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E@M

THE MAGAZINE OF THE A. JAMES CLARK SCHOOL *of* ENGINEERING

Our Students Shine

#1 in U.S., #2 Worldwide in Solar Decathlon

THE UNIVERSITY OF MARYLAND

STORIES

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Photo above by Prakash Patel
Large cover photo by Al Santos, others courtesy of LEAFHouse

Dear Alumni and Friends:

RECENTLY I HAD THE OPPORTUNITY to hear an inspiring presentation by student members of the University of Maryland chapter of Engineers Without Borders (EWB). To quote from their web site, EWB is a "non-profit organization that partners with disadvantaged communities to improve their quality of life through implementation of environmentally and economically sustainable engineering projects, while developing internationally responsible engineering students." Undergraduate and graduate students from all disciplines are welcome to join the chapter, and a large number of participants are Clark School students.

Engineers Without Borders provides students not only an incredible experience in practical engineering but a better understanding of their responsibilities to improve society.

One recent project was to bring electricity—and improved literacy—to the village of Tangsabla in the West African nation of Burkina Faso. The government has launched "Alphabetization" (literacy) centers in Tangsabla and other villages, but when people come to the centers after their work days, they must struggle to learn to read and write while using smoky lanterns. Our students and faculty advisors visited the village to learn its needs, and designed and installed a solar-powered system that solves the lighting problem and produces enough energy to charge villagers' cell phones. Other projects have taken students to northeast Brazil to assist in wastewater treatment problems and to Thailand to provide clean drinking water, among many examples.

Engineers Without Borders provides students not only an incredible experience in practical engineering but a better understanding of their responsibilities to improve society. Speaking for the Clark School, I would like to thank EWB faculty advisors such as Jungho Kim, Elisabeth Smela, Ilias Balaras, Peter Chang, and especially overall advisor Deborah Goodings, as well as people like Board of Visitors member Chuck Waggner who so generously support the chapter's work (see related story on page 13). For more information or to make a gift to EWB, contact Stewart Stabley at 301-405-8289 or Deborah Goodings at 301-405-1960.

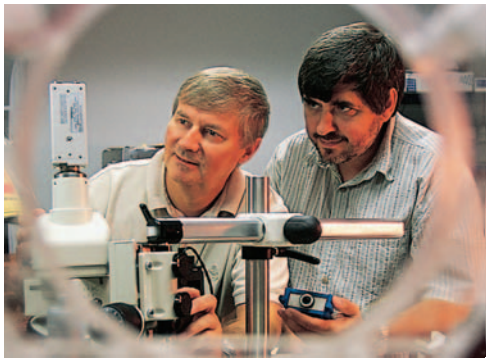
Herbert Rabin
Professor and Interim Dean

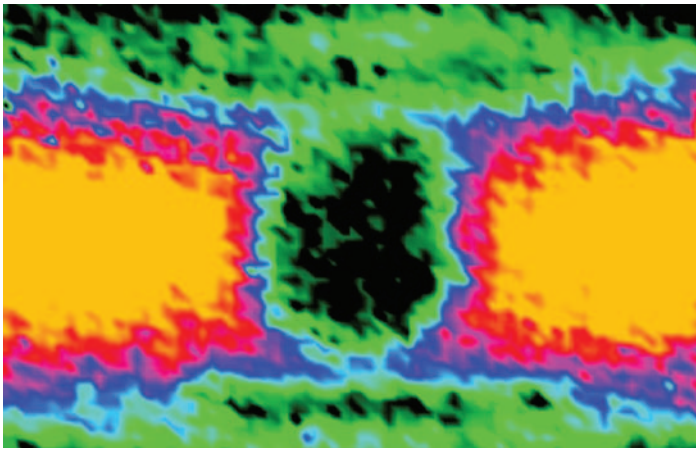
Clark School Researchers Create World's First Invisibility Cloak

Move over Harry Potter. A Clark School research team comprised of Visiting Research Scientist Igor Smolyaninov, Professor of Electrical and Computer Engineering Christopher Davis, and graduate student Yu-Ju Hung, has used plasmon technology to create the world's first invisibility cloak for visible light. The researchers have applied the same technology to build a revolutionary superlens microscope that allows scientists to see details of previously undetectable nanoscale objects.

The new cloak is just 10 micrometers in diameter; by comparison, a human hair is between 50 to 100 micrometers wide. Generally speaking, when we see an object, we see the visible light that strikes the object and is reflected. The Clark School team's invisibility cloak refracts (or bends) the light that strikes it, so that the light moves around and past the cloak, reflecting nothing and leaving the cloak and its contents invisible.

PHOTO BY JOHN T. CONSOLI.





Above: Christopher Davis (left) with Igor Smolyaninov. Left: The flow of energy around the cloaked region is visualized.

The research team has made use of the unique properties of metamaterials, artificially structured substances that help control electromagnetic waves in unusual ways. The cloak consists of a two-dimensional pattern of concentric gold rings coated in a plastic called polymethyl methacrylate. The plastic and the gold each have different refractive properties and bend plasmons—electron waves generated when light strikes a metallic surface—in different directions. The whole arrangement lies flat on a gold surface. By varying the mix of metal and plastic in different areas of the cloak, the team can control and guide plasmons around the cloak, as water in a stream flows around a rock.

The team's research has been included in *New Scientist* and in *Discover Magazine's* "Top 100 Science Stories of 2007."

ParaLeap Aims for New Era of Supercomputing

What do you call a desktop computer capable of computing speeds 10 times faster than current desktops? When Computer Engineering Professor Uzi Vishkin announced a new desktop supercomputer last year and held a contest to name it, the winning entry was "ParaLeap."

Vishkin's ParaLeap is based on parallel processing on a single chip, in a unique design which makes programming practical and simple for software developers. He believes his innovative parallel processing model holds great promise for revitalizing the ailing computer industry, possibly launching a new era of desktop supercomputing.

He says the name captures key elements of the new technology. "The name refers to a leap forward for desktop computing using parallel computing technology and it implies the real leap when the full-power computer based on the current prototype will be used and widely deployed."

Vishkin's research, funded by the National Science Foundation and the U.S. Department of Defense, has received significant interest from the computer industry. He is a recent winner of the Innovator of the Year Award from the *Maryland Daily Record*.

The winning name was submitted by Jaryd Malbin, a 21-year-old student at Franklin and Marshall College.

Uzi Vishkin made his technology available to local high school students to test ease of use.

Online 3D Training Game Prepares First Responders on I-95

A new tool developed by researchers at the Clark School's Center for Advanced Transportation Technology Laboratory (CATT Lab) could help save the lives of those involved in and responding to car accidents and other emergency situations.

The three-dimensional training game allows remote participants to interact online in various disaster and emergency situations from car accidents to chemical spills to mass casualty scenarios. "Every scenario has a moderator watching who can pause and resume the game to give feedback," says Michael Pack, director of the CATT Lab. The moderator can also throw in "hiccups" to test the reactions of players.

"The technology is designed to expose trainees to real-life situations and focus on their interactions with each other," says Captain Henry de Vries of the New York State Police. "The project provides incident responders from all disciplines the opportunity to train together in real time to learn the latest best practices in incident scene safety, coordination and quick clearance of highway events."

PHOTO BY MICHAEL PACK

Screen captures of the CATT Lab's new three-dimensional training game show first responders at an accident scene.

The research is funded by the I-95 Corridor Coalition, an alliance of transportation agencies, toll authorities and related organizations from Maine to Florida that provides a forum to address transportation management and operation issues. A steering committee made up of police officers, firefighters, emergency medical technicians and state transportation officials is developing training criteria for the game, which the coalition hopes to use to certify emergency responders. The coalition has devoted $1.4 million for the game's development and plans to provide more funding for its implementation. The system may be deployed up and down I-95 later this year.

Bentley Named Fischell Distinguished Professor

The Fischell Department of Bioengineering continues to solidify its position as a national leader in bioengineering with the naming of William Bentley, department chair, as the school's inaugural Robert E. Fischell Distinguished Professor. The renewable five-year professorship recognizes Bentley's sustained and influential scientific and scholarly work in the area of bioengineering.

"I am especially honored to hold a professorship in the Fischell name," says Bentley. "It's a name that stands for exceptional ingenuity and expertise, a commitment to improving life for millions of people and enormous generosity. I will do my best to live up to it."

The new professorship is part of the $31 million endowment by Fischell and his sons that created the Fischell Department of Bioengineering and the Robert E. Fischell Institute of Biomedical Devices and supports the university's *Great Expectations* campaign. The professorship provides the recipient resources and recognition to facilitate collaborations and significantly advance the department's research agenda.

Bentley and his colleagues recently won a competitive $2 million National Science Foundation grant to revolutionize the development and testing of therapeutic drugs. He is leading a group of researchers—from the University of Maryland Biotechnology Institute, the Maryland NanoCenter, the Institute for Systems Research and the Clark School's electrical and computer engineering and materials science and engineering departments—that is building devices to test new drugs using living, human biological components rather than "animal models."

The devices, which could significantly improve the accuracy and speed of drug development, serve as research environments that mimic the human body.

Drug researchers can input both a drug to be tested and specific human biological components, such as proteins or cells, and obtain multiple, simultaneous measurements of how those components respond to the drug to determine its potential success. "It will be an adaptable, multipurpose toolbox built using microfabrication techniques that are already the industry standard," says Bentley. His team is particularly focused on using the device to test drugs that may block cell-to-cell "quorum-sensing," a key process in the development of infections in the body.

PHOTO BY JOE COKER

Members of the Gessow family celebrated the legacy of Alfred Gessow and the anniversary of the Gessow Rotorcraft Center named in his honor. Pictured with the Alfred Gessow Medal, which recognizes significant contributions in rotorcraft, are, from back left, Alfred Gessow's sons Jory and Jody Gessow, wife Elaine Gessow and daughters Laura Goldman and Lisa Michelson.

Clark School Units Celebrate Milestone Anniversaries

Congratulations are in order for two Clark School departments and the Alfred Gessow Rotorcraft Center, all of which celebrate milestone anniversaries in 2007-2008.

Some 300 alumni, students, faculty and friends of the Gessow Center commemorated its 25th anniversary the weekend of November 30. Events included a welcome reception, a one-day workshop that highlighted key research activities and rotorcraft innovations and an anniversary gala. Workshop presenters included representatives from Sikorsky Aircraft Corporation, Boeing Corporation, NASA, the U.S. Army and Aero-Science Technology Associates.

"Thanks in large part to the vision of Alfred Gessow to create a rotorcraft center at Maryland and the Gessow family's generous gift, the Department of Aerospace Engineering has risen from a *U.S. News & World Report* ranking of 26th in the nation in 1982 to 10th in the nation in 2007," says Darryll J. Pines, professor and chair of the aerospace engineering department. Most recently, Thomson Scientific's *Sci-Bytes* ranked the department number one in the country based on tracking aerospace journal articles. To learn more about the anniversary events and see photos, visit www.aero.umd.edu.

Civil and ECE Centennials

The centennial anniversary celebration for the Department of Civil and Environmental Engineering (CEE) is right around the corner with a range of events slated for early April. An April 4 reception will welcome guests to campus, and a symposium on the future of civil engineering is set for April 5, capped off by a centennial gala that evening. The department's plans received a tremendous boost late last year with a $25,000 gift from A. James Clark, B.S. '50, civil engineering, honorary doctorate of science '92, chairman and CEO of Clark Enterprises, Inc. and longtime Clark School benefactor. He plans to attend the Centennial Gala as well. Whiting-Turner is co-sponsoring the CEE festivities and has also made a $25,000 gift to the department. For more information, visit www.civil.umd.edu/centennial.

The Clark School's Electrical and Computer Engineering Department celebrates its 100th anniversary this year as well. The department launched its celebrations in November, attracting nearly 200 participants to an Institute of Electrical and Electronics Engineers GlobeCom Networking Reception held at the Jeong H. Kim Engineering Building. The department is planning a series of activities for a centennial celebration weekend in late September. Events on the drawing board include an alumni reception and panel events on the future of communications systems, energy and nanotechnology, featuring industry experts, and a major gala at the Riggs Alumni Center. For details, visit www.ece.umd.edu.

Mechanical Engineering (ME) Professor **SHAPOUR AZARM** received the 2007 Design Automation Award from the American Society of Mechanical Engineers (ASME) for his contributions to research in design automation, specifically in computational design optimization and engineering design decision-making.

AVRAM BAR-COHEN, ME chair and distinguished university professor, was elected an honorary member of ASME for his contributions to the thermal management of electronic components and systems. The only other ASME honorary member at the university is President C.D. Mote, Jr.

The Society of Fire Protection Engineers presented Fire Protection Engineering Professor Emeritus **JOHN L. BRYAN** with its first Mentoring Award. The John L. Bryan Mentoring Award recognizes commitment to mentoring that enhances the practice of fire protection engineering.

Professor **RAMA CHELLAPPA**, electrical and computer engineering (ECE)/computer science/University of Maryland Institute for Advanced Computer Science (UMIACS), received the Clark School's Outstanding Faculty Research Award for innovative research in pattern recognition and signal processing, which has included advances in human gait and face recognition and the development of intelligent surveillance applications.

Assistant Professor **THOMAS MURPHY** (ECE) won the Clark School's E. Robert Kent Outstanding Teaching Award for Junior Faculty for his passion for education, his versatility as an instructor and the supportive environment he creates in the classroom.

ECE Assistant Professor **EDO WAKS** received a three-year Army Research Office Young Investigator Award, which recognizes young faculty who show exceptional promise for creative research. Waks's interests include the application of photonic crystals to quantum information processing and as practical tools in optical telecommunication and sensing.

Associate Professor **MIN WU**, ECE/UMIACS/Institute for Systems Research (ISR), was selected as one of *Computerworld's* 40 innovative IT people under the age of 40 for her research in information security forensics.

Assistant Professor **MIAO YU**, ME/ISR, received the Air Force Office of Scientific Research Young Investigator Program Award to study the development of fly ear-inspired sensors on a micro-opto-electro-mechanical system platform for use in micro-air-vehicles.

Books and Editorships

The Institute of Electrical and Electronics Engineers (IEEE) has appointed ECE Professor **VIRGIL GLIGOR** as editor-in-chief of *IEEE Transactions on Dependable and Secure Computing*, one of the top journals in the field of computer engineering.

Professor **VICTOR GRANATSTEIN**, ECE/Institute for Research in Electronics and Applied Physics, has authored a new book titled *Physical Principles of Wireless Communications*.

ECE Associate Professor **BRUCE JACOB** is the lead author of a new book on computer engineering titled *Memory Systems: Cache, DRAM, and Disk*. The book is the first to comprehensively cover the logical and physical design, operation, performance characteristics, design trade-offs and energy consumption of modern memory hierarchies.

Fischell Department of Bioengineering Professor **ART JOHNSON** is publishing a new textbook scheduled to hit classrooms in time for the Fall 2008 semester. *Biology for Engineers* presents a new approach to teaching biology to engineering students.

Professor **K.J. RAY LIU**, ECE/ISR, co-authored a new book titled *Network-Aware Security for Group Communications*, which serves as a reference on securing group communications in emerging networks and in future applications. Liu's co-authors are two former students, **YAN SUN**, M.S. '03 and Ph.D. '04, electrical engineering (EE), and assistant professor of ECE at the University of Rhode Island, and **WADE TRAPPE**, Ph.D. '02, applied mathematics, and associate professor of ECE at Rutgers University. Liu also co-authored a book with former student **W. PAM SIRIWONGPAIRAT**, M.S. '01 and Ph.D. '05, EE, titled *Ultra-Wideband Communications Systems: Multiband OFDM Approach*.

Fellows

Associate Professor **CHRISTOPHER CADOU**, aerospace engineering, has been named an associate fellow of the American Institute of Aeronautics and Astronautics.

ECE Professor **MARIO DAGENAIS** was named a fellow of the Optical Society of America for his work in quantum optics and nonlinear optics of gases and semiconductor devices and for the development and integration of active semiconductor devices.

Professors **MICHAEL FU**, Smith School of Business/ECE/ISR, and **ALEXANDER BARG**, ECE/ISR, have been elected fellows of IEEE. Fu's contributions to stochastic gradient estimation and simulation optimization and Barg's work on coding theory were recognized.

Professor **BONGTAE HAN**, ME, and Associate Professor **S.K. GUPTA**, ME/ISR, have been elected fellows of ASME. Han is recognized for his work in the measurement and interpretation of thermo-mechanical deformations of microelectronic and photonic devices. Gupta's election recognizes his contributions to the field of computer-aided design and manufacturing through the incorporation of application-specific intelligence into geometric reasoning algorithms.

Department of Materials Science and Engineering Associate Professor **LUZ MARTINEZ-MIRANDA** has been elected to fellowship in the American Physical Society.

Professor **PATRICK G. O'SHEA**, chair of ECE, has been elected a fellow of the American Association for the Advancement of Science.

PHOTO COURTESY OF FEDERAL EMERGENCY MANAGEMENT AGENCY

By Nancy Grund

Learning From— and Working With—Nature

The Clark School Leads Environmental Efforts Nationwide and in Maryland

The images from New Orleans were heartbreaking— in a city with large areas below sea level, massive destruction of life and property caused by Hurricane Katrina and by the failure of levees to contain its storm surge. Could another catastrophe loom across the country in California's Central Valley, where poorly built levees risk flooding that could cause extensive loss of life and billions of dollars in damages? And, here in Maryland, can we find better ways to protect our Chesapeake Bay from pollutants and maintain the Port of Baltimore as a crucial economic asset?

Today, Clark School faculty members and students are helping to answer the questions raised by Katrina and to anticipate and solve water and waterway problems around the nation and the state. By learning how nature works, by designing infrastructure and technologies that reflect that knowledge, and by leading policy-making and public awareness efforts, they are helping to ensure that we use natural resources in more sustainable ways and protect against future disasters.

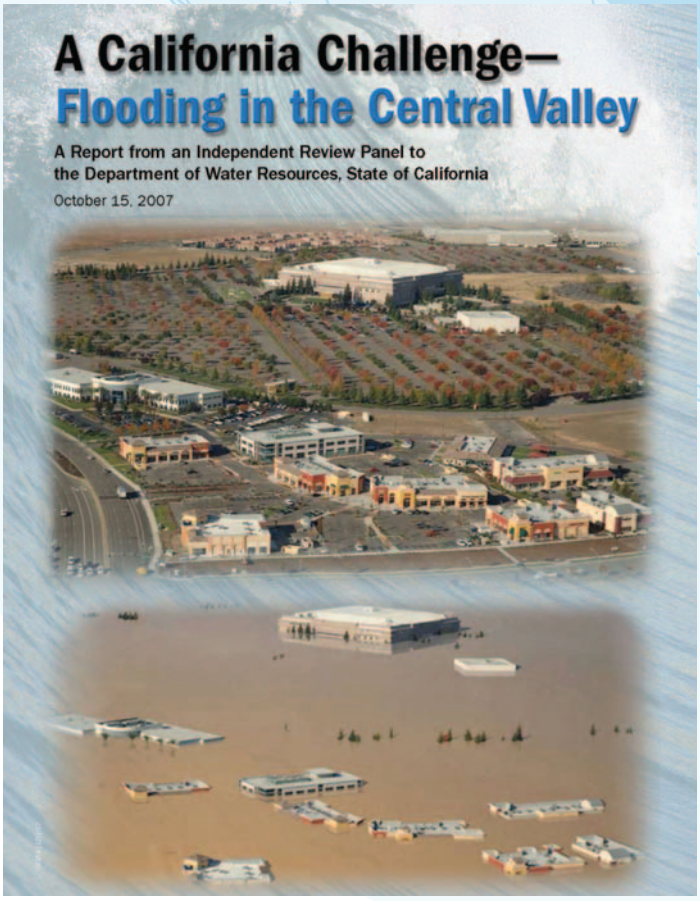
From Gulf Coast to California: Formulating Environmental Policy

As director of the Interagency Performance Evaluation Task Force commissioned by the Army Corps of Engineers, Lewis E. Link, Jr., senior research engineer in civil and environmental engineering (CEE) and risk management expert, has led some 300 people from 25 universities, 25 private firms and nearly a dozen government organizations in a forensic analysis of Hurricane Katrina and its aftermath.

Using on-site inspection and computer modeling, the task force has studied 350 miles of hurricane protection structures with some 90 pump plants and numerous floodgates. Members worked to understand why levees and flood walls failed, to make risk-based recommendations for redesign and repair, and to provide Internet-accessible risk assessment for residents. "Risk-based design and decision support is a big step forward," Link has stated. "If we can carry through and institutionalize it… it will facilitate that cultural change the Corps wants to go through." Link, the recipient of the *Engineering News-Record* Award of Excellence for his task force leadership, says the nation's lack of a comprehensive national water policy and risk assessment policy makes it critical for environmental engineers "to be much more proactive in formulating and implementing policy."

Gerry Galloway, Glenn L. Martin Institute Professor of Engineering and a former Army Corps of Engineers general who dealt with Mississippi River levees, recently chaired a panel of 13 national flood experts in a review of the levee system of California's Central Valley. The report cited the high risk posed by the area's aging and inadequate floodplain management system as a "disaster waiting to happen," and provided a roadmap for improvement. "As engineers build and upgrade flood damage reduction systems, we must always look at the ever-changing hazard and the long-term ecological and biological consequences of these actions," says Galloway, who will receive the 2008 ASCE Outstanding Projects and Leader Lifetime Achievement Award and deliver the Second Annual Gilbert F. White Lecture in the Geographical Sciences at the National Academy of Sciences this spring.

PHOTO BY ANITA LINK



Ed Link, pictured at the site of the new surge gates and pumping station at the end of the 17th Street Canal in New Orleans. The gates were prescribed to prevent hurricane surge from entering the outfall canals that are used to drain rainwater from the city. Right, The report released by a panel of experts chaired by Gerry Galloway. Below, Alba Torrents (right) and graduate student Natasha Andrade apply biosolids to Maryland farmland to study chemical reactions in the soil.

Fighting Wastewater Contaminants

For more than a decade, CEE Professor Alba Torrents has worked with the Agricultural Research Service of the U.S. Department of Agriculture to minimize the effects of pesticides in the environment. Recently, her research has focused on the persistence, toxicology and mobility of organic pollutants found in rivers that receive significant amounts of municipal wastewater. Her goal is to track and document the survival capacities of wastewater-derived contaminants.

The problem, Torrents explains, is that "wastewater treatment plants are not equipped to filter many of today's pharmaceuticals, personal care products, surfactants and flame retardants," resulting in new resistant chemicals in wastewater. Torrents and her team of Clark School undergraduate and graduate students are searching for microorganisms that can help to minimize the chemical buildup.

PHOTO BY AL SANTOS

Two other researchers are working to improve wastewater treatment facilities. Funded by the District of Columbia Water and Sewer Authority, CEE Associate Professor Eric Seagren, in collaboration with Jennifer Becker, an assistant professor in environmental science and technology in the College of Agriculture and Natural Resources, developed a strategy for improving the process used to stabilize the biosolids produced at the Blue Plains Advanced Wastewater Treatment Plant, the largest facility of its kind in the United States. Their work has led to new measures for evaluating the quality of lime-treated biosolids and helped the Blue Plains facility consistently make a product with low odor that meets the EPA's criteria for safe land application as a fertilizer.

Battling Underground Toxins

Seagren and Becker also study underground contaminants, developing new methods to control how naturally occurring bacteria dissolve toxic chemicals.

Seagren works in the area of *in situ* bioremediation, using microorganisms to treat soil and groundwater contaminants in place, particularly nonaqueous phase liquid contaminants, such as petroleum products and chlorinated solvents. Most recently, with support from a National Science Foundation (NSF) CAREER Award, Seagren has examined ways to predict what processes control how fast bacteria can transform contaminants. This work has incorporated theoretical and experimental investigations, including experiments in a model aquifer for simulating groundwater flow in the laboratory and a field experiment at a former landfill site. Ultimately, his work could lead to more

PHOTO BY AL SANTOS

Jennifer Becker is developing new methods to dissolve toxic chemicals in groundwater.

informed use of *in situ* bioremediation in the field.

High concentrations of toxic chemicals in groundwater are grave concerns, particularly in rural areas that rely on wells for drinking water. Becker works with one species of bacteria—*Dehalococcoides ethenogenes*—that can break down two common, possibly carcinogenic, contaminants: tetrachloroethene and its chemical cousin trichloroethene. *D. ethenogenes* can detoxify these chemicals by itself under laboratory conditions, but in polluted groundwater systems, additional bacteria that transform these contaminants to other hazardous compounds may be present and compete with *D. ethenogenes* for the contaminants and other materials that it needs to grow. Becker's work focuses on understanding the factors that control which organism will be successful in the fight for resources in contaminated groundwater and using that information to develop strategies for engineering site conditions that lead to complete detoxification of the contaminants. Her work is funded by an NSF Presidential Early Career Award for Scientists and Engineers.

Improving Stormwater Quality

Urbanization has increased the volume and amount of pollutants in the water that runs off roads, parking lots and rooftops. CEE Professor Allen Davis has concentrated much of his work on improving stormwater quality through bioretention (or rain gardens), a low impact development (LID) management practice that uses natural porous media to filter and cleanse stormwater. Davis has guided the construction of rain gardens on campus parking lots from which stormwater runs into nearby Campus Creek. The gardens act as filters removing toxins, such as automotive oil and grease, and preserving the creek's integrity by reducing the volume and velocity of water entering the stream.

In another collaboration with Seagren, this one funded by the Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET), Davis is studying how disease-causing microorganisms can be removed from stormwater and how they react when trapped in a bioretention soil mixture. At the Agricultural Research Service in Beltsville, Davis is developing portable mats that will remove toxic metals from a building's runoff.

Davis is now working with colleagues from Villanova and North Carolina State University on another CICEET project to monitor and understand the performance of different bioretention systems in the mid-Atlantic region. The goal is to refine system designs and

In the Right Place at the Right Time

Mechanical Engineering Professor Reinhard Radermacher launched the Clark School's Center for Environmental Energy Engineering (CEEE) in 1991, well ahead of the current green movement. "We are in the right place at the right time," he says, noting rising interest in the center's work on air conditioning, heat pumping and energy conversion systems as well as new sources of energy. (See related story, Fall 2006 *E@M*.)

At the center's Cooling, Heating and Power (CHP) Integration Test Facility, based in the real-life environment of the campus's Chesapeake Building, new applications have resulted in energy savings for homeowners, business and industry. More than 30 corporate partners now bring their own projects to the center.

Another program is the center's Small Autonomous Energy Systems group, which is improving the cost and efficiency of truck cab heating and cooling systems to comply with California regulations against engine idling. "Traditionally, drivers heat and cool their living quarters using systems that draw power from the idling main truck engine, which generates harmful emissions and increases fuel costs," says Radermacher. In a project supported by organizations such as the U.S. Army, Ballard Power Systems, Sanyo and Thermogy, the center is developing a lightweight, energy-efficient heating and cooling device to recycle heat from the truck's radiator.

The center's "ultimate technology transfer tool" is software that helps partner organizations minimize energy costs and maximize efficiencies. "We design software with integrated genetic algorithms that employ the concept of evolution in searching for the best design for heat exchangers and air conditioning systems," explains Radermacher.

Always looking to the natural environment for engineering solutions, Radermacher shared one such idea that helped the university's Solar Decathlon entry, LEAFHouse (see related story, p. 11), take first among U.S. schools and second worldwide, and has given birth to a student start-up company. His idea is to use an interior fountain or waterfall as a natural dehumidifier, reducing the work air conditioners must perform in cooling a house. The waterfall contains a dessicant, such as calcium chloride, to absorb moisture directly from the air around it. When the dessicant reaches capacity, it is renewed by heat from solar hot water collectors and returned to the waterfall. Tyler Sines, B.S. '08, mechanical engineering, and several team members successfully applied the idea to LEAFHouse. "Part of the challenge for LEAFHouse was to keep the humidity within a certain range," says Sines. "Within minutes of activating the waterfall in the house, humidity levels noticeably dropped." Sines is now refining the concept as a modular unit that can be easily installed.

PHOTO BY DEREK WINOGRADOFF

Rain gardens developed by Allen Davis remove toxins from stormwater.

develop a model to predict the effects of implementing large-scale LID systems.

Funded by the Maryland State Highway Administration (MSHA), Davis is also monitoring the use of grass swales along major highways to improve water quality. David M. Ayres, PhD '03, CEE, who founded Tate Incorporated to provide education, safety and hazard training and development services to government agencies, recently contracted with Davis to model the use of swales and bioretention for environmental improvement. "The coupling of mathematical modeling with empirical studies represents the best approach to solving future environmental engineering problems," notes Ayres. "The ultimate goal is to better understand the bioretention environment and how we can improve the physical design of these low impact treatment systems."

Engineering New Uses for Waste

In a study supported by the MSHA and the Maryland Department of Natural Resources, CEE Associate Professors Ahmet Aydilek and Eric Seagren are investigating the use of petroleum-contaminated soils in geotechnical construction and transportation. "The soils could possibly be used to build reactive barriers or underground vertical liners that serve as cutoff walls and limit the movement of contaminated sources that have leaked from underground storage tanks," Aydilek explains.

In an NSF-funded project that examines the "microbial cementation" of soils, the team seeks to stabilize poor quality soil with microbes to increase its strength and make it a good platform for roads or runways. In lab studies, soil strength increased sixfold as a result of microbes precipitating calcium in the soil, offering a natural, sustainable design improvement that preserved original soil biology.

Aydilek recently completed a project on alternative ways to handle sediments dredged from the Chesapeake Bay and frequently disposed of on manmade islands. The study, funded by the Maryland Water Resources Research Center, evaluated the re-use of bay sediments in two important geo-environmental applications: slurry walls and landfill liners. In another MSHA study, Aydilek and his team investigated the suitability of soil and cement mixtures that contain fly ash, a by-product of coal combustion, for highway applications.

He is also working on a project to dewater and consolidate contaminated sediments from Baltimore's harbor for possible use in a pavement system or landfill. "Geotubes," large cylinders made from geotextiles, may be filled with dredged silty soils. Using image analysis tools to evaluate the geotubes' pore structures, he is determining the filtration and settlement properties of the dredged materials they contain.

Managing Finite Resources

Clark School researchers are poised to play significant roles in devising viable environmentally sound alternatives for managing the nation's finite resources. "Climate change and the issues that go with it will fuel continued demand for environmental engineers," says Ali Haghani, professor and CEE chair, who notes that environmental engineering is among the hottest fields in engineering today. "Our faculty members are recognized leaders in their fields, and our location, close to national partners such as the EPA and the USDA, gives our professors and students unique opportunities for collaboration and for continuing to take leading roles in policy development."

Nancy Grund is editor of E@M.

Leader in Geotechnical Engineering Joins Innovation Hall of Fame

Krizek's International Slurry and Grout Standards Guide Marine Dredging

Last October, Raymond J. Krizek, M.S. '61, became the first civil engineer to be inducted into the Clark School's Innovation Hall of Fame. Krizek, the Stanley F. Pepper Professor of Civil Engineering at Northwestern University, has made essential contributions to geotechnical engineering and the field of slurry mechanics. The first chair of the Geotechnical Institute of the American Society of Civil Engineers, he created standards that guide such environmentally challenging projects as marine dredging, port management and island restoration in the Chesapeake Bay and around the world.

During his induction remarks, Krizek expressed pride in his profession and was especially honored "to be the first civil engineer to join this eminent group of outstanding engineers who have contributed so much in so many different ways to improve our quality of life."

The 2007 Charles and Helen White Symposium on Engineering Innovation followed the induction. One of the speakers, Frank L. Hamons, Jr., deputy director of the Maryland Port Administration's Harbor Development Department, discussed how he has utilized Krizek's innovations in his own work in the Baltimore Harbor, overseeing the dredging of 5.6 million yards of channel annually.

To learn more about the Innovation Hall of Fame, see www.eng.umd.edu/ihof. To watch the White Symposium, see www.eng.umd.edu/events/white.html.

PHOTO BY AL SANTOS

PHOTO BY AL SANTOS

PHOTO BY COURTESY OF LEAFHOUSE

PHOTO BY AL SANTOS

Above left, the LEAFHouse team celebrates their win. Lower left, students assemble LEAFHouse on the National Mall. Above, the green wall of plants filters rain water from the roof to feed the adjacent grey-water garden.

Our Students Shine

#1 in U.S., #2 Worldwide in Solar Decathlon

Two years of grueling work, of gaining invaluable hands-on experience in practical engineering and project management, have paid off handsomely for the University of Maryland. In the 2007 International Solar Decathlon sponsored by the U.S. Department of Energy, LEAFHouse, the university's beautifully designed and engineered entry, placed first among U.S. teams and second only to Technical University of Darmstadt, Germany. LEAFHouse (Leading Everyone to an Abundant Future) also won the BP Solar People's Choice Award as the favorite entry of the thousands of visitors to the competition site on the National Mall in Washington, D.C.

The objective of the Solar Decathlon is to build an 800-square-foot, fully functional, solar-powered house that produces more energy than it uses. Participating universities represented 16 states, Puerto Rico, Germany, Spain and Canada. Judges ranked each house on 10 criteria. The Terp team, made up of architecture, engineering, landscape architecture, communications, business and other students, won the communications contest and garnered second in architecture, market viability and

PHOTO BY AL SANTOS

Above and left, students provide tours of LEAFHouse.

PHOTO BY AL SANTOS

lighting. LEAFHouse was one of seven teams to score a perfect 100 points in the energy balance contest.

"The LEAFHouse team demonstrated that the way forward to a more responsibly built environment is through multidisciplinary, integrated, holistic design. The level of collaborative, out-of-the-box thinking that this team achieved is found in only the most sophisticated of professional design entities," says Amy Gardner, associate professor of architecture, who served as a faculty advisor on the project along with Kaye Brubaker, associate professor of civil and environmental engineering, and Julie Gabrielli, adjunct professor of architecture.

The house's photovoltaic system, spanning most of the sloped roof, provides 100 percent of the electrical energy to the home, while solar hot water tubes, also roof-mounted, provide heated water for the bathroom, kitchen and laundry. All systems are overseen by an adaptive control energy monitor system. The most innovative feature of the Maryland house is an indoor waterfall incorporating a liquid dessicant dehumidifying system—the first such system used in a residential application. (See related story, p. 9). A separate system handles the recycling, filtering and storage of water.

During the project's two-year duration, courses were offered through the Clark School, the School of Architecture, Planning and Preservation and the Department of Communications in the College of Arts and Humanities to equip students with basic green design concepts and marketing skills.

LEAFHouse is now back on the College Park campus with plans in the works to re-assemble the house and use it as office and meeting space for the Potomac Valley Chapter of the American Institute of Architects.

The university placed fourth in the 2002 Solar Decathlon and won the People's Choice Award in 2005.

PHOTO BY AL SANTOS

PHOTO BY COURTESY OF LEAFHOUSE

Left, the 34 photovoltaic panels on the roof each generate 205 watts of electricity. Right, students install the automatically adjusting window louvers, each containing its own solar cell.

Clark School Campaign Donors Support Unique Interests

Great Expectations: The Campaign for Maryland, the university's seven-year fundraising initiative, continues to make unprecedented progress, closing in on the midpoint of its $1 billion campaign goal. The Clark School is, to date, the largest contributor to that total, raising some $118 million toward its $185 million goal. Major fundraising initiatives like *Great Expectations* succeed when they inspire and involve donors at all levels. As the following stories show, the Clark School's donors have found meaningful giving opportunities among the school's many programs and activities, and made a variety of generous gifts to support them.

Helping Students to Help Others

Charles E. "Chuck" Waggner, B.S. '54, chemical engineering, had very little contact with his alma mater for more than 20 years until he was invited by former Dean William Destler to join the school's Board of Visitors more than a decade ago. It did not take long for Waggner to appreciate the Clark School's rapid progress, and he generously demonstrated his enthusiasm by providing scholarship funding.

Charles E. "Chuck" Waggner

Last year at a Board of Visitors meeting, Waggner heard a student presentation that made an immediate and lasting impression. "I was very familiar with the Doctors Without Borders group and knew that was a great program to follow and to emulate," explains Waggner. "When I heard students talk about their experiences working with Engineers Without Borders, I was intrigued—and inspired."

On the spot, he made a $5,000 gift commitment to the Clark School's chapter of the organization. "This gift was as close to spontaneous as they come," says Waggner.

The Clark School chapter is an affiliate of the national nonprofit organization that assists communities with engineering needs while training internationally responsible engineering students. Members of the chapter have assisted in efforts that have taken them from Northern Thailand to a South Dakota Indian reservation. Students gain experience in a range of engineering projects from laying pipeline in an area where residents have never accessed fresh water to installing septic systems.

"I wish I had the opportunity to participate in something like this 55 years ago," relates Waggner. "It must be wonderful to begin and complete a project and to see the instantaneous benefit you can bring to people through so many of the engineering fundamentals we take for granted in our society."

Waggner hopes the chapter expands to include alumni of the Clark School and students from other disciplines who can share their expertise. "There is a great deal of personal satisfaction in seeing programs like this one develop. My financial commitment is secondary to the commitment of so many people that has taken the Clark School from good to great to true excellence."

A Beneficiary Turned Benefactor

Rodney A. Harrill, B.S. '68, civil engineering, believes the direction of one's life is shaped by a few key decisions. One of his critical decisions was choosing to attend engineering school at the University of Maryland. "My education at Maryland was a significant experience in my life," recalls Harrill, who went on to enjoy a 35-year career at the company now known as ExxonMobil.

Rodney A. Harrill

"In a company like Exxon you work with people from the very best universities all over the world," explains Harrill. "My Maryland education put me in good stead with any of my colleagues."

The first person in his family to attend college, Harrill relied on scholarships to help fund his education. "Part of my belief system is that you give to an organ-

ization that has given to you," he professes. He has demonstrated those beliefs with a number of generous gifts to the Clark School over the years, all of which were matched three to one by ExxonMobil.

Following his strong history of unrestricted giving, he established the Rodney A. Harrill Endowed Scholarship three years ago with an initial $50,000 gift. He has subsequently increased the fund to $100,000.

"There is a great deal of satisfaction in supporting a school that supported me," says Harrill, who traveled the world and moved 14 times with his wife and three daughters before retiring from a senior executive position with Exxon. "I am fortunate to be at a point in my life where I can make these types of gifts."

Thankful for his wonderful career, Harrill admits, "It is one of those things I never would have predicted. But having a sound education was a good way to start."

Creating a Legacy

Close to nine years ago, Gloria J. and Ronald V. Murad lost two sons, Michael and Matthew, in a tragic car accident. In honor of Michael, B.S. '80, chemical engineering, the Murads established the Michael P. Murad President's Scholarship in Chemical Engineering at Maryland.

"Michael was very much for education," recalls Gloria. "He had a great mind for engineering," notes Ronald. Following graduation, Michael took a position with Hess Oil Company at a refinery in St. Croix, Virgin Islands. He went on to join a contractor in Saudi Arabia, before returning to the U.S. and a job with the Mobil Oil Company. He later transferred back to Saudi Arabia, where he excelled as a process control engineer designing refinery controls.

"We had set aside money to give our sons and we thought there was no better way to remember them than to establish scholarships in their names," describes Ronald. "We hope to help

Facility Additions and Renovations Improve Research and Education

In its never-ending quest to provide the very best environment for its research and education programs, the Clark School is engaged in facilities projects ranging from a major building addition to numerous renovations, supported by the generosity of individuals and corporate partners.

New Fischell Wing Connects Bioengineering and Fab Lab

Construction is now complete on a new wing of the Jeong H. Kim Engineering Building that houses two laboratories and administrative office space for the Clark School's Fischell Department of Bioengineering.

The second floor of the Kim Building has been expanded to create a 6,000 square-foot wing for one of the fastest growing bioengineering departments in the nation. Funded by an earlier gift from the Fischell family and the university, the wing creates lab space for the department's rapidly growing faculty and office space for administrative staff.

PHOTO BY AL SANTOS

Yu Chen, center, sets up his lab in the new Fischell Wing of the Kim Building.

"Our new space was added directly adjacent to the Kim Building Fab Lab, which is part of the Maryland NanoCenter," describes Robert E. Fischell Distinguished Professor and Department Chair William Bentley. "We recognize that the next generation of biomedical devices will come out of the synergy between bioengineering and microfabrication. We are positioned to take advantage of these two related fields and to foster increasing partnerships in these areas. (See related story, p. 3).

The new space, which includes wet labs, was designed to allow researchers to tailor the labs to their specific needs. Assistant Professor Yu "Tim" Chen, who studies biomedical optical imaging to improve early disease detection, and Associate Professor Bruce Yu, who researches microsensors to aid the repair and rehabilitation of injured musculoskeletal tissues and studies the delivery of radio-pharmaceuticals, will share the lab space with two new faculty members.

A formal ribbon-cutting ceremony for the new wing is scheduled for April 11 as part of the second annual Fischell Festival. Visitors can tour the facilities and attend the unveiling of a portrait of benefactor Bob Fischell and his three sons. For more information, visit www.bioe.umd.edu/fischellfestival.

Hillman Center Fosters Transfer Student Community

When the Hillman Entrepreneurs Program was designed, Program Director Karen Thornton stressed the importance of "community" to the success of the program. Funded by a $1.7 million gift from David and Suzanne Hillman, the program offers a new model in education: Scholarships are offered to students at Prince George's Community College who transfer to the university upon completion of their associate's degrees. "For transfer students, this sense of community is particularly critical," explains Thornton, who is also associate director for entrepreneurship education for MTECH ventures.

PHOTO BY AL SANTOS

Students in the Hillman Entrepreneurs Program access technology in the new center.

With funding from the Clark School, MTECH and university administrators, Hillman students now have a place to call their own. As Stanley Ohaka, a Hillman student who is a computer science major preparing for computer engineering,

Gloria J. and Ronald V. Murad

as many needy students as we can." Gloria concurs, "This was a good way for us to memorialize our sons."

The Murads continue to support the Clark School scholarship they established with a $100,000 gift. Their most recent gift of securities brought the scholarship total to more than $200,000. "At the school's scholarship luncheons, we have met the nice kids who have good lives in front of them thanks to this scholarship," says Ronald. "We receive their 'thank you' notes and they tell us they could not have completed school without our help. That is gratifying."

Gloria acknowledges that, "Our sons are always with us." Ronald agrees and believes "creating this legacy was one of the best things we could have done." In addition to his parents, Michael is survived by his wife and three children, one of whom is currently studying to become an engineer, and another brother Stephen.

confirms, "The Hillman Center is beyond doubt a safe haven for me. It is a place for late night studying, relaxing, and for meeting my tutor. It is no wonder I feel so at home here."

Located on the third floor of the J. M. Patterson Building, the Hillman Entrepreneurs Center serves as both a professional and academic workspace, replete with a seminar room, modern computing facility, and lounge area with kitchen amenities. A special "Idea Room" conceived by Hillman students as a "garden where ideas can grow," offers a casual and comfortable meeting place for brainstorming.

Advanced Engineering Education Expands Support

The J. M. Patterson Building is also the new home for the Clark School's Office of Advanced Engineering Education (OAEE). "The expansion and renovation were due to the tremendous growth over the last few years in the Professional Master of Engineering Program (ENPM) and Graduate Certificate in Engineering programs," says Paul Easterling, associate director of the office. ENPM is a practice-oriented, part-time graduate program to assist engineers and technical professionals in developing their careers and gaining the expertise for a rapidly changing work world. "The move to the J. M. Patterson Building has allowed us to expand our infrastructure so that we can continue to give outstanding program support to our campus-based students while adding staff to handle the increase in our online programs."

The former lab and storage space has been renovated to accommodate a suite of three offices and a conference room. A new welcome area is now available for meeting and greeting new students.

"One of the reasons we created the space was to give students and faculty access to office space for meetings after hours. Over time, this will become an incredibly busy place," says George Syrmos, executive director of the office, who notes the project was funded by the OAEE and the Office of the Dean.

Syrmos points out that since OAEE began offering courses in 1994, "We have witnessed a 20-fold increase in credit hours and a 10-fold increase in the number of students—now totaling 486." New online offerings are expected to generate continued growth for the advanced education programs.

Productive Partnerships Fuel Growth for Fire Protection Engineering

The new FM Global Welcome Center in the Department of Fire Protection Engineering (FPE) is providing a convenient, comfortable setting for prospective students, visitors and members of the department. Housed in the FPE space on the third floor of the J.M. Patterson Building, the center includes a flat-screen display with information on careers in the field, research activities within the department and other major research facilities. Surrounding graphics highlight the challenges and opportunities in FPE and showcase program alumni.

The center was funded by a gift from FM Global, a leading commercial insurance company, which has also supported the construction of and equipment for the new FM Global Fire Phenomena Laboratory. The lab, set to open this summer, will provide state-of-the-art facilities for conducting sophisticated laboratory-scale fire experiments, including a salt-water facility for exploring induced fire flows, a modular workplace for a variety of bench-scale experiments, and other advanced diagnostics.

PHOTO BY AL SANTOS

Fire Protection Engineering students relax in the FM Global Welcome Center.

This fall the FPE department unveiled the upgraded UL Fire Modeling Laboratory, sponsored by Underwriters Laboratory Inc. The lab, located in a spacious room near the department lobby, includes 12 workstations for general use and four workstations for fire modeling projects. The UL Laboratory will provide access to parallel computing power to assist students and faculty in solving large computational problems.

A Boost for Socially Responsible Start-ups

New Fund Rewards Student-run Companies That Benefit Society

by Beth Panitz

A new fund is inspiring Clark School and other University of Maryland students to become agents of change as they pursue their entrepreneurial dreams. The Impact Pre-Seed Fund offers grants, in $500 to $5,000 increments, to students in the university's Hinman CEOs and Hillman Entrepreneurs programs who present business plans for new companies that benefit society. The fund is supported by a $250,000 gift from engineer and entrepreneur Warren Citrin, co-founder of Solipsys Corp., a firm that specialized in U.S. Department of Defense data integration and display software before being acquired by Raytheon as Raytheon Solipsys.

"The purpose of the Impact Pre-Seed Fund is to motivate student entrepreneurs to innovate and think creatively about starting companies that have some positive influence on the world," says Citrin, now CEO of Gloto Corporation, which specializes in cell-phone applications. Potential companies could specialize in any field from the environment to education to health care. Grants can be used to fund prototype design, patent applications and marketing research or other components of the product development process.

"Ultimately," says Citrin, "the idea is to encourage entrepreneurship, but I want to show students that businesses can be viable and successful, and create jobs, yet still exhibit social responsibility." He recognizes that engineering students play a key role in the entrepreneurial process. "Developing a product, by its very nature, fits into the engineering concept," says Citrin. "You have to build something; you have to design something. That requires engineering talent."

Citrin is eager to facilitate relatively simple, low-tech solutions for big, societal problems. As an example, he points to an inventive, new bicycle rental program in Paris that has transformed that city into a biker's haven, reducing air pollution while encouraging fitness. "Students may be better able to think of solutions than a 56-year-old like me, because they are plugged into current trends and technology," he admits.

The Pre-Seed Fund awarded its first grant this fall to Impact Education, a student-run company that developed the MacroMEMS Educational Kit, the first-ever, hands-on learning experience for microelectromechanical systems (MEMS) that does not require the sterile environment of cost-prohibitive clean rooms.

"Clean rooms cost millions of dollars to build and thousands of dollars per student to maintain. Our kit costs only $250 per student per semester," says Peter Orlicki, B.S. '08, computer engineering and finance, and president and CEO of Impact Education. A team of students developed the MacroMEMS kit inspired by the research of Clark School Associate Professor of Mechanical Engineering Elisabeth Smela. The kit allows students to learn about MEMS on a macroscopic scale, using commercial light-curing polymers that are relatively inexpensive.

"It is really hard for companies to compete in the education landscape without subsidies or grants," says Orlicki. "This contribution gives us a jump start in taking our product to the next level." Impact recently completed pilot testing of its introductory MEMS education kit at three universities and is now incorporating feedback, with plans to launch the product to engineering programs nationwide. The company will use its $5,000 grant to help develop an intermediate-level kit for more advanced students.

The Impact Pre-Seed Fund is administered by the Maryland Technology Enterprise Institute (MTECH), a unit of the Clark School that accelerates new ventures, spurs economic growth and promotes technology entrepre-

"I want to show students that businesses can be viable and successful, and create jobs, yet still exhibit social responsibility."

Entrepreneur Warren Citrin, left, meets with student Peter Orlicki to discuss his new venture.

PHOTOS COURTESY OF MTECH

neurship and partnership programs. The fund is targeted to two student groups: The Hinman CEOs, the nation's first living-learning entrepreneurship program, places entrepreneurially-minded students from all academic disciplines in a unique living community to explore new ventures; the Hillman Entrepreneurs Program, launched in 2006, is a four-year entrepreneurship scholarship program in which students from all majors transfer from Prince George's Community College to complete their education at the University of Maryland.

Citrin cites an important quality the Hillman Entrepreneurs bring to their new ventures. "Many of the Hillman students have faced adversity in pursuing their education," says Citrin. "Being an entrepreneur requires you to take risks and confront enormous odds; these kids have already done that in their lives."

Entrepreneurial aspirations are within reach, according to Citrin. "My objective is that these students will never have to say, 'If only I had the money, I could have given my idea a try.'"

Beth Panitz is a freelance writer based in Rockville, Md. A graduate of the University of Maryland Merrill College of Journalism, she previously served as senior editor of ASEE Prism, *the magazine of the American Society for Engineering Education.*

Chung Named Director of MTECH VentureAccelerator

Jim Chung has joined the Maryland Technology Enterprise Institute as the new director of the MTECH VentureAccelerator, the university's initiative for helping faculty and students launch successful technology-based ventures.

Chung previously directed new business development for the Corporate Executive Board, a firm that provides business advice for corporations around the world. There he helped build the company's mergers and acquisitions capabilities, including the $59 million acquisition of ITtoolbox. He also was vice president of Intervale Capital (formerly Cherington Capital), a private equity firm investing in middle-market manufacturing and service businesses in the oil and gas industry. He has worked in the venture capital industry and conducted academic research on how business, government and academia work together to create innovation in high technology industries. With a bachelor's degree in political science with honors and a master's degree in international policy studies from Stanford University, Chung is a Ph.D. candidate on leave from Massachusetts Institute of Technology.

Students Turn Trash into Treasure

QUEST Program Stresses Teamwork, Innovation

With the campus as their test lab, business, engineering, and computer, mathematical and physical sciences students in the university's QUEST Honors Fellows Program are creating innovative tools to improve the campus environment. QUEST (Quality Enhancement Systems and Teams) is a multidisciplinary, reality-based learning program focused on cross-functional collaboration, quantitative methods, interactive planning and quality principles.

A solar-powered trash compacting receptacle designed by one QUEST team was recently selected by mtvU, MTV's 24-hour college network, and GE, as one of the top 10 student projects in the first-ever mtvU GE ecomagination challenge. The idea was sparked by a weekend walk around campus, according to team member Allen Jones, B.S. '09, mechanical engineering. "We thought a good solution to eliminate the overflow trash problem on weekends was a solar-powered compactor," says Jones. The team updated a compactor currently on the market with a cylindrical design, an automatic opening for trash deposit and a complementary recycling bin. A ram in the hood of each bin is activated by a sensor and automatically compacts the trash when it reaches a certain level.

A second QUEST team created the CompoStation™ composting system that has been well received in campus dining halls. The eye-catching bin in a movable cart includes a place to park trays and a built-in scraping device, which makes it quick and easy for students to dump food before taking dishes to the dishwashing line. "Observing the process in the dining hall helped us come up with design requirements," says W. Nathaniel Brown, B.S. '09, aerospace engineering. "We researched the manufacturing process and the type of materials to use, designed a CAD model of the bin and made an actual prototype." Brown notes his group talked to dining services administrators and others to research the composting challenge in the dining halls and determine how it could be improved. Bins are emptied daily and the organic material is processed off campus.

PHOTO COURTESY OF QUEST

From top left, the mtvU-honored QUEST team includes: Safa Razeghi, student mentor, business; Allen Jones, mechanical engineering; Tracey Epstein, bioengineering. Bottom from left, Allison Sedrish, business; Kyle Bodt, business; and Aditya Yerramilli, finance.

PHOTO BY JOHN T. CONSOLI

From top left, QUEST team members pictured with their CompoStation™ include: Anna Volper, marketing; W. Nathaniel Brown, aerospace engineering; Vighna Rajesh Karyampudi, mechanical engineering; Julia Perskie, business. Bottom middle, Joel Liebman, business. All team members from both teams graduate in 2009 except Safa Razeghi.

A total of 15 QUEST student teams participated in the ecomagination challenge to develop green technologies to improve the campus environment. QUEST students gain team skills and quality management tools and principles through the three-year program, which includes five courses and integrates a number of events, including an annual Innovation and Consulting Conference. Throughout the program, students work on small teams to complete semester-long projects. Their final course is a consulting project for a real client facing a real-time organizational challenge.

The CompoStation™ team is now developing a business plan to take its product to market. As Vighna Rajesh Karyampudi, B.S. '09, mechanical engineering, notes, "We learned about the true value of networking. We e-mailed, phoned, interviewed and met with a number of people for our project. They all helped us take it from the classroom and into the business world."

Duong Wins National Service Medal

Anh Duong, B.S. '82, chemical engineering, has been awarded the 2007 National Security Medal as part of the Service to America Medals program that celebrates excellence in federal civilian service. Duong was honored for designing the thermobaric bomb credited with helping to win the war in Afghanistan and for developing anti-terrorism technologies for the Pentagon.

Duong and her family fled Vietnam during the war and traveled by U.S. Navy ship to the Philippines, where they were assigned to a refugee camp. Her family was eventually given political asylum in the U.S. "I came here 32 years ago as a refugee with empty hands and a bag full of broken dreams," Duong says. "We as immigrants only succeed because of the opportunities we are given."

Decades after escaping one war, Duong helped her adopted country win another. Her team of nearly 100 scientists and engineers went from concept to development and deployment of the United States' first thermobaric weapon – a device that creates shock waves that can cause caves and tunnels to implode. These types of sophisticated weapons have been known to take years to create; her team finished the job in 67 days.

PHOTO PROVIDED BY SAM KITTNER-KITTNER.COM

Duong has worked for the federal government since graduating from the Clark School, beginning at the Naval Surface Warfare Center in Indian Head, Md., where she formulated the materials that launch projectiles out of the barrels of big naval guns. From 1991-1999, she managed all Navy basic exploratory research and advanced development programs in high explosives. She has also done critical work to improve the safety of explosives on Navy ships.

In 2006, she was put in charge of technology issues for the deputy chief of naval operations and for the Naval Criminal Investigative Service, where she is creating mobile, modular battlefield forensics labs for war fighters. This technology will enable U.S. forces to use DNA and other forensic evidence to better identify the perpetrators of terrorist acts.

Reconnect with Clark School Alumni at Upcoming Events

Plan to attend one of the Clark's School upcoming events in the coming months. Mark your calendar now and take advantage of great opportunities to reconnect with fellow alumni, visit with faculty and network with colleagues.

Heading West

Interim Dean Herbert Rabin will attend an alumni reception on March 27 at 6:30 p.m. at the Stanford Park Hotel in Menlo Park, Calif. Details will be forthcoming. RSVPs are required by March 24. To RSVP, see www.eng.umd.edu/alumni/e-vites/rsvp-2008.html.

Second Annual Fischell Festival

Learn what the future holds for bioengineering and biomedical devices and how engineers and healthcare providers can work together to achieve that future at the Second Annual Fischell Festival on April 10 and 11. Attend seminars, view a live, streamcast medical imaging procedure, take self-guided lab tours and participate in a career fair. Attend the dedication of the new bioengineering wing of the Jeong H. Kim Engineering Building. For more information, see www.bioe.umd.edu/fischellfestival.

William Brody to Give Whiting-Turner Lecture

Now beginning its second decade at the Clark School, the Whiting-Turner Business and Entrepreneurial Lecture Series brings leading technology thinkers to campus to share their insights and experiences. In conjunction with the Fischell Festival on Tuesday, April 10, hear William Brody, president of Johns Hopkins University, discuss his entrepreneurial experiences as an innovator in the medical field. His talk begins at 5 p.m. in the Kim Engineering Building lecture hall. For more information, see www.eng.umd.edu/whitingturner.

Baltimore-Area Graduates, Mark Your Calendars

The Baltimore Engineering Alumni Reception, supported by Whiting-Turner, is set for Thursday, May 8, at the Engineer's Club in downtown Baltimore. Doug Duncan, University of Maryland vice president for administrative affairs, will be the guest speaker. All Baltimore-area engineering alumni are invited. Look for additional information in upcoming e-newsletters or visit www.eng.umd.edu. Reservations are required.

Alumni Golf Outing

Support your Engineering Alumni Chapter and enjoy a day on the links at the Fifth Annual Alumni and Faculty Golf Outing and Banquet on June 11 at the University of Maryland Golf Course. The shot gun start is scheduled for 1:30 p.m. For more information, see www.eng.umd.edu/alumni/index.html.

A Celebration of Leadership (1966-1994)

Robert Beckmann

(This article is part of a continuing series on the leadership of the Clark School.)

The research agenda of the engineering school became a top priority when Robert Beckmann assumed the deanship in 1966. Beckmann initiated plans to expand the faculty to raise the stature of the school's research programs and began to appoint research-oriented department chairs. At the same time, undergraduate enrollment reached new highs as the Apollo rocket program and the potential of nuclear energy and supersonic transport received national attention.

In 1970, the Cooperative Engineering Education program was initiated, which allowed students to combine career-related employment with their academic programs. At the graduate level, Beckmann oversaw the establishment of new M.S. and Ph.D. programs in nuclear engineering and engineering materials. Throughout the 1970s, Beckmann led the school in making great strides in the recruitment of women and minorities.

After a successful decade as dean, Beckmann handed over the reins to George E. Dieter, who was recruited from Carnegie Mellon University. Driven by the VLSI (very large scale integration) revolution, growing computer accessibility and a strong national defense build-up, the demand for engineers was soaring. Dieter capitalized on the opportunities. He created the Board of Visitors, formerly called the Advisory Council, which met for the first time in 1978 to chart a vision and development plan for the booming engineering school.

George E. Dieter

Under Dean Dieter's leadership, the school broadened its reach as the Instructional Television System began serving students in Baltimore, Hagerstown and the Patuxtent River Naval Station. Graduate enrollment and sponsored research grew dramatically from 495 students and $2.7 million in 1977-78 to 1,359 students and $35 million in 1993-94.

Recognizing the importance of technology and entrepreneurship to our economy, Dieter guided the establishment of what is now known as the Maryland Technology Enterprise Institute (MTECH) to provide entrepreneurship education to technology creators and services and resources to entrepreneurs. The Technology Advancement Program, Maryland Industrial Partnerships Program and the Maryland Technology Extension Service were all initiated during Dieter's tenure as dean. In 1986, he oversaw the creation of the Innovation Hall of Fame to recognize engineers for their significant technological achievements; Dieter continues to serve on the Hall of Fame selection committee. In 1994, Dieter orchestrated a major fundraising coup when A. James Clark, B.S. '50, civil engineering, honorary doctorate of science '92, and chairman and CEO of Clark Enterprises, Inc., made a multi-million dollar gift to the school, which was subsequently named in his honor. Dieter stepped down from the deanship later that year, but still remains active in the Clark School.

Alumni News

ROBERT BRISKMAN, M.S.'61, electrical engineering (EE), co-founder of Sirius Satellite Radio, received the 2007 American Institute of Aeronautics and Astronautics Aerospace Communications Award. Briskman was honored for his pioneering efforts in developing the Satellite Digital Audio Radio Service, known widely today as satellite radio.

PHOTO BY AL SANTOS

Briskman is a fellow and past director, vice president for technical activities and secretary-treasurer of the Institute of Electrical and Electronics Engineers and a fellow of the American Institute of Aeronautics and Astronautics.

Postdoctoral researcher **MOUNYA ELHILALI**, M.S. '03 and Ph.D. '04, EE, has accepted a faculty position in the Department of Electrical and Computer Engineering at Johns Hopkins University.

FARHAN GANDHI, M.S. '92 and Ph.D. '95, aerospace engineering (AE), and an associate professor of AE at Pennsylvania State University, is a recipient of the *Popular Mechanics* 2007 Breakthrough Award. Gandhi, one of only eight inventors to receive the award this year, was recognized for his dual-rotor design for helicopters.

WILLIAM KOFFEL, B.S. '79, fire protection engineering, and a Clark School Board of Visitors member, has been appointed executive director of the American Association of Engineering Societies.

RYAN STARKEY, M.S. '98 and Ph.D. '00, AE, received the 2008 American Institute of Aeronautics and Astronautics Lawrence Sperry Award in Aeronautics. Starkey is an assistant professor and McAnally Faculty Fellow for Aerospace Engineering Sciences at the University of Colorado in Boulder.

Retirement Fund Supports an Innovative Gift

Professor Emeritus Jimmy Lin Fulfills Wish to "Give Back"

Professor Emeritus H.C. "Jimmy" Lin has never been one to walk away from a challenge. A $5 bet with a former boss at Westinghouse Electric Corporation some 35 years ago spurred Lin to create a breakthrough invention in transistors. Today, Lin's lateral transistor is used in nearly all analog integrated circuits.

A pioneer in the field of semiconductors and transistors, Lin began tinkering with electronics during his schooldays in China. After earning his B.S. degree in electrical engineering at Chiao Tung University in Shanghai, he worked as an engineer in China until coming to the United States in 1946 where he completed his M.S.E. from the University of Michigan. As a research engineer at RCA Laboratories, Lin received patent after patent in the explosive field of transistors, while earning his Ph.D. at the Polytechnic Institute of Brooklyn. Busy at home helping his wife Ann raise two young sons, Lin studied during the hour-long train commute to and from school.

Lin's career continued to flourish at the Columbia Broadcasting System and Westinghouse before he became a full-time professor of engineering at the University of Maryland in 1969. "I had spent more than 20 years in industry and wanted to utilize my industrial experience to teach others," says Lin, who helped the engineering school develop an international reputation in semiconductors.

Even after his retirement in 1990, Lin continued to teach part time and to mentor graduate students until 2005. A recipient of the Outstanding Professor Award from the Electrical Engineering Graduate Student Association, he advised some 25 Ph.D. students during his career at Maryland. The Clark School encouraged his innovative talents and with the help of students he continued to obtain patents, now numbering 62. In recognition of his groundbreaking work, Lin was inducted into the Clark School Innovation Hall of Fame in 1990.

This fall, Lin decided it was time "to give back" to the Clark School with a gift of $100,000 funded through his retirement account. The gift will create the Jimmy Lin Fund for Innovation and Invention, which will foster a culture of innovation among electrical and computer engineering faculty, staff and students. Income from the fund will stimulate, encourage, support or reward the invention and patent process. "Having spent half my life at the university, I want to see the Clark School continue to excel," says Lin.

PHOTO BY AL SANTOS

Left, University President C.D. Mote, Jr. congradulates Jimmy Lin on his induction into the Clark School's Innovation Hall of Fame.

"I want to see the Clark School continue to excel."

Lin's gift follows those of a number of Clark School faculty members. Recently, Anthony Ephrimedes, professor of electrical engineering with a joint appointment in the Institute for Systems Research, initiated the Anthony Ephremides Chair Professorship Endowment with a capital campaign commitment of $100,000. The Ephremides Chair will be fully funded through a bequest.

Lin created his fund by utilizing his university-related TIAA-CREF retirement account; under the Pension Protection Act of 2006, the gift is 100 percent deductible. "I am not a rich man," says Lin. "I have never been in business or had a windfall, but through the years, my retirement account has accumulated."

"What makes this country special is innovation," he says. "I owe a lot to America, and now I want to give back."

To learn more about making a gift to the Clark School, please call or write:

Stu Stabley, acting assistant dean for external relations, Clark School of Engineering,
University of Maryland, College Park, Maryland 20742-2831 ■ 301.405.8289 ■ sstabley@umd.edu

Do You Remember?

Do you know what is going on in the photo above? The names of the people shown? Send your answer to mcorley@umd.edu and you may be eligible for a prize!

GREAT EXPECTATIONS
THE CAMPAIGN *for* MARYLAND

Fall 2007 Contest Winner

We were surprised and delighted to discover that Electrical and Computer Engineering Professor Steven Tretter, B.S. '62, electrical engineering, was in the back cover picture of the Fall 2007 *E@M*! Tretter was posing for a photo taken by an engineering honor society member during senior year registration.

Peter Himmelheber, B.S. '62, electrical engineering, was the first to write in and identify Tretter (far right in that photo) as well as (from left to right in that photo) Allen Rehert, Robert Russell, his twin brother William Russell and William Smith. All received bachelor's degrees in electrical engineering in 1962. Both Himmelheber and Tretter received copies of the book *Maryland Reflections on 150 Years*.

Remember This

You can help to protect the Clark School's history and create an even brighter future by participating in *Great Expectations: The Campaign for Maryland*. Thank you for your support.

A. JAMES CLARK
SCHOOL OF ENGINEERING

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