and Jean Crentz established a $1.5 million charitable remainder unitrust that will support the William L. Crentz Centennial Chair in Energy Research. "I have set aside this gift as my legacy to ensure that support for energy resources research continues," Bill says. "And it gives me great pleasure to know that [with this planned gift] a significant scholar and teacher can be recruited to Maryland."

TO LEARN MORE ABOUT CHARITABLE REMAINDER UNITRUSTS, 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**

Hatching the Terp Alumni Network

ONLINE COMMUNITY TO KEEP YOU CONNECTED

The Maryland Alumni Association has hatched the Terp Alumni Network, an online community that is free and open to all University of Maryland, College Park alumni—and to all members of the alumni association.

Last fall, the association launched two key features of the community, including an online directory to help you locate old friends and permanent e-mail so that your friends can also find you.

The online directory helps you to quickly locate others through a database of current biographical data and a powerful search engine. Through permanent e-mail, you maintain your very own Terp Alum e-mail address that forwards e-mail to your actual e-mail address, especially convenient if you have changed your Internet Service Provider or job.

The online directory and permanent e-mail are just the beginning of what promises to be an exciting forum in cyberspace. For more details and to register for the Terp Alumni Network, visit the alumni association's Web site at **www.alumni.umd.edu**. We look forward to keeping in touch with you through the virtual alumni community.

A. JAMES CLARK
SCHOOL OF ENGINEERING

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