



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

You Are **Now** **Entering** the **Launch Zone**

THE CLARK SCHOOL HELPS MAKE THE FEDERAL REGION
THE RIGHT PLACE TO START YOUR TECH VENTURE



**CLARK SCHOOL
MTECH**

D.C.



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Please note that *Engineering @ Maryland* refers to the A. James Clark School of Engineering by that name in all cases, including stories that describe alumni who graduated before the name was established, in 1994, to honor Mr. Clark's outstanding philanthropy.

COVER AND INSIDE MAP BY
LAURA FIGLEWSKI



Dear Friends of the Clark School,

It's time to think about the Clark School in a new way.

Let's start with where we're located.

Everyone knows we're a proud constituent of the University of Maryland's flagship campus in College Park, Maryland.

But few fully appreciate what that means.

On the following pages you'll find a map that offers a Clark School perspective on our unique location. The map shows that the Clark School is central to the Maryland/D.C./Northern Virginia area commonly known as the federal region.* We are situated amidst an incredible assortment of federal research agencies and labs, tech corporations, venture capital firms, and state economic development organizations, with the University of Maryland's Baltimore and Baltimore County campuses nearby.

So, if you're a Clark School student, faculty member, alumnus or alumna, you can quickly travel from here to some of the nation's most important organizations for engineering. This makes it easier to get involved in research, education, business development and service activities that can have a profound effect on your life and career, and—if you're committed—help shape the progress of engineering itself.

In this special issue of *E@M*, we consider that advantage in terms of entrepreneurship. We show how our location—plus the nationally recognized programs offered by our renowned Maryland Technology Enterprise Institute—makes the Clark School one of the nation's best places to start a new tech venture. The resources here and all around us are incredibly valuable for start-ups.

It's an exciting story. You may be surprised by the quantity and quality of tech ventures associated with your school (and there are many more not included in this issue).

You may even decide that, with so much going for you here, it may be time to take that step and launch the business you've always dreamed about.

If so, this is the place. Welcome to the Launch Zone.

Sincerely,

Darryll Pines
Dean and Farvardin Professor of Engineering

Welcome to the Launch Zone.

***The map presented in this issue of E@M provides a "Clark school perspective" on entrepreneurship in the federal region. It is for illustrative purposes only and is not meant to document all of the region's many worthy tech organizations. Locations are approximate. An online version of the map is available at www.eng.umd.edu/launchzone. To request that your organization be added to the online map, please go to www.eng.umd.edu/joinlaunchzone and fill in the simple request form. The Clark School will make every effort to evaluate your request and include your organization in the online map in a timely manner. Thank you.**

● FT. DETRICK

FREDERICK

● BECHTEL

MARYLAND

MARYLAND TECHNOLOGY
DEVELOPMENT CORPORATION

BAE SYSTEMS

MICROS SYSTEMS

GRACE

MARTEK

JOHNS HOPKINS
APPLIED PHYSICS LAB

NATIONAL
SECURITY AGENCY

DEPARTMENT OF
AGRICULTURE

ATK

NASA GODDARD

NATIONAL CANCER
INSTITUTE

ARMY RESEARCH LAB

FOOD AND DRUG
ADMINISTRATION

SAIC

LOCKHEED MARTIN

NATIONAL INSTITUTES OF HEALTH

CLARK ENTERPRISES

NOVAK BIDDLE
VENTURE PARTNERS

NEW ENTERPRISE ASSOCIATES

DEPARTMENT OF
HOMELAND SECURITY

DEPARTMENT
OF ENERGY

CARLYLE GROUP

SMALL BUSINESS
ADMINISTRATION

DEPARTMENT OF
TRANSPORTATION

NAVAL SEA
SYSTEMS COMMAND

NATIONAL OCEANIC
AND ATMOSPHERIC
ADMINISTRATION



CLARK SCHOOL
MTECH

SMITH SCHOOL
DINGMAN CENTER

D.C.

NATIONAL INSTITUTE OF
STANDARDS AND TECHNOLOGY

TECH COUNCIL OF
MARYLAND

ORBITAL SCIENCES

LGS

VALHALLA PARTNERS

BOOZ ALLEN HAMILTON

MID-ATLANTIC VENTURE ASSOCIATION

DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH

NATIONAL VENTURE CAPITAL ASSOCIATION

ACCENTURE NATIONAL SCIENCE FOUNDATION

NORTHROP GRUMMAN

IN-Q-TEL

IBM EXXON-MOBIL

L-3 COMMUNICATIONS

CSC

GENERAL DYNAMICS

DEPARTMENT OF DEFENSE

NVTC

OFFICE OF NAVAL RESEARCH

VIRGINIA

GROTECH
VENTURES

STANLEY BLACK AND DECKER

RAYTHEON

ABERDEEN PROVING
GROUND

BALTIMORE

JOHNS HOPKINS

GREATER BALTIMORE TECH COUNCIL

MARYLAND DEPARTMENT OF BUSINESS AND ECONOMIC DEVELOPMENT

UNIVERSITY OF MARYLAND,
BALTIMORE

MARYLAND SMALL BUSINESS
DEVELOPMENT CENTER

WHITING-TURNER

CONSTELLATION ENERGY

UNIVERSITY OF MARYLAND,
BALTIMORE COUNTY

A CLARK SCHOOL PERSPECTIVE

- UNIVERSITIES
- FEDERAL AGENCIES AND LABS
- STATE ECONOMIC DEVELOPMENT ORGANIZATIONS
- TECH CORPORATIONS
- VENTURE FIRMS AND ORGANIZATIONS

CYBERCORE

You Are Now Entering the Launch Zone

THE CLARK SCHOOL HELPS MAKE THE FEDERAL REGION
THE RIGHT PLACE TO START YOUR TECH VENTURE

See online map at www.eng.umd.edu/launchzone



TRX personnel, front to back, counter-clockwise: CTO and Chairman Carole Teolis, Founder Gilmer Blankenship, Vice President of Engineering Amrit Bandy, Eric Kohn, Vice President of Development Ben Funk, David Lemus and Karina Drees.

PHOTO BY: TRACEY BROWN

4 **“THE PEOPLE at Mtech know how to take a product from its infancy through development and how to maximize this region’s unique funding resources. With their help, TRX Systems developed from a two-person company to a business with 10 employees by the time the company graduated from Mtech’s TAP program. Mtech helped TRX win a \$100,000 challenge grant from the Maryland Department of Business and Economic Development. That support was important in the early days, and helped us gain credibility.”**

Gilmer L. Blankenship
Professor, Clark School Department of Electrical and
Computer Engineering, Co-Founder and Chairman,
Techno-Sciences, Inc., and Founder, TRX Systems, Inc.

Exactly Where We Need to Be

Gil Blankenship is an expert in control system science, a Clark School professor and an entrepreneur. In partnership with Lee Davisson, former chair of the Clark School’s Department of Electrical and Computer Engineering, he co-founded Techno-Sciences, Inc. (TSI) and began to build it into a successful technology company. In 2006 TSI spun off TRX Systems to build technology that tracks first responders in GPS-denied environments.

Four years later, TRX Systems has millions of dollars in research and development contracts from the Department of Homeland Security, Defense Advanced Research Projects Agency, the U.S. Army, the Technical Support Working Group and the National Science Foundation; \$1.2 to \$1.5 million in revenues; and several hundred thousand dollars of product in the market.

As Blankenship relates, the Clark School’s Maryland Technology Enterprise Institute (Mtech) was important to the spin-off’s rapid success.

“As a first step, TRX joined Mtech’s incubator, the Technology Advancement Program,” Blankenship explains. “TAP provided TRX with office and lab space, mentorship and assistance in raising funds.”

With Mtech’s support the company captured grants from the state of Maryland’s economic development organizations and entered and won international and state venture competitions, including first place as the Most Promising Security Start-up in the third annual Global Security Challenge and first place in the Homeland Security Company category of the Maryland Incubator Company of the Year competition. While a member of the TAP incubator, TRX partnered with the university’s Maryland Fire and Rescue Institute, which helped TRX refine its technology with extensive practical knowledge about fire fighting. TRX also received an important contract with the National Science Foundation that led to private investment and stimulated the growth of the company.

“In such close proximity to the federal labs, one relationship leads to another,” states Blankenship. “An agency program manager stops by our offices, sees our technology and recommends us to a colleague who has similar interests. The TAP facility was exactly where we needed to be—Mtech helped us grow and become a solid company that has attracted the attention of federal agencies and large companies.”



Where to Begin: Launching a Start-Up in the Federal Region

The Maryland/D.C./Northern Virginia region has immense resources for start-ups like TRX Systems. Entrepreneurial Clark School alumni, faculty members and students—as well as people with no prior connection to the school—can access these resources to increase the likelihood their own launches will succeed.

Expert Cultivators: The University of Maryland, College Park offers entrepreneurship education programs (23 courses offered in 2010) at the middle school, high school, undergraduate, graduate and executive levels, plus partnership and incubator programs addressing every level of the launch process. The Clark School's Maryland Technology Enterprise Institute (Mtech) focuses on tech start-ups and the Smith School's Dingman Center addresses a range of business enterprises.

New Ideas: The region is a hotbed for high-technology ideas across a broad range of applications, based on the strengths of: the University of Maryland and Johns Hopkins, two top research institutions; a vast array of federal research agencies and laboratories with interests in every technical area; and both large and small corporations that work with the universities and agencies to develop products.



Lockheed Martin, Bethesda, Md., left, and Smithsonian Castle, right.

“ENTREPRENEURS here have amazing resources to exploit in a region that is highly recession-resistant.”

John Kenyon, Senior Vice President, Hughes Network Systems

Educated Workforce: The region has developed a real community of scientists and engineers—a highly educated workforce ready to advance such fields as nanotechnology, bioengineering, cyber-security, telecommunications, climate monitoring and robotics, to name only a few. This makes it easier for entrepreneurs and established companies to find qualified employees and expert consultants.

Mtech's Comprehensive Programs for Entrepreneurs

Education

- *Hinman CEOs:* this award-winning program is the nation's first living-learning undergraduate entrepreneurship experience for all majors
- *College Park entrepreneurship courses:* more than 500 middle school, high school, undergraduate, graduate and executive students enroll each year
- *Hillman Entrepreneurs:* a merit and need-based scholarship program for entrepreneurial minority transfer students from Prince George's Community College in Maryland
- *Entrepreneurship and Innovation Program:* a new Honors College program that provides freshmen and sophomores from all majors with the opportunity to learn entrepreneurship and innovation
- *Mtech Impact Seed Fund:* grants for students in the programs above who present business plans for new companies that benefit society

Venture Creation

- *Technology Advancement Program:* the state's first technology business incubator with a staff of seasoned veterans from start-ups and venture capital firms
- *VentureAccelerator Program:* assists university inventors in translating lab research to the market and creating successful companies
- *University of Maryland Technology Start-up Boot Camp:* an intensive one-day workshop and networking event on launching new tech ventures
- *Entrepreneur Office Hours:* free, on-campus mentoring sessions offering advice on starting new ventures
- *University of Maryland \$75K Business Plan Competition:* an annual technology business plan competition with investor pitches to venture capitalists and entrepreneurs

Partnerships

- *Maryland Industrial Partnerships Program:* an award-winning technology product development program for University System of Maryland institutions and Maryland companies
- *Biotechnology Research and Education Program:* a unique bioprocess scale-up and training facility
- *University of Maryland Manufacturing Assistance Program:* provides lean practices, export marketing, pollution prevention and many other services to help Maryland manufacturers grow and compete.

Large Market: The departments of the federal government, and the corporations that work with them, offer start-ups large, stable, interconnected markets for high-technology products. The region's two state governments and the District of Columbia also offer strong sales potential. Ground, air and sea-based transportation systems make national and global markets readily accessible.

Investors: The region is home to some of the nation's top venture capital firms and angel investors, with a growing cadre of experienced start-up management teams. Skilled support firms—legal, accounting, marketing, real estate—are in good supply.

State Support: State and county governments deliver effective support programs that connect entrepreneurs with prospective government, university and corporate partners and provide loan programs and tax incentives.

Standard of Living: The region provides a highly desirable standard of living, with an excellent K-through-college system, urban and rural communities, rich cultural opportunities and one of the nation's most diverse, international populations. Yet the cost of living is competitive with other regions well known for technology entrepreneurship.

Resource: Mtech's Renowned Education, Incubator and Product Development Programs

The University of Maryland is one of the nation's leading academic centers for entrepreneurship. The Clark School's Maryland Technology Enterprise Institute (Mtech) focuses on technology-based entrepreneurship; the Dingman Center at the Robert H. Smith School of Business serves the broad range of businesses; and the university's Office of Technology Commercialization facilitates the transfer of intellectual property to industry. The university is planning an Innovation and Entrepreneurship Center that will unify and expand these three programs.

The hallmark of Mtech is its comprehensiveness. "Mtech offers a family of mutually reinforcing programs in education, venture creation and partnerships," explains Mtech Director Herbert Rabin. "We are here to guide and assist students from middle school to graduate school, faculty members at all levels, working professionals in industry, and all who desire to reap the benefits of entrepreneurship and innovation, not only for themselves but for society generally." (See sidebar, left.)

The institute offers two undergraduate, living-learning, entrepreneurship education programs—the Entrepreneurship and Innovation Program for freshmen and sophomores and the



Dean Chang



Technology Advancement Program Building

nationally recognized Hinman CEOs for juniors and seniors—plus specialized scholarships for graduate students.

Mtech Ventures, directed by Dean Chang, is the name for a broad array of programs that guide and support entrepreneurs, including the Technology Advancement Program incubator, the VentureAccelerator program for university inventors, the Technology Start-Up Boot Camp, \$75K Business Plan Competition and open Entrepreneur Office Hours. “Mtech personnel are connected. They have close working relationships with nearby federal and state agency leaders and venture capitalists who have millions of dollars to invest in worthy start-ups,” says Chang. “We run a top-quality incubator with outstanding facilities and support. We have developed popular how-to sessions, forums for networking and fiercely contested competitions that bring together entrepreneurs, labs, agencies, VCs and support firms. We have all the ingredients for success, right here.”

Maryland Industrial Partnerships (MIPS), Mtech’s award-winning technology product development program directed by Martha Connolly, supports research projects led by university faculty members working with corporate personnel whose companies provide matching funds. The projects help the participating companies solve technical challenges and develop products. Since 1987 more than 400 Maryland companies have participated in MIPS projects worth hundreds of millions of dollars. Resulting products have generated billions in sales and thousands of jobs. (See sidebar, right.) “Technology-based jobs are the basis for wealth creation in this region,” notes Connolly. “There is an economic development multiplier: for every job you create in a new venture, you create three or four others in the economy.”

For the manufacturing sector, Mtech offers a cost-effective resource to help companies increase productivity, lower costs, develop new markets and retain jobs through its University of Maryland Manufacturing Assistance Program (UMMAP). The program provides solutions in a wide range of areas including lean manufacturing, exports, supply chains, environmental compliance, energy audits, process/product improvement, automation and safety. As the university’s affiliate of the federal NIST Manufacturing Extension Partnership, UMMAP connects companies with a national network of solution providers as well as the expertise of the entire University System of Maryland.

“THE NEW Innovation and Entrepreneurship Center will integrate, accelerate and elevate the excellent programs found in Mtech and the Dingman Center by creating for the first time an idea-to-market ecosystem reaching across this large research university campus.”

C. D. Mote, Jr., President, University of Maryland
and Glenn L. Martin Institute Professor of Engineering

Visionary Mtech Leaders Put Clark School at Entrepreneurial Forefront

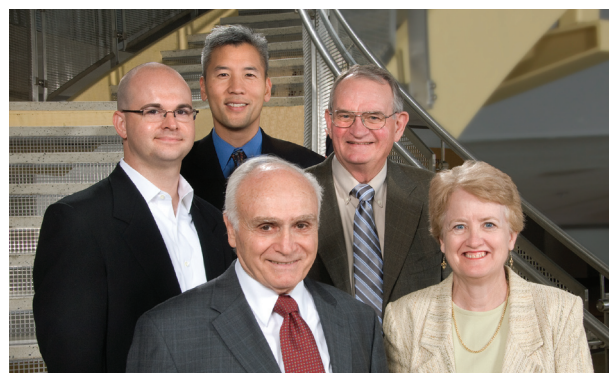


PHOTO BY LUISA DIPIETRO

Mtech Senior Leaders, counter-clockwise from bottom: Mtech Director Herbert Rabin, MIPS Director Martha Connolly, Mtech Executive Director David Barbe, Mtech Ventures Director Dean Chang, Hinman CEOs Director James V. Green.

Since its founding in 1983, Mtech has made a **\$22.5 billion impact** on the Maryland economy; created or maintained more than **8,100 jobs**; trained over **400 Hinman CEOs** students who started dozens of companies; supported more than **\$160 million in research projects** involving more than **400 Maryland companies**; and **incubated over 90 start-ups**.

Such accomplishments ultimately derive from the visionary leadership of founding director Herbert Rabin, Ph.D. '59, physics, a Clark School professor of electrical and computer engineering, former Clark School interim dean and former deputy assistant secretary of the Navy.

Rabin, together with Mtech Executive Director and Professor David Barbe, winner of the 2008 Olympus Lifetime of Educational Innovation Award, has fostered a culture of innovation and technology entrepreneurship at the Clark School through Mtech programs and services that now serve as models for other programs worldwide. (See sidebar, p. 6.)

“The expertise, commitment and entrepreneurial spirit that Herb, Dave and the entire Mtech staff have brought to their programs have placed us at the forefront of academic technology start-up programs,” says Dean Darryll Pines. “Mtech is one of the Clark School’s greatest assets.”

Resource: The Federal Agencies' Innovative Tech Transfer Programs

Today, many federal agencies have developed large and comprehensive tech transfer programs. These agencies recognize the importance of partnering with start-ups and established companies to take agency technologies into the market and acquire technologies that further agency objectives. A few of these are described below.

The National Institute of Standards and Technology



Patrick Gallagher

One of the key federal research agencies for entrepreneurs is the National Institute of Standards and Technology (NIST), led by Patrick D. Gallagher, in Gaithersburg, Md. As a unit of the Department of Commerce, NIST not only addresses the standards and measurement needs of science and industry, but also works to assist technology start-ups and further the nation's industrial competitiveness.

NIST's Technology Innovation Program (TIP) funds research in technologies of critical national interest, including areas such as infrastructure sensing, advanced manufacturing and alternative energy. TIP awarded Pixelligent Technologies, a company in Mtech's incubator, an \$8.2 million project (half funded by TIP, half by the company) for the development and scale-up of nanocomposites. According to Gallagher, NIST offers \$3-4 million per year in three-phase Small Business

Innovation Research (SBIR) grants. Start-ups also can access unique measurement capabilities through NIST's Center for Nanoscale Science and Technology and Center for Neutron Research—capabilities often brokered by Mtech to its start-ups.

"The University of Maryland and the Clark School play key roles in NIST research and tech transfer," states Gallagher. "They are close by, their excellent faculty members share our interests and work extensively with us as guest researchers and facility users, and they have great entrepreneur-support programs. NIST employs approximately 1,500 scientists and engineers, and we engage with approximately the same number as university guests. Maryland and the Clark School are the largest contingent of that university component."

NASA Goddard Space Flight Center

Nona Cheeks, chief of the Innovative Partnerships Program Office at NASA Goddard Space Flight Center, in Greenbelt, Md., provides a range of services for start-ups. "We offer traditional programs such as SBIRs and hold workshops on SBIR Phase II to make sure new companies find their next customers after Phase I. Many small businesses have benefited from our Innovation Fund, which helps accelerate advancement of their technologies to meet our needs. Our Innovation Ambassadors pro-



Nona Cheeks

NASA's Exploration Sciences Building at the Goddard Space Flight Center, Greenbelt, Md.



PHOTO PROVIDED BY: MANHATTAN CONSTRUCTION CO.



NIH Campus in Rockville, Md.

gram places Goddard staff members in small start-up ventures focused on space. Our people work side by side with theirs; learn how they could help us develop and market products; and return with knowledge that will make transfer more efficient.” Ted Mecum, B.S. ’84, electrical engineering, a technology manager in the same office, notes, “In the past, more emphasis was placed on licensing out technologies. Now we are looking for partnerships that involve licensing, with small or start-up companies as well as larger established companies.”

The National Institutes of Health

The National Institutes of Health (NIH) in Rockville, Md., supports an Office of Technology Transfer that serves not only NIH but also the Food and Drug Administration. “NIH has a \$3 billion internal research program in the medical sciences, and we need entrepreneurs to bring our work into clinical and public use more rapidly,” explains Steven M. Ferguson, deputy director of licensing and entrepreneurship. “Our employees are not likely to leave NIH to do so. Thus, there are enormous opportunities for start-ups that are looking for new ideas or

“OUR PROXIMITY to NIH, just being able to go there for meetings without a lot of cost or time, is a big advantage we have over start-ups elsewhere.”

Scott Strome, founding scientist, Gliknik, Inc.,
and professor, University of Maryland School of Medicine,
University of Maryland, Baltimore

solutions to problems.” He notes that a “sweet spot” for entrepreneurs is to acquire early-stage technology from a university or a federal lab, develop it further, gather additional data, and, by reducing risk, make the product more attractive to a large company.

NIH recognizes that to solve challenging medical problems it must blend basic and applied research and connect with universities and entrepreneurs to create the needed teams. “Through programs such as Mtech, we are seeing the rise of the ‘scientist/entrepreneur,’” Ferguson explains. “Such programs help train a scientist or engineer to understand the launch process, provide incubator space, connect him or her with loans and grants from state-based economic development offices, and help form a connection with federal agencies looking for new partners such as NIH.”



Steven M. Ferguson

The National Cancer Institute

The National Cancer Institute, one of 27 institutes and centers that comprise NIH, filed 135 new invention reports and obtained 53 patents in fiscal year 2009. Through its Advanced Technology Partnerships Initiative, NCI seeks relationships with private companies and academic institutions that will move its basic research in cancer and AIDS out of the laboratory and into clinical use. Thomas Stackhouse, associate director of NCI’s Technology Transfer Center, cites NCI’s Collaborative Research and Development Agreements (CRADAs) as key tools in this effort. “CRADAs let us provide a company with the option to negotiate an exclusive license. A new form of CRADA recently developed by NCI creates an umbrella agreement with a private company to cover multiple projects. This streamlines the review process and permits the transfer of data or materials to occur more efficiently.”

A prime vehicle for these public-private partnerships is NCI’s Federally Funded Research and Development Center (FFRDC) in Frederick, Md., to be located in a 330,000 square-foot, state-of-the-art research facility in the new 177-acre Riverside Research Park. At the new facility, researchers from NCI, the FFRDC, life science companies and academia can perform synergistic research side by side, ranging from basic science to producing clinical grade materials ready to go into trials. Major areas of research and development to be conducted at Riverside Park include proteomics, nanotechnology, imaging and biopharmaceutical development. In addition, academic institutions will be able to offer educational programs at the park.

Resource: Strategic State Economic Development Programs



Christian Johansson

The state of Maryland is a strong advocate for technology entrepreneurship as a vital component of economic growth. Key assets are its excellent public education system and private schools; highly regarded state and county economic development organizations; and professional groups such as the Tech Council of Maryland and the Greater Baltimore Tech Council. All provide programs to increase the likelihood of successful start-ups.

According to Christian Johansson, secretary of the Maryland Department of Business and Economic Development, the state established the Small Business Credit and Recovery Program “to streamline the loan approval process for small business in gaining access to credit.” Already this year, the program has helped push out \$5 million in loan guarantees to Maryland small businesses.

To jumpstart translational work and company formation, Johansson adds, “Governor Martin O’Malley has proposed an initiative called InvestMaryland, which seeks to create a public-private partnership to fuel venture capital investment in Maryland companies. The initiative could spur the creation of thousands of jobs and secure \$100 million in venture capital to unlock perhaps billions in economic activity in Maryland.”

The Clark School’s Mtech unit is a “core pillar of Maryland’s economic development strategy,” says Johansson. “Mtech attracts the state’s best students, pulls outside research talent into the state, offers effective programs in entrepreneurship education and support and manages the highly successful Maryland Industrial Partnerships program. We work together closely.”

Mtech’s Bioprocess Scale-up and Training Facility



The Maryland Technology Development Corporation (TEDCO) is an independent entity established by the Maryland General Assembly. TEDCO facilitates tech transfer and commercialization from Maryland’s research universities and federal labs into the marketplace, and assists in the creation and growth of technology-based businesses in all regions of the state. *Entrepreneur* magazine has listed TEDCO as the most active investor in seed/early-stage companies in the nation for five years in a row.

John M. Wasilisin, TEDCO acting president and executive director, states, “For the many proposals that come to us, we conduct stringent due diligence and fund about half. The \$8.8 million invested by TEDCO in start-up companies resulted in over \$354 million in follow-on funding; that is, for every \$1 TEDCO invests, our portfolio companies receive an additional \$40 in downstream funding.”

Wasilisin sees the state’s proximity to the federal government and access to federal business as “unparalleled.” “Federal facilities that once thought they had all the answers inside the fence now realize they need to partner with external companies to maximize their technologies. As an entrepreneur, you can set yourself up with a career pipeline for procurement, business and contracts.”



John M. Wasilisin

Resource: Venture Capital for Early and Later Stages

In addition to vying for federal and state-based loans and grants, entrepreneurs in the federal region can compete for funding from numerous private sources. Julia Spicer, executive director of the Mid-Atlantic Venture Association in McLean, Va., and a member of the Clark School’s Board of Visitors, states that the region offers the “full spectrum of private funding. Investor interest crosses sectors, sizes and stages of investment.”

Thomas Scholl, a partner with Novak Biddle Venture Partners in Bethesda, Md., and the chair of the Clark School’s Board of Visitors, says, “Money is available in the region at multiple levels. At the state level, Maryland and Virginia have programs to invest in local start-ups. Active angel investors and venture capitalists are interested in many types of companies, including biotech, healthcare and information technology. Venture firms like Novak Biddle are willing to invest in early-stage companies; other venture capital firms are interested in later-stage companies. The key is to do your homework. Look for a good match between you and your investors.”

Both Spicer and Scholl see Mtech as a great asset for tech



Julia Spicer

“THERE REMAINS considerable research to move from the federal labs and universities to the market. Entrepreneurs have much to choose from.”

David Mott, General Partner, New Enterprise Associates

entrepreneurs. “Mtech does the crucial job of connecting technology innovators and their ideas to people and institutions that can make them commercially viable, and provides support at all stages of development in one place,” explains Spicer. “Mtech exemplifies



David Mott

the mentorship and nurturing that are needed in this delicate process.”

The need for start-ups to find experienced management teams is a primary concern for David Mott, general partner with New Enterprise Associates, Chevy Chase, Md., one of the nation’s largest venture capital firms with \$11 billion in committed capital. “Some of the leading life sciences companies in the area have grown their own management teams, and these senior managers are now spinning off and managing new companies,” explains Mott, who as former president and CEO of Maryland venture-backed, start-up MedImmune led its sale to AstraZeneca for \$16.6 billion. (See related story, p. 12.) “With time and continued seeding we will grow managers and, by collaborating with educational institutions such as the University of Maryland, develop a good management base.”

Resource: A Growing Community of Entrepreneurs

Entrepreneurs like Gil Blankenship and companies like TRX Systems, introduced at the beginning of this article, are vitally important to venture creation in the federal region. Not only are they developing new products that save lives, and creating jobs and revenue, they are also helping to build a community of entrepreneurs.

“Entrepreneurs need other entrepreneurs,” notes Dean Chang, “even when they are competitors. A critical mass of start-ups, spin-offs and serial entrepreneurs attracts investors, which most entrepreneurs will need at some point.”

Blankenship agrees. “Meeting others, finding people who have succeeded or who have tried several times and finally succeeded on their third try, is very important. Mtech provides a very effective platform for these vital interactions.”

In the following pages you can read more about technology entrepreneurs associated with the Clark School and Mtech. Some are amazing success stories—MedImmune, Hughes Network Systems, Martek Biosciences, Digene, PAICE. Some are up and comers—TRX Systems, Remedium, FlexEL, Gliknik, OmniSpeech. All began as someone’s brilliant idea. All found



resources at the Clark School and in the region that enabled them to launch and compete.

“We are now looking at spinning off a second part of Techno-Sciences,” states Blankenship, “our Trident Security Systems Division. Trident builds coastal and border surveillance capability and supports it—a market with a strong future. We haven’t officially spun it off yet, but we have learned a lot from Mtech and from our own experience, and we know how this process works.” ■

When You’re Ready to Launch, Contact Mtech

If you are an entrepreneur with an idea for a new technology product and the dream of starting a company, the Clark School’s Mtech can help you develop your business plan, explore funding options, meet important contacts in federal and state organizations and take the crucial first steps that will help your venture launch successfully. To learn more about the many Mtech events and programs offered throughout the year, visit www.mtech.umd.edu. When you are ready to act, contact the Mtech Ventures office at 301-314-7803. Better yet, come meet the Mtech Ventures staff, as well as representatives from many other organizations mentioned in this article, at one of the free, monthly Entrepreneur Office Hours sessions (www.eoh.umd.edu).

From Mtech to Market

Mtech Resources Fuel Start-ups' Success

SuccessStory

Building a \$9.5 Billion Blockbuster Drug

The Maryland Industrial Partnerships (MIPS) program at Mtech has jointly funded six different research projects with MedImmune. Three were directly related to Synagis, the company's \$9.5 billion blockbuster drug that prevents a serious respiratory illness in infants called respiratory syncytial virus (RSV). Synagis was approved in 1998 by the U.S. Food and Drug Administration.

MIPS "helped in the structural testing of Synagis lots," MedImmune scientist John Hope noted in a post-project report. "The process, which the MIPS grant assisted in the development of, is still being used at MedImmune for testing Synagis and related glycoproteins."

Since 2004, MedImmune has worked with Mtech's Bioprocess Scale-Up and Training Facility to develop a training series for the company's entire Synagis production workforce. The training gives MedImmune employees a better understanding of their individual roles and how they fit into the larger Synagis production process.

MedImmune employs 2,000 people in Maryland. In 2007, the company was purchased for \$16.6 billion by London-based pharmaceutical giant AstraZeneca.



SuccessStory

World's Largest Satellite Internet Access Provider

Hughes Network Systems, LLC, a subsidiary of Hughes Communications Inc. (NASDAQ:HUGH), is the world's leading provider of broadband satellite networks and services to businesses, governments and consumers, with more than 2.2 million terminals shipped to customers in some 100 countries. HughesNet® is the U.S. market's number one, high-speed satellite Internet service, with more than 500,000 consumer subscribers in North America.

The communications protocol that helps enable the HughesNet service was developed through the Maryland Industrial Partnerships (MIPS) program at Mtech. John Baras, the Clark School's Lockheed Martin Chair in Systems Engineering (joint with the Institute for Systems Research), wrote a MIPS proposal and received initial funding to study asymmetric TCP-IP connections. "Baras's team, consisting of Doug Dillon (a Hughes employee) and Aaron Falk (B.S. '92, electrical engineering, and M.S. '94, systems engineering), developed a technique and software that facilitated packaging our small receiver inside a PC card to transport TCP-IP efficiently over satellite channels. That technology helped us get started in the

Internet business," explains John Kenyon, senior vice president.

Hughes, which patented the technology, credits MIPS with having made a significant contribution

to this project, and the company

has hired many engineers and operations staff as a direct result.



SuccessStory



Global Leader for HPV Testing

Founded in 1985, Digene was one of the first three companies to join Mtech's newly established Technology Advancement Program (TAP) incubator. In less than a decade, Digene became the world leader in human papilloma virus (HPV) testing, offering the only U.S. Food and Drug Administration-approved test of its kind. The test helps determine a woman's risk of cervical cancer.

Digene set up its first laboratory space at the original TAP facility, acquiring new and used equipment from such diverse sources as the government surplus program and various equipment brokers. Its initial workforce included many university students. The company also was an early client of Mtech's Bioprocess Scale-Up and Training Facility.

Digene employed 500 individuals, marketed its tests to more than 40 countries worldwide and was traded on the NASDAQ before it was acquired by Qiagen in 2007 for \$1.6 billion.

SuccessStory

Scaling Up for the Infant Formula Market

Martek Biosciences makes products from microalgae, plant-like microorganisms that contain unique carbohydrates, fats and proteins. One of its most significant products is DHA, an omega-3 fatty acid critical to cardiovascular health and infant development.

“When Martek started we were working in an unknown area—algae—and no one understood it,” recalls President Steve Dubin, a former venture capitalist and current member of the Clark School Board of Visitors. “When Mtech gave our work the thumbs-up, we were instantly validated. That made it a lot easier to find investors and get the business functioning.”

Martek became the first client of Mtech’s Bioprocess Scale-up and Training Facility, which helped them take their products from the lab to manufacturing levels. Facility staff also helped train Martek personnel and select equipment. Now one of Maryland’s most successful biotechnology companies, Martek has licensed its oil ingredients to 80 percent of the world’s infant formula manufacturers.



“TECHNOLOGY-BASED jobs are the basis for wealth creation in this region. There is an economic development multiplier: for every job you create in a new venture, you create three or four others in the economy.”

Martha Connolly, Director, Maryland Industrial Partnerships

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SuccessStory

Hinman CEOs Firms Are Among *Inc.* Magazine’s Fastest-Growing Private Companies

Squarespace, Inc. and Lurn, Inc., companies launched by graduates of the Hinman CEOs program, are named in *Inc.* magazine’s recent listing of the 500 fastest-growing private companies in the U.S.

Anthony Casalena, B.S. '05, computer science, wanted to redefine publishing on the web in 2003 when he founded Squarespace, Inc., as a 20-year-old student in the Hinman CEOs program. Today, the company offers a hosted, managed environment for creating and managing websites and blogs, serving tens of thousands of sophisticated business websites and logging hundreds of millions of hits per month with

unprecedented levels of reliability. Squarespace recently received \$38.5 million in venture capital from Index Ventures and Accel Partners.

“The Hinman program was an excellent resource during my time at Maryland,” says Casalena. “The connections I made through the program provided for a very strong knowledge base, which helped Squarespace avoid many common pitfalls.”

Lurn, Inc., formerly known as Affiliate Classroom, is a leading provider of e-learning content and technology and a graduate of Mtech’s VentureAccelerator Program and TAP incubator program. Founded by Hinman CEOs alumnus Anik Singal, B.S. '05, finance, the company provides step-by-step training to help people develop and launch Internet businesses, with staff in virtual offices throughout the U.S. and in two locations in India.



Anik Singal

In 2009, Lurn, Inc. was named a Maryland Incubator Company of the Year in the technology services category. In 2008, Singal was ranked second in *BusinessWeek.com*’s Best U.S. Entrepreneurs 25 and Under.



squarespace

SuccessStory

Helping Patients with Cancer

Gliknik is a start-up that is developing new therapies for patients with cancer and autoimmune inflammatory diseases. "David Block, our CEO, and I are both physicians, and we want to make a difference for patients," says Scott Strome, M.D., company co-founder and professor of otorhinolaryngology, head and neck surgery at the University of Maryland School of Medicine at the University of Maryland, Baltimore. "Gliknik was created through an alliance with the School of Medicine, which owns a portion of the company and shares our outlook."

When he started Gliknik in 2007, Strome received several critical grants from Maryland Industrial Partnerships (MIPS) at Mtech. "Martha Connolly is a visionary leader. We met with her, and MIPS provided seed funding to develop our ideas. After that we received an NIH contract through the SBIR program based on our earliest pre-clinical development through MIPS." Gliknik, a 2009 Maryland Incubator of the Year award winner, recently received a financial boost from the Maryland Health Care Development Corporation, an investment organization that stimulates growth in Maryland's biomedical industry through early-stage investment.

SuccessStory

Improving Cell Phone Communication

The sound quality of cell phone conversations may soon improve dramatically thanks to OmniSpeech LLC, a start-up company that is developing a speech extraction technology for voice communications. OmniSpeech's technology solves a major problem—background noise in cell phone conversations—with cost-effective software. The new technology can ultimately be used to enhance sound quality in hearing aids, for military sniper and subject identification, and in teleconferencing.

The winner in the High Technology Category of Mtech's 2010 University of Maryland \$75K Business Plan Competition, OmniSpeech was founded by Professor Carol Espy-Wilson, electrical and computer engineering and Institute for Systems Research, who credits part of the company's success to Mtech's VentureAccelerator (VA) program.

"VA helped us develop our business plan presentation, identify potential grants, apply for state funding and find law firms to help us work out legal agreements," explains Espy-Wilson. "We are talking with possible strategic partners, and we are in the process of identifying others who can support us."



SuccessStory

The Value of Start-Up Competitions

Imagine a battery that is flexible, ultra-thin, non-toxic, with a higher storage capacity than any available today and capable of being recharged wirelessly. For developing that patent-pending product, FlexEI LLC has won business plan and best invention competitions within the University of Maryland and now has been named a 2010 Maryland Incubator Company of the Year.



FlexEI was started by a group of faculty members in the Clark School's electrical and computer engineering department who took full advantage of Mtech's programs. "The VentureAccelerator has a rigorous due diligence and review process," notes FlexEI co-founder Martin Peckerar, "and provides business expertise from a full-time staff with extensive experience in entrepreneurship, venture capital and investment banking." The company has now been accepted into Mtech's Technology Advancement Program incubator.

"At first, I didn't see the value of competitions," Peckerar states. "However, they force you to refine your thinking and your technology and help you stand out in a field filled with competitors. The people at Mtech knew they would make a difference."

SuccessStory

A Life-Saving Treatment

A 2008 Maryland Industrial Partnerships (MIPS) grant gave Remedium Technologies the financial boost it needed to further develop Kytoclot, an innovative blood-clotting foam that can be sprayed into an injured body cavity, where it adheres to tissue and rapidly stops bleeding as it expands. The foam could ultimately be distributed to soldiers, paramedics or civilians for use in emergency or mass casualty situations.

Mtech's VentureAccelerator program "connected all of the pieces of the start-up process for us," recalls Fischell Fellow in Biomedical Engineering Matthew Dowling, company founder, who was named an Innovator of the Year in 2009 by the *Maryland Daily Record*. The company also won first prize in the Oak Ridge National Laboratory's 2010 Global Venture Challenge.

Remedium received significant funding from the Maryland Technology Development Corporation, allowing the start-up to complete a large set of animal studies. Through the Clark School Board of Visitors, the firm connected with a regulatory expert who is now providing advice on accelerating approval from the U.S. Food and Drug Administration.



How to Inspire Innovation

Innovating is hard work—just ask the many alumni, faculty members and students featured in this issue. It is a challenge to take the glimmer of a great idea, develop it into a well-defined product, perform the analysis and strategizing to create a comprehensive business plan and launch a well managed and financed start-up company to take the product to market.

To spur innovation, the university and the Clark School, together with individuals, corporations and Maryland economic development organizations, have created programs that inspire professors and students to take on those challenges and compete for prizes and recognition that will help them succeed. These include:

The Invention of the Year Award, sponsored by the university's Office of Technology Commercialization, selects winning inventions, one each from the areas of information, life, and physical science, based on creativity, novelty and potential benefit to society. 2010 winners include:

- **Information Science:** Carol Espy-Wilson, software to reduce cell-phone background noise
- **Life Science:** Utpal Pal and Adam Coleman, genetic markers for improved Lyme disease diagnostics
- **Physical Science:** Gary Rubloff and Sang Bok Lee, high-density energy storage for vehicle and electronic device batteries.

See www.eng.umd.edu/facstaff/facstaff_invention-award.html for past years' winners.

The University of Maryland \$75K Business Plan Competition, sponsored by the law firms of Fish and Richardson and Nixon Peabody, together with SAIC, promotes the commercialization of innovative ideas in high-technology, biotechnology and undergraduate categories by offering faculty and students prizes for the best new venture plans. 2010 winners are:

- **High Technology:** OmniSpeech, LLC, software to reduce cell-phone background noise
- **Biotechnology:** Aeramatics, a spirometer to reduce post-operative lung complications
- **Undergraduate:** DoseSpot, a web-based medication prescribing system that is easy to use and integrate.

See www.bpc.umd.edu for more information.

TERP Start-up Lab Helps the Newest of the New

SAIC has donated funds to establish and equip the TERP Start-up Laboratory, a new incubation program for companies that are launched by University of Maryland faculty members and students and regional entrepreneurs. Admitted companies are worthy start-ups that do not yet meet the requirements for Mtech's VentureAccelerator or the Technology Advancement Program, but need a place where they can establish offices, quickly develop technology prototypes and connect with other entrepreneurs.

The Warren Citrin Social Impact Award, sponsored by entrepreneur, philanthropist and Clark School Board of Visitors member Warren Citrin, is offered as part of the \$75K Business Plan Competition to support start-ups whose technologies serve to improve the world. 2010 winners are:

- **OmniSpeech, LLC:** software to reduce cell-phone background noise
- **DoseSpot:** a web-based medication prescribing system that is easy to use and integrate
- **CloudSolar:** affordable systems for capturing solar thermal energy and converting it into electricity.

See related story, p.22.

The \$50K SAIC-VentureAccelerator Competition, made possible by funding from SAIC, supports companies in (or entering) Mtech's VentureAccelerator program that are commercializing technology to solve problems in national security, energy and the environment, critical infrastructure or health. The 2010 winner is:

- **OmniSpeech, LLC:** software to reduce cell-phone background noise.
- See www.mtech.umd.edu/funding/saic for more information.

The University of Maryland Technology Start-Up Bootcamp, also sponsored by Fish and Richardson and Nixon Peabody, trains attendees in the basics of business plans, funding, marketing and other topics. See www.bootcamp.umd.edu for more information.

The Maryland Incubator Company of the Year Award, sponsored by The Maryland Technology Development Corporation (TEDCO), Maryland Department of Business and Economic Development, and private firms, offers prizes in several categories.

- **2010 Best Technology Transfer Company:** FlexEI, LLC, thin-film battery technology that is higher in charge storage capacity than market-leading alternatives.



Scenes from a recent \$75K Business Plan competition.





Kai Y. Duh

Mtech Brings International Tech Companies to the Launch Zone

Building on the success of Mtech's Technology Advancement Program (TAP), the University of Maryland, together with the State of Maryland's Department of Business and Economic Development, created the Maryland International Incubator (MI²) in fall 2009 to provide a soft landing for companies from abroad seeking to establish a presence in Maryland. Administered by Mtech, MI² seeks to spark economic growth, bring foreign investment to Maryland and, ultimately, create jobs in the state and add to the tax base.

"We are a different type of incubator. We are not working with true start-ups, but are dealing with successful companies that are looking to enter the U.S. market," says MI² Director Kai Y. Duh, who was president of Maryland Semiconductor, Inc. for a decade before joining the university. "In this type of economy, it is no longer a zero-sum game. For companies to be successful in today's global village, they must enter into partnerships and collaborations to expand their markets."

MI² provides participating companies with access to the University of Maryland's world-class research capabilities through collaborations with faculty members and employment of students; physical space for the companies to reside in; participation in various Mtech programs; and networking opportunities with potential partners having common or complementary interests.

The incubator's current members hail from China, Russia, Canada, Bangladesh, the United Kingdom and India. The Chinese members, the incubator's largest component, operate here through a novel arrangement with the Chinese government. Known as the University of Maryland-China Research Park and formerly directed by Duh, the initiative is an incubation effort by the Chinese Ministry of Science and Technology to help Chinese companies expand internationally. The Ministry program is the only one of its kind in the United States and one of only five in the world.

"The State of Maryland already has a significant presence in the global market, but this research park is another boon to the state's efforts to enhance the economy," says University of Maryland President C.D. Mote, Jr. "The park's participants will likely stay in Maryland and further simulate the growth of high-wage, high-knowledge jobs."

MI² encourages research collaboration in such areas as health care, the environment, agriculture, energy and fire protection. "High-tech firms like locations close to a major research university to draw on its expertise and talent," says Duh. "The state's ability to provide a highly educated workforce is also important to companies. Mtech facilitates member companies' access to the region's many resources and offers a set of services that will help members achieve their goals here."

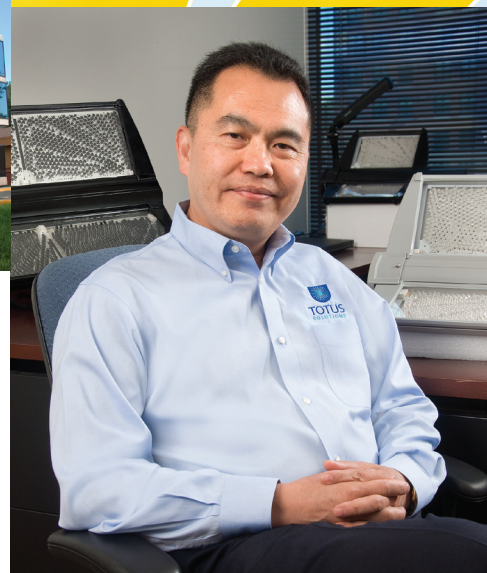
Officials celebrate the dedication of the UM-China Research Park. From left, Maryland Department of Business and Economic Development Secretary Christian Johansson, University President C.D. Mote, Jr., Chinese Science and Technology Minister Wan Gang and Chinese Embassy Minister Liu Guangyuan.



MI² Offices, College Park, Md.



PHOTOS BY LUISA DIPIETRO



Steven Chen, founder and president, Totus Lighting Solutions.

Diverse MI² Member Companies Seek Expanded U.S. Presence

Glodon (formerly Beijing Grandsoft Company)

Founded in 1994 in Beijing, the company provides information technology solutions for the construction industry and holds more than 50 percent of the construction software market in China. Glodon, which had its initial public offering in China and has more than 1,000 employees and \$35 million in revenues, is interested in pursuing research and development in construction information technology.

Shandong Province Liaison Office

The Department of Science and Technology of Shandong Province has established a liaison office at the UM-China Research Park to assist Shandong businesses in collaborating with U.S. firms. Shandong is the biggest industrial partner and one of the top manufacturing provinces in China.

Community DNS

Community DNS Limited, based in the United Kingdom, is a community-based initiative designed to promote best practices in handling Internet infrastructure domain name resolution services (DNS), the underlying infrastructure that makes the Internet work. The company, the second largest DNS provider in the world, is seeking to become the global leader in this field by entering the U.S. market.

US-China Training Services, Inc.

Founded in Shanghai, US-China Training Services (UCTS) seeks to promote educational programs in innovation and entrepreneurship for Chinese business executives. UCTS has conducted training classes for executives and plans to broaden its services to high school students to encourage participation in the University of Maryland's Young Scholars Program.

Wuxi TocaTek

Located in Wuxi in the Jiangsu province of China, TocaTek provides asset management and productivity management services. The company's line of products includes a cargo and fleet transaction management program integrated with GPS.

Investment and Venture Fund of the Republic of Tatarstan

This fund, based in Kazan, Russia, was created in 2004 to promote innovation in the Republic of Tatarstan by developing high-tech industries. The firm is seeking to build relationships with Maryland businesses.

DaSol Solar Energy Science and Technology Co., Ltd.

Located in Zhejiang, China, the firm specializes in the research, development, manufacture, installation and service of solar panels, photovoltaic application systems and power systems. DaSol plans to establish a U.S. operation for research and development and large-scale local production for international market distribution.

Totus Lighting Solutions, Inc.

Backed by investments from the U.K. and Switzerland, Totus provides solid-state lighting for street and signage applications with significant electricity savings and extended product life. Totus plans to establish a research and development operation for green, state-of-the-art lighting solutions to reach a worldwide market.

Dycent Biotech

Dycent manufactures and supplies high-quality biochemicals and re-agents for molecular biology, the life sciences and diagnostics organizations. Dycent conducts analytical testing of more than 100 diverse biochemicals and materials at its Shanghai, China, location and continues to expand plant and technical capabilities, adding large-scale process equipment and state-of-the-art facilities.

Dimetek Digital Medical Technologies, Ltd.

Established in 2007, this Sino-American joint venture corporation concentrates on researching, manufacturing and selling a range of monitoring and assessment equipment. The company is working on a number of Chinese and international patents.

Mina Mar Group

A Canadian boutique stock promotion and investor relations firm, the company works with investors, third-party owners and small- and micro-cap public companies in the North American capital market. Mina Mar Group helps growing companies gain attention in the investment community.

ZaZa Industrial Co., Ltd.

ZaZa is an infrastructure development firm that provides technologies, equipment and human resources to assist the country of Bangladesh in expanding its emerging economy. Current projects and accompanying financing focus on renewable energy, communications and emergency planning.

Signalway Antibody Co.

Signalway is a biotechnology company specializing in the research and development, production and marketing of phosphor-specific antibodies with a manufacturing base in China, sales centers in the U.S. and U.K. and distributors worldwide. The company is looking to expand its presence and fully utilize advancing technologies in the U.S.



PHOTO BY AL SANTOS

Alex Severinsky at his induction to the Clark School's Innovation Hall of Fame.

Severinsky Reaches Licensing Settlement with Toyota

TAP Entrepreneur's Hybrid Technology Patent Dispute Resolved After Six Years

When Alex Severinsky launched PAICE LLC in 1992 with support from the Clark School and Mtech, he envisioned licensing his patented hybrid electric/internal combustion engine technology to major car companies and helping to create a new era of higher fuel efficiency, lower emissions and superior driving performance.

Some 18 years later, Toyota has agreed to license all 23 of PAICE's domestic and foreign patents, the last of which expires in 2019. Terms of the licenses remain confidential. This settlement follows a six-year legal dispute that included an appeal by Toyota to the U.S. Supreme Court.

"I am pleased that Toyota and PAICE came to an amicable resolution regarding our patents," said Severinsky, a Clark School visiting professor of mechanical engineering and member of the school's Board of Visitors and Innovation Hall of Fame. "We have long believed that hybrid vehicles represent the wave of the future for the auto industry and hope that consumers will continue to embrace hybrid vehicles as a meaningful way to reduce emissions."

In the early 1990s, Severinsky developed the Hyperdrive power-amplified internal combustion engine (PAICE) power train, a unique successor technology to the conventional internal combustion engine power train. Hyperdrive's key innovation is in the use of a high-voltage, alternating current electrical subsystem, which offers significant performance advantages over conventional power trains and other hybrid technologies, with average fuel economy improvements of greater than 50 percent at equivalent cost, broad applicability across chassis sizes and vehicle types, lower environmental impact, and ample power for all vehicle accessories.

PAICE joined Mtech's Technology Advancement Program (TAP) incubator in 1992. "Mtech was most helpful in introducing us to relevant university faculty and technology companies that could analyze the Hyperdrive technology and provide advice on commercialization," says Severinsky. "The university as a

whole played a significant role in PAICE's success." Severinsky had previously connected with TAP for support for an earlier venture, Viteq, which developed uninterrupted power supplies for computer systems.

Severinsky made a physical prototype of his technology and demonstrated the system in Detroit in October 1999. He proved that the system could effectively reduce the gas consumption of a Cadillac Coup de Ville by half in city driving while retaining its driving performance.

Engineers at U.S. and Japanese automakers were interested in Severinsky's invention, but top management resisted. A staff engineer at Toyota later developed the same idea as Severinsky's for hybrids. Toyota introduced the technology in its second generation Prius, and stated in a corporate report that the key to the new car's improved performance was switching to a high-voltage system. Shortly thereafter, in 2004, PAICE sued to protect its patent rights. In 2005 a federal judge in Texas ruled that Toyota had infringed upon one of PAICE's patents. An appellate court upheld the ruling in 2007. Toyota then appealed to the U.S. Supreme Court, which refused to review the case. Severinsky served as CEO and chairman of PAICE until 2006.

PAICE was poised to take the case to the International Trade Commission on Monday, July 19. That morning the case was settled out of court. In early July, PAICE LLC and Ford Motor Company entered into an agreement for the license of PAICE's breakthrough 1994 hybrid vehicle patent (U.S. Patent 5,343,970). The terms of this license are also confidential.

PAICE will continue to pursue licensing agreements with other automakers that use hybrid technology patented by the company. This fall, Severinsky will enter TAP again with his new company, AtomNet, which develops safe, portable technologies for generating electricity.

A Long Tradition of Launching and Leading

The Clark School has produced many ambitious alumni—and inspired generous benefactors—who have launched or led companies that have succeeded internationally or in specialized local markets. Here is a small sampling.

Adisai Bodharamik, Ph.D. '71, electrical engineering, is the founder and former chairman/CEO of Jasmine International Group, a group of telecommunications companies that has launched such technologies as the roving, hand-held satellite telephone and an underwater, fiber-optic cable system linking Thailand's provinces along the Gulf of Siam.



Robert Briskman, M.S. '61, electrical engineering, co-founded Sirius Satellite Radio to implement his digital satellite communications system, the first significant development in the radio industry in decades. (See related story, p. 20.)



Kimberly Brown, M.S. '98 and Ph.D. '05, chemical engineering, created Amethyst Technologies, a company specializing in current Good Manufacturing

Practices compliance systems for life science and research organizations. The company is housed at bwtech@UMBC, a technology incubator community at the University of Maryland, Baltimore County.

Sudhitham Chirathivat, B.S. '71, electrical engineering, is executive chairman of the CEO Management Board of the Central Group of Companies, which includes Central Pattana, Thailand's largest retail developer.



A. James Clark, B.S. '50, civil engineering, formed Clark Enterprises, Inc., a leading company in commercial and residential construction and real estate. Clark Construction is one of the nation's largest general contractors.



Robert E. Fischell, M.S. '53, physics, benefactor of the Clark School's Fischell Department of Bioengineering, is a serial entrepreneur whose inventions include the implantable insulin pump, rechargeable pacemaker and flexible coronary artery stents.



Brian Hinman, B.S. '82, electrical engineering, is a serial entrepreneur who founded PictureTel (videoconferencing), Polycom (audio, video and data conferencing), and 2Wire (products that distribute broadband content throughout the home). The founder of the Hinman CEOs program at the Clark School, he is now working with a number of alternative energy start-ups.



Jeong H. Kim, Ph.D. '91, reliability engineering, founded Yurie Systems and pioneered the development of a revolutionary ATM switch for wireless applications crucial to the modernization of telecommunications systems for digital applications. He is now president of Bell Labs and a Clark School professor of the practice.

Rajiv Laroia, M.S. '89 and Ph.D. '92, electrical engineering, co-invented a spread spectrum technique that helps companies extend IP-based Internet functions to mobile devices. He was founder and CTO of Flarion Technologies (a Lucent spin-off), which was purchased by Qualcomm.

Aris Mardirossian, B.S. '74 and M.S. '75, mechanical engineering, founded a patent company, Technology Patents, with 16 patents granted or pending. He also founded 6-12 Convenient Marts.



Glenn L. Martin, pioneer aviator and entrepreneur, founded the Martin Aircraft Company, a predecessor to Lockheed Martin, and established the University of Maryland's Glenn L. Martin Institute of Technology, creating major engineering facilities and professorships.



Yagyensh (Buno) Pati, B.S. '86, M.S. '88 and Ph.D. '92, electrical engineering, developed the phase-shift lithography process for the design and manufacture of subwavelength integrated circuits, and founded Numerical Technologies, Inc., to produce and market related software tools and technologies.

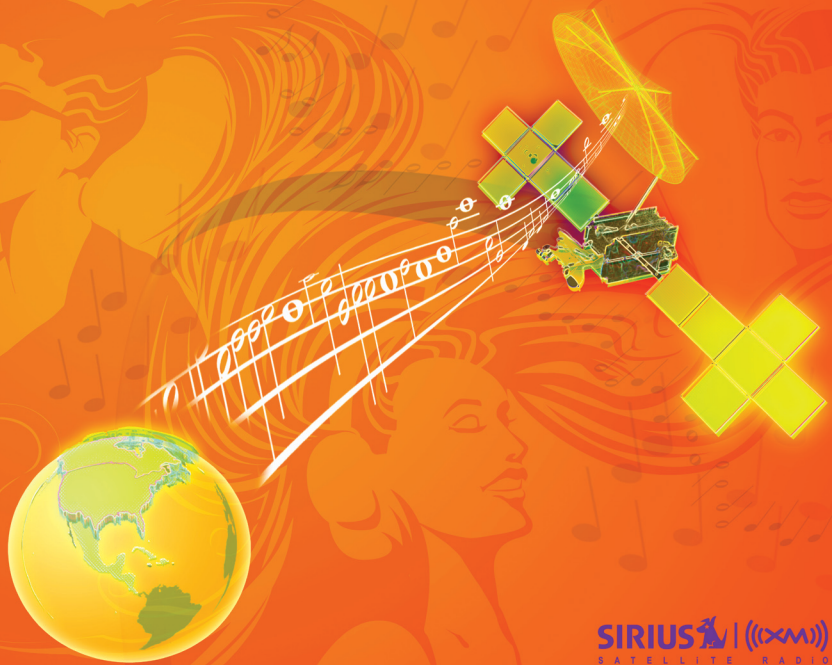
Kerry W. Wisnosky, B.S. '86, aerospace engineering, is a founding partner of Millennium Engineering and Integration Company in Arlington, Va., one of the nation's premier employee-owned businesses specializing in space systems, weapon systems and advanced technologies. He currently is a member of the firm's board of directors.

NO ADS NO INTERFERENCE NATIONWIDE

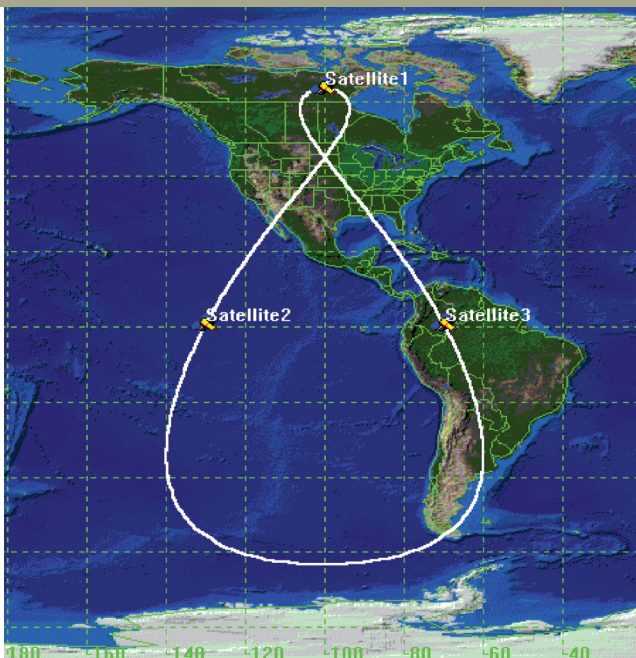
ROBERT BRISKMAN'S SIRIUS SATELLITE RADIO IS THE INDUSTRY'S FIRST MAJOR INNOVATION IN DECADES

Robert D. Briskman, M.S. '61, electrical engineering, remembers working with a slide rule and an HP-35 calculator to solve complicated engineering problems during his graduate school days at the Clark School. Those fundamental tools of the trade and rigorous academic preparation from stellar faculty members, including Electrical Engineering Professor Henry Reed, helped Briskman achieve key positions at NASA and with industry giants such as Communications Satellite Corporation and COMSAT, before applying satellite technology in an entirely new way and launching his own business. This fall, Briskman will be honored as the 2010 Clark School Innovation Hall of Fame inductee for developing key technologies that make efficient satellite radio possible and co-founding Sirius Satellite Radio.

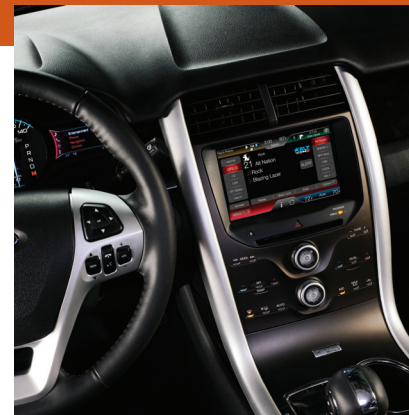
Briskman created the innovative technologies, formally known as Satellite Digital Audio Radio Service (SDARS), that enable satellite transmission of continuous radio programming to mobile and fixed receivers, with near perfect availability across enormous geographic areas, using ground "repeaters" to complete communications for less than one percent of the service area. To build and implement that service, he co-founded Sirius Satellite Radio. The service was the first major development in radio in decades,



SIRIUS
SATELLITE RADIO



"Figure 8" geosynchronous
satellite orbit.



From left, Robert Briskman; launching of satellite; Professor Henry Reed; in-car receiver.

providing the first subscription-based, advertising-free model and programming that was consistent across the country.

Now functional throughout the continental U.S. and much of Canada, SDARS uses satellites to broadcast a digital signal in the radio-frequency band around 2332 MHz, primarily to small mobile receivers in automobiles that convert the signal to analog audio. The success of SDARS depends on maximizing the strength of the signal that reaches the earth, which, in turn, depends on satellite transmission power, the elevation angle of the signal and other factors. Briskman designed and built three of the most powerful commercial broadcast satellites at the time, each producing two megawatts of radiated power, and launched them into a “figure 8” geosynchronous orbit over the Americas. Briskman devised this unique elliptical orbit to achieve the highest possible elevation angle of the satellites to the mobile receivers, minimizing signal outages.

A Challenging Journey

Briskman’s journey from the Clark School to Sirius has been highly rewarding, but at times challenging. For some five years, he balanced graduate school with raising a family and working full time, initially with the intelligence community, then at NASA. Briskman still remembers

Professor Reed’s teaching style and his ability to successfully integrate lectures, text and assignments. “A Southerner, Dr. Reed had a clear, slow, speaking voice that helped me understand the most complex topics,” he recalls.

His work at NASA dovetailed with his thesis topic: deep-space communications. “While at NASA, I played a part constructing the first 210-foot, deep-space antenna under extreme temperatures at NASA’s Goldstone Deep Space Network Facility in California’s Mojave Desert,” explains Briskman. At the facility, he worked with Andrew Viterbi, the developer of the Viterbi decoding algorithm and co-founder of Qualcomm.

From 1959 to 1963 Briskman served as chief of program support for NASA’s Office of Tracking and Data Acquisition, where he invented the unified S-band system and received the Apollo Achievement Award. For the next two decades, he worked for Communications Satellite Corporation and then COMSAT General Corporation, where he was vice president of systems implementation. He was senior vice president of engineering for Geostar Corporation from 1986 to 1990, and in 1991 co-founded Sirius Satellite Radio, now Sirius XM Radio, where he is technical executive.

Briskman has received numerous hon-

ors, authored more than 50 technical papers and holds many U.S. and foreign patents. On October 21, Briskman will add yet another honor to that list when he joins the Clark School’s Innovation Hall of Fame, which recognizes Clark School alumni, faculty and associates who have pioneered many of the most significant engineering advances in the past century. Briskman is one of several inductees whose area of innovation was satellites, including S. Joseph Campanella, Robert Caruthers, and Edward Miller and James Plummer. For more information, visit www.eng.umd.edu/ihof. ■

Innovation Hall of Fame Induction Ceremony and White Symposium on Engineering Innovation Thursday, October 21, 4:30 p.m. Jeong H. Kim Engineering Building

Join alumni, students, faculty members and guests in honoring Robert Briskman, M.S. ’61, electrical engineering, co-founder of Sirius Satellite Radio, for his achievements. The 5 p.m. White Symposium focuses on the impact of satellite technology on society. For more information, contact Missy Corley at 301-405-6501 or mcorley@umd.edu.

New Fund Enhances Student Recruitment Efforts

Board of Visitors Endowment Expands Dean's Scholarship Options



James Redifer

The 40 members of the Clark School Board of Visitors are leaders from a wide range of public and private organizations. Some are alumni, some are not. Yet all share a common interest: to assist Dean Darryll Pines in promoting exceptional engineering education and research at the Clark School.

In the last year, their support for the Clark School reached a new level. At its fall 2009 meeting, the board agreed to launch its first group fundraising effort, the Board of Visitors Scholarship Fund, to endow merit

scholarships. To date, \$400,000 has been raised.

"Potential engineering students in the state of Maryland are being lured by lucrative scholarship offers from out-of-state colleges and universities, and we want to help keep the best and brightest here," says retired executive James Redifer, B.S. '58 and M.S., '71, electrical

engineering, chair of the board's scholarship committee. "This fund demonstrates the school's commitment to students in its own backyard. We realize students have many options and the board feels it is important to join with the dean in attracting home-grown talent to the Clark School."

The fund will give Dean Pines, and future deans, greater flexibility in student recruitment. "If the dean wants to attract students from certain high schools that do not typically send many students to the Clark School, our scholarship could be an impetus for change," says Redifer.

The board's goal is to raise a minimum of \$500,000 and engage all board members in supporting the fund. That amount would generate \$25,000 in annual income to be used at the dean's discretion. "Our goal is within reach, and the board is answering the call," says Redifer.

With this effort, notes Board Chair Tom Scholl, a partner in the Bethesda, Md., venture capital firm of Novak Biddle, "We are turning a new page. We have a dynamic board that wants to have a lasting impact on the Clark School. We can grow the fund over time and make it a living, breathing endowment we can feel proud of." ■

Warren Citrin Funds Fellowships to Address Sustainability

Supporting Research and New Ventures to Improve Global Community

It took only one visit to the Clark School—to speak to a group of students in the Hinman CEOs program—for Warren Citrin to recognize that "the Clark School is one of the first universities to make significant progress in helping students understand the transition from education to the workplace." A serial entrepreneur, Citrin became increasingly interested in Clark School programs that support and encourage innovation and entrepreneurship, particularly the offerings of the Maryland Technology Enterprise Institute (Mtech) and its "extremely impressive" group of leaders and projects.

This spring, inspired by his work on a committee to create a global sustainability center at the Clark School, he established the Warren Citrin Graduate Fellowships to support graduate research in the broad area of sustainability. Starting in fall 2011, the \$560,000 gift will provide four, first-year doctoral students with \$35,000 and additional financial support through the completion of their graduate degrees.

Citrin, a member of the Clark School Board of Visitors, previously established the \$250,000 Impact Pre-Seed Fund, which offers \$500-to-\$5,000 grants to students in Mtech's Hinman CEOs, Hillman Entrepreneurs, and

Entrepreneurship and Innovation programs.

"Real progress in solving the many sustainability problems facing the global community will come through multidisciplinary approaches, with engineering at the nucleus," says Citrin, co-founder of Gloto Corporation, known for its patented mobile-to-Web technology. "From sociology and psychology to business, all academic disciplines must converge to achieve our sustainability mission."

"The Citrin fellowships will enable the Clark School to attract talented graduate students who will address sustainability issues while contributing to the university's entrepreneurial culture," says David Barbe, executive director of Mtech, which will manage the fellowship program.

Citrin notes three key areas in which he believes the Clark School can excel in addressing sustainability issues. "Solutions often involve how materials can be applied, which depends on materials science. We need accessible tools, or metrics, to measure the extent of environmental problems and to track improvements, and we need to identify models and software to assess the risks of new technologies," he explains. "The Clark School has significant potential in each of these areas."

Citrin's gift also supports a new half-time



position at the university dedicated to helping the four fellowship students commercialize their technologies. That position will be housed under Mtech's VentureAccelerator program.

"If just one research paper or product that advances the greater good comes out of this program, whether it is containing oil in the Gulf or improving the quality of life in a developing country, these fellowships will be the best investments I have ever made," Citrin attests. ■

Business and Technical Leaders Join Board

Seven national leaders—serial entrepreneurs, CTOs, investment fund managers, association directors—have brought their knowledge, experience and dedication to the Clark School's Board of Visitors, the group that advises the dean on broad strategic plans as well as specific initiatives to advance the school.

Warren Citrin is co-founder and director of Gloto Corporation, developer of patented mobile-to-Web technology. Citrin previously co-founded Solipsys Corporation, specializing in defense-related data integration and display software technologies. Raytheon acquired Solipsys in 2003. Citrin established the Warren Citrin Graduate Fellowships this year to support graduate students interested in conducting research in the area of sustainability. (See related story, left.)



Paul Gaske, B.S. '76, electrical engineering, is executive vice president and general manager for the North American Division of Hughes Network Systems LLC, which operates the largest satellite broadband network for consumers in the United States. Most recently he launched broadband satellite services for Hughes's business, government and consumer markets. Gaske holds numerous patents in satellite communications and broadband networking and earned his master's in computer science from The Johns Hopkins University. (See related story, p.12.)

Arthur A. Morrish, Ph.D. '86, chemistry, is vice president and chief technology officer for the products group of L-3 Communications, the sixth largest defense company in the United States. Previously Morrish served as director of the Tactical Technology Office for the Defense Advanced Research Projects Agency, where he led the development of numerous high-risk, high-payoff projects, including unmanned vehicles, space systems, high-energy lasers, high-energy density propellants and hypersonic propulsion systems. (See related story, inside back cover.)



Timothy J. Regan, B.S. '77, civil engineering, is executive vice president of The Whiting-Turner Contracting Company, which provides construction management, general contracting, and design/build services. In his 30 years with the company, he has led numerous construction projects in the Washington, D.C., and Baltimore areas, as well as nationally, and has helped expand Whiting-Turner's presence in the life science industry, working with research, biotechnology, pharmaceutical processing and various federal laboratory clients. The company generously supports the Clark School's Whiting-Turner Business and Entrepreneurial Lecture Series, now in its second decade.



A 2008 inductee of the Clark School Innovation Hall of Fame, **Alex Severinsky** invented the Hyperdrive power-amplified internal combustion power train for today's hybrid vehicles. (See related story, p. 18.) Severinsky, who immigrated to the United States from the Soviet Union in 1978 and holds more than 30 U.S. and foreign patents, refined his ideas and launched his company through the Clark School's Maryland Technology Enterprise Institute (Mtech). He is entering Mtech's incubator again with his new company, AtomNet, which develops portable technologies for generating electricity.



As executive director for the Mid-Atlantic Venture Association, **Julia Spicer** represents the interests of more than 500 venture capital professionals from 100 venture and private equity funds and CEOs of growth companies across a multitude of industry sectors. Previously, she was vice president for Columbia Capital, a specialty communications and technology investment fund. Spicer formerly served as corporate vice president of strategic planning and communications for GTE Corporation, directing investor relations and marketing for the corporation's \$4 billion wireless and emerging technology businesses, research laboratories and federal public policy initiatives. She also served as president of the GTE Foundation. (See related story, p. 10.)

Stephen P. Zaminski, B.S. '86, mechanical engineering, co-founded Starwood Energy, a \$433 million private equity investment fund focused on energy infrastructure. Starwood invests in power generation, renewable energy and high-voltage power transmission projects in North America. At Starwood, Zaminski committed to more than \$3.5 billion in investments. Previously he worked as an investment banker, specializing in private equity advisory. He earned an M.B.A., graduating with honors from the Wharton School of the University of Pennsylvania. ■

Clark School's O'Shea to Oversee University's New Relationship with Lockheed Martin

Additional Agreements Signed with Federal Agencies



Patrick O'Shea

More than 60 years after Glenn L. Martin, founder of Martin Aircraft Company, made a generous gift to the university to establish instruction and research in the aeronautical sciences, the company that bears his name has re-affirmed its long-standing relationship with the university.

Following the tradition of innovation established by Martin himself, Lockheed Martin Corporation and the university have signed a new agreement designed to foster collaborations that will produce innovative solutions for global and national security challenges. The initial commitment, at \$1 million per year for three years, solidifies a strategic partnership through centers of collaboration, joint pursuit of business opportunities, and enhanced research and development. The centers of collaboration will support sustained cooperative work in mutually-agreed upon areas that initially include acquisitions and logistics, climate change and cyber-security.

"Our powerful, decades-long relationship with Lockheed Martin represents one of the most historically significant relationships between a university and a corporation in the

United States," says Clark School Dean Darryll Pines. "The relationship between Lockheed Martin and the Clark School continues to grow in many ways, and we anticipate a close coupling of research and training that will benefit both institutions." The Martin or Lockheed Martin name is associated with numerous prestigious awards, medals and professorships for faculty, students and alumni; two Lockheed Martin classrooms are located in the university's Computer Science Instructional Center building; and, of course, Martin Hall is a major classroom, laboratory and office facility all Clark School students and alumni know well.

Patrick O'Shea, professor and chair of the Department of Electrical and Computer Engineering, will oversee the strategic relationship created by the agreement. "Our new relationship will produce opportunities for us to join forces on innovative research and development projects," O'Shea describes. "We will create a one-stop shop that will simplify our interactions. Our researchers and students will have access to Lockheed Martin technology and equipment that will allow us to advance the mission of both institutions." He anticipates the agreement will encourage Clark School faculty and students to conduct research in cooperation with Lockheed Martin scientists and engineers, both at the corporation's facilities and at the College Park campus.

Students will gain practical experience through internships and research projects at Lockheed Martin. "We are training the leaders of the future, and, in that regard, we understand that our students should explore beyond the classroom to get a complete education," says O'Shea. "This relationship will give students opportunities to see how research connects to the real world and how to work as part of a research team on practical projects."

O'Shea looks to the Lockheed Martin relationship as a model for future corporate partnerships. He recounts how the university has become increasingly important as a research

and development center. "It can be difficult for corporations to engage in the kinds of long-term, exploratory research we do here. Therefore, we can play a significant role in promoting research that is of interest to the corporate sector. Once we have a set of procedures in place, the process will be streamlined for establishing similar agreements, which will enable us to become more efficient in interacting with the corporate world."



NCI and NASA Formalize Partnerships

In addition to strengthening ties with an international corporation, the university has signed two agreements with federal agencies to broaden research opportunities.

University of Maryland and Clark School researchers with sought-after expertise in computational biology, bioengineering, physics and math—including Fischell Department of Bioengineering Professor and Chair William Bentley—hope to contribute to the battle against cancer through a new partnership with the National Cancer Institute (NCI), part of the National Institutes of Health.

An agreement signed this spring establishes the Collaborative Research and Graduate Partnership Program in Cancer Technology between the University of Maryland and the Center for Cancer Research at NCI. The program, only the second of its kind affiliated with NCI, will send Maryland graduate students to NCI laboratories in Bethesda, Md., for training and will provide for professional and academic exchanges between university faculty and NCI researchers.

Bentley is lending his expertise in bioengineering and nanotechnology, using the Clark School's sophisticated nanofabrication laboratories to expand knowledge in areas like targeted drug delivery and micro-photonics that can be used in cell imaging. "My group is developing a simultaneous eradication and detection system," he says of his role in the project. "We're developing a targeted means

of drug delivery that brings drugs to kill cancer cells and delivers contrast agents that can help identify any new cancer growths.”

Clark School researchers have long made significant contributions to the areas of flight navigation and control, microscale and unmanned aerial vehicles and hypersonic air vehicles. Under a new agreement between the university and NASA Goddard Space Flight Center, collaborative engineering research and

development opportunities will be more actively pursued between the two organizations.

The agreement looks to increase access to the research expertise and facilities of both Goddard and the university. By working closely together, researchers can more easily identify, develop and implement future partnerships.

“The new direction that the space agency has undertaken requires promoting and implementing revolutionary initiatives in

science and engineering,” says Goddard Space Flight Center Director Rob Strain.

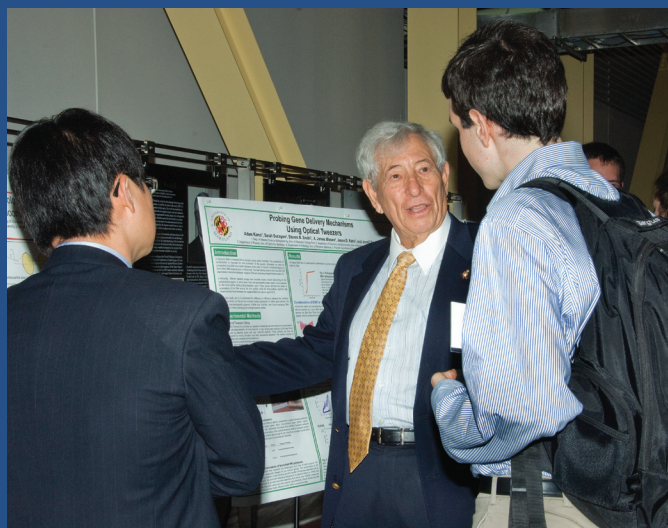
“Developing cutting-edge technologies will require interdisciplinary participation of the highest caliber of personnel. Our partnership with the University of Maryland will help Goddard attract and retain scientific and engineering talent, including graduate students, post-doctoral research associates as well as full-time scientists and engineers.” ■

Fischell Bioengineering Department Celebrates Its Success

Since its inception in 2006, the Fischell Department of Bioengineering has been one of the fastest growing units within the Clark School, fostering an entrepreneurial spirit that has led to the development of rigorous research programs and innovative new companies. This fall, the department welcomes more than 200 undergraduate students, and by the end of the academic year the number of bioengineering faculty members, with expertise ranging from plant metabolic engineering to supercomputer modeling of blood turbulence, is expected to grow to 20. “It has been an amazing ride for us,” Fischell Distinguished Professor and Department Chair William E. Bentley told those attending the department’s Fischell Festival in April. “We have gone from no external funding to a research portfolio of \$4 million per year, and our students and faculty have started at least five new companies.”

Bentley and his team are offering a strong return on the investment made by Robert E. Fischell, M.S. ’53, physics, and his sons, Tim, Scott and David, who established the Fischell Department of Bioengineering and the Robert E. Fischell Institute for Biomedical Devices with a \$31 million gift to the Clark School. Recent activities and research initiatives include the following:

The 2010 Fischell Festival celebrated innovation in the field with a host of presenters who highlighted the potential of their exciting new technologies. **Jonathan Lederer**, M.D., Ph.D., professor and interim director of the Center for Biomedical Engineering at the University of Maryland, Baltimore, described his research group’s efforts to develop new instruments for measuring and visualizing electrical signals originating from heart cells; their goal is to understand the underlying problems that cause arrhythmias. Audience members had the rare opportunity to watch a live video of groundbreaking surgery by **James Gammie**, M.D., associate professor of cardiac surgery at University of Maryland Medical Center. He performed a mitral valve repair, a type of surgery used to treat the narrowing or leaking of an inflow valve that conducts blood from the left atrium to the left ventricle. Gammie repaired the valve with GORE-TEX sutures, tested the seal by flowing saline solution through the valve, and adjusted the sutures to obtain the perfect fit. **Mark Smith**, M.D., director of the MedStar Institute for Innovation, presented a case study about Amalga, an information system for hospitals and other healthcare providers, detailing how his team created the product and obtained buy-in for the technology from staff at Washington Hospital Center. The day ended with a presentation from benefactor **Robert E. Fischell**, chairman and president of Fischell Biomedical, LLC, on how



Benefactor Robert Fischell talks with students at the 2010 Fischell Festival.

biomedical engineers can create new medical devices that decrease the cost of care while improving quality; he cited his new implantable device to combat congestive heart failure as an example.

Bioengineering students are earning venture and research accolades. Fischell Fellow **Matthew Dowling** and colleagues **Peter Thomas** and **Oluwatosin Ogunsola** won first place in the security division of the Oak Ridge National Laboratory 2010 Global Venture Challenge for their company Remedium Technologies, which develops sprays, foams and bandages to stop heavy bleeding and treat chronic wounds more effectively. In addition to a host of university awards, the company also received the Most Promising Security Idea award in the 2009 4th Annual Global Security Challenge. (See related story, p. 14.)

The January issue of *Nature Nanotechnology* highlighted departmental research on tiny biochemical machines—nanofactories—that can confuse bacteria and stop them from spreading without the use of antibiotics. The work demonstrates for the first time that the nanofactories are capable of finding a specific kind of bacterium and, with a much finer level of control, inducing it to communicate. **Rohan Fernandes**, M.S. ’03 and Ph.D. ’08, bioengineering; graduate student **Varnika Roy**, molecular and cell biology; graduate student **Hsuan Chen-Wu**, bioengineering; and Department Chair **William Bentley** authored the article. ■



University Earns Coveted Spot in 2011 Solar Decathlon

The University of Maryland is one of only 20 teams worldwide selected to participate in the international U.S. Department of Energy (DOE) Solar Decathlon 2011, to be staged on the National Mall in October of next year. In Solar Decathlon 2007 the university's entry, *LEAFHouse*, placed first among U.S. teams, second overall. This marks the fourth time the university has qualified for the finals in the competition.

The Chesapeake Bay ecosystem is the inspiration for the university's 2011 Solar Decathlon entry. Called *WaterShed*, it will draw attention to how urban sprawl and inadequate stormwater management threaten the health of the bay. *WaterShed* will strive to create a mini-ecosystem that efficiently captures and fully utilizes the energy of sun, wind and rain as well as household wastes that retain valuable energy and nutritional resources.

This year's entry will include a rooftop photovoltaic array, an edible green wall and garden, and innovative, smart technologies that allow residents to control temperature, ventilation, humidity and light for year-round comfort.

Some 250 students from the Clark School, architecture, environmental science and technology and other disciplines have expressed

interest in working on the project, says Keith Herold, associate professor of bioengineering and Clark School faculty adviser, who is part of a multidisciplinary faculty advising team. A series of Decathlon-related courses in engineering, architecture and agriculture and natural resources form the foundation for Maryland students' participation.

Members of the *WaterShed* team met with other teams and Department of Energy officials in May for a schematic design review of their projects. "It was exciting to get the project moving. We reviewed design elements, safety measures and process issues," says Herold. The team is now finalizing the structure's design, and construction is scheduled to begin in January 2011.

The Solar Decathlon team is counting on significant direct contributions through grants, individual gifts or corporate donations, as well as donated products and services, to match university and DOE support. Donors will receive recognition through the team's website and display materials, including signage visible to hundreds of thousands of visitors on the National Mall. To learn more about how you can participate, contact Keith Herold at 310-405-5268 or herold@umd.edu. ■

Clark School Baja and SAE Teams Win—and Learn

When Adjunct Professor of Mechanical Engineering Greg Schultz began working with Clark School students in 2004 to build racing vehicles and prepare them for competitions, the school frequently placed among the bottom of the pack. "Now we are considered one of the top Baja teams in the world," he says. This spring Clark School mechanical engineering students, known as TerpsRacing, earned top spots in two racing competitions.

A Clark School team placed first out of U.S. teams and fourth overall in the 2010 Baja SAE Carolina competition at the Clemson University International Center for Automotive Research this spring. Some 1,000 students from 100 universities competed for three days in various design, suspension and maneuverability events. The final event of the weekend was a four-hour endurance race on a rugged and challenging off-road course.

In the Formula SAE competition at the Michigan International Speedway, a Clark School racing team was one of 14 teams to advance to the Design Semi-Finals. The Clark School team was chosen from more than 100 teams, representing colleges and universities from



The Clark School team at the Formula SAE competition in Michigan.

Austria, Brazil, Canada, Estonia, India, Japan, Singapore, South Korea, Turkey, the United States and Venezuela.

Just as important as their recent victories on the track is the practical experience students gain, says Schultz. "These students have worked harder on these cars than almost any other project in their lives. They see the kind of effort that is needed to be successful. Their experiences using the tools, working on the hardware, and designing computer models for the cars make these students all the more advanced when they enter the job market." ■

New Clark School Alumni Chapter President Launches Mentoring Initiative

Wollard Cites Benefits of Reconnecting, Giving Back



Gregg Wollard

As the new president of the Clark School Alumni Chapter of the University of Maryland Alumni Association, Gregg Wollard, B.S. '89, civil engineering, is eager to give back to the school that

helped his career take flight. "I would not be where I am today if not for the Clark School," admits Wollard, who, as senior planner for the Metropolitan Washington Airports Authority (MWAA), plans multi-billion dollar projects for Ronald Reagan Washington National Airport and Washington Dulles International Airport.

At Dulles, Wollard helped develop a 10-year, \$4 billion expansion that included a new airport traffic control tower, a fourth runway, a new concourse, two new parking garages and the underground AeroTrain, which transports passengers throughout the airport. "My proudest accomplishments were planning this expansion in a manner that fit the community's needs and getting the job done efficiently, economically and expeditiously."

He traces his success to the practical, hands-on training he received at the Clark School, including an airport master-planning course in which he and his classmates developed a master plan for St. Mary's County Regional Airport in Southern Maryland. That class project helped Wollard land a job with the airport when he graduated. Two years later he joined MWAA.

For his first initiative as president, Wollard is seeking to launch a mentoring program in which alumni coach students on a one-to-

one basis. "It's a win-win-win situation," says Wollard. "Mentors feel great knowing that they are helping students' careers grow and blossom. Students get the encouragement and advice to help them transition into industry. The school benefits from the expertise of alumni and builds its relationship with them."

Wollard's other goals include boosting the school's scholarship program. "There are so many talented undergraduates who have the ambition to become engineers, but are limited financially," says Wollard. The chapter's upcoming golf tournament on September 24 will raise funds for the scholarship program.

Wollard encourages alumni to get involved with the Clark School by joining the alumni association and considering a board position with the engineering chapter. "If you haven't been on campus for a while, you'll be stunned," says Wollard. "The Jeong H. Kim Engineering Building features the newest technologies and has married all the engineering disciplines under one roof, creating an interactive environment unlike any I've ever seen. The energy within the Clark School is second to none." ■

Hit the Tees with Clark School Alumni

Join friends and fellow alumni at the Seventh Annual Clark School of Engineering Alumni and Faculty Golf Outing at the University of Maryland Golf Course on Friday, September 24. Shotgun start is at 8 a.m. followed by an awards luncheon and silent auction. Individual packages are available as well as corporate team sponsorships. For more information, see terpnation.net or contact Josey Simpson, director of alumni relations, at 301-405-2150, josey@umd.edu.



Alumni News

JEONG H. KIM, Ph.D. '91, reliability engineering, was inducted into the University of Maryland Alumni Hall of Fame.

JOHN MULARSKI, B.S. '05 and M.S. '07, aerospace engineering (AE), received the Space Flight Awareness Launch Honoree Award for his work in support of NASA's Space Shuttle and International Space Station programs at Johnson Space Center.

MARK B. TISCHLER, B.S. '78 and M.S. '79, AE, received the 2009 Presidential Rank Award as a Distinguished Senior Professional from the Secretary of the Army.

FUMIN ZHANG, Ph.D. '04, electrical engineering (EE), received a Young Investigator Program (YIP) grant from the Office of Naval Research, one of only 17 awarded nationwide.

NSF Career Award Winners

PINAR AKCORA, Ph.D. '05, chemical engineering, and **ZHU HAN**, M.S. '99 and Ph.D. '03, EE, have received National Science Foundation Early Faculty Career Awards. Akcora received an award for a proposal titled "Multi-functional Particle Assemblies in Polymer Nanocomposites," and Han was honored for his research, titled "Mutual Benefit in Cognitive Radio Networks: A Coalitional Game Framework."

Clark School Students Win Highest National Awards

DYLAN REBOIS, a junior mechanical engineering student, was named one of this year's Truman Scholars, a prestigious national award recognizing leadership, intellectual ability and potential "to make a difference." He was also one of only 80 student recipients of a Udall Scholarship, which recognizes future leaders across a wide spectrum of environmental fields. An Honors College member and Gemstone Program participant, Rebois has volunteered with Engineers Without Borders for two years, serving as design lead in Burkina Faso and

project lead in Ethiopia. A teaching fellow with the Clark School's Keystone Program, he also received the Clark School Engineering Leadership Award this year.

Clark School undergraduate students **ALEXANDER LEISHMAN**, aerospace engineering, and **ETHAN SCHALER**, mechanical engineering, received 2010-11 Goldwater Scholarships. The Goldwater Scholarship is the premier national award granted to undergraduate students majoring in mathematics, natural sciences and engineering who are

interested in research careers.

Leishman is a university honors student who has worked in Peru as a member of Engineers Without Borders and currently serves as its fundraising coordinator. He plans to earn a Ph.D. in aerospace, mechanical or ocean engineering. Schaler is a junior active in Engineers Without Borders, working on the Burkina Faso and Peru projects and co-leading a local project focused on stormwater management on the Anacostia River. He plans to earn a Ph.D. in mechanical engineering, focusing on nanotechnology. ■

Four Faculty Members Promoted to Full Professor



HUGH BRUCK, mechanical engineering (ME), conducts research on smart materials, nanocomposites and materials processing. Most recently, he has taught a graduate course on composite materials

and undergraduate courses in engineering materials and manufacturing processes.



SHERYL EHRLMAN, chemical and biomolecular engineering, focuses her research on the formation, characterization and processing of dry particles (aerosols). She is a Keystone Professor,

teaching sections of the Clark School's *Introduction to Engineering Design* class for freshmen. She has recently been appointed chair of the Clark School's Department of Chemical and Biomolecular Engineering.



The research interests of **GREG JACKSON**, ME, include solid oxide fuels, PEM fuel cells, H₂ production, catalytic oxidation, combustion and thermoelectric waste heat recovery. In the last academic

year, he taught an undergraduate class on thermodynamics.



CHARLES SCHWARTZ, civil and environmental engineering (CEE), pursues research in pavement design and analysis, advanced soil mechanics, computational geomechanics (including

pavement mechanics) and civil infrastructure systems. He teaches undergraduate courses in engineering information processing and pavement engineering.

NAE Inducts Three Faculty Members

Three Clark School-affiliated faculty members have been inducted into the National Academy of Engineering (NAE). The NAE has more than 2,000 peer-elected members and foreign associates who are among the world's most accomplished engineers. Professor Emeritus **JOHN ANDERSON**, aerospace engineering, and curator at the Smithsonian National Air and Space Museum, was inducted for aerospace engineering and history textbooks and for contributions to hypersonic gas dynamics. **ALI MOSLEH**, Jeong H. Kim Professor of Mechanical Engineering, was inducted for contributions to the development of Bayesian methods and computational tools in probabilistic risk assessment and reliability engineering. **BEN SHNEIDERMAN**, computer science and Institute for Systems Research (ISR), was inducted for research software development and scholarly texts concerning human-computer interaction and information visualization.

Faculty Honors

Assistant Professor **DEREK PALEY**, aerospace engineering (AE)/ISR affiliate, and Associate Professor **PETER SUNDERLAND**, fire protection engineering, have each won National Science Foundation Early Faculty Career Awards. Paley was recognized for work that will study information transmission in biological groups (like schools of fish) and apply the same principles to design motion coordination strategies for autonomous vehicles. Sunderland will study soot oxidation in the hopes of reducing environmental soot pollution, which has been shown to cause respiratory illnesses and cancer in addition to contributing to climate change.

Senior Research Professor **ED LINK**, CEE, received the U.S. Army Engineer Association and Regiment's Gold de Fleury Medal. The U.S. Army chief of engineers awards one gold medal each year to an individual who exemplifies boldness, courage and commitment to a strong national defense.

A. James Clark Endowed Chair and Professor of Construction Engineering and Project Management **MIROSLAW SKIBNIEWSKI** has been named the founding dean of engineering at Khalifa University of Science, Technology and Research in the United Arab Emirates.

Clark School Professor **JAMES BAEDER**, AE, was named 2010 Engineer of the Year by the National Capital Section of the American Institute of Aeronautics and Astronautics. Baeder was honored for his research leading to improvements in the prediction of aeromechanics in helicopters and other rotary wing vehicles.

The Alfred P. Sloan Foundation has named ISR-affiliated Assistant Professor **PATRICK KANOLD**, biology, a 2010-2011 Sloan Research Fellow. He is the only person in the state of Maryland to receive a fellowship this year.

Schwartz and Thornton Join Fundraising Team

JENNIFER LEED SCHWARTZ has joined the Clark School's Office of External Relations as the director of development for corporations and foundations. She establishes relationships in which institutions support the school's scholarship, professorship, facilities and program goals through contributions to the *Great Expectations* campaign and the Corporate Partners program. Previously she worked in the performing arts field, including at the Baltimore Symphony Orchestra and The Kennedy Center.

KAREN THORNTON is the Clark School's new director of development for individual major gifts. Thornton has extensive experience with the Clark School, where she has served as associate director of business development for the Maryland Technology Enterprise Institute (Mtech), directed the nationally recognized Hinman CEOs program, and, more recently, directed the new Hillman Entrepreneurs Program. She previously served as director of external relations and human resources in the school's Department of Electrical and Computer Engineering. She earned her M.B.A. from the Robert H. Smith School of Business.

L-3 Communications Aligns with Clark School in Unique Partnership

Strategic Support Translates to Recruitment Pipeline

Problem: A \$15.6 billion international defense company faces the retirement of a high percentage of its engineering workforce.

Solution: Align with one of the nation's top engineering programs to support engineering education and research and create an important recruitment pipeline.



Art Morrish

That is how L-3 Communications Corporation, the sixth largest defense company in the U.S., recently solved one of its most pressing problems. "I was a member of a corporate task force looking for ways to deal with the 'gray tsunami' or the potential large-scale retirement of many of our senior engineers," explains Art Morrish, Ph.D. '86, chemistry, and vice presi-

dent and chief technology officer of the products group of L-3 Communications, based in Crystal City, Va.

One of the task force recommendations was to work closely with a select group of major research universities to "establish an L-3 presence." When Morrish reviewed a 2008 study by *Aviation Week and Space Technology* and saw that the Clark School was one of the top engineering schools producing U.S. engineers for aerospace and defense companies, the solution was clear.

That's when Morrish reconnected with his old friend and colleague, Clark School Dean Darryll Pines. "I was director of the tactical technology office and Darryll worked in the program office of the Defense Advanced Research Projects Agency," says Morrish. "I knew Darryll was very interested in outreach to the corporate community, so the Clark School was a natural fit."

On that basis, L-3 made a \$1 million gift over three years to support a number of initiatives. L-3 Graduate Research Fellowships will support five Ph.D. candidates in the last three years of their programs, conducting research at the Institute for Systems Research, the UM Robotics Center, the UM Energy Research Center, the Autonomous Vehicles Laboratory, the UM Rotorcraft Center, the Center for Advanced Life Cycle Engineering or research in cyber-security. Eight merit-based L-3 Undergraduate Scholarships will be made available to students in electrical and computer engi-

neering, mechanical engineering, materials science and engineering, and aerospace engineering.

The gift also supports diversity initiatives at the Clark School through the Women in Engineering Program, the Center for Minorities in Science and Engineering and student competition teams such as Robotics@Maryland and TerpsRacing. Still more Clark School programs will be supported by L-3's involvement as a Clark School Corporate Partner.

"L-3's partnership with the Clark School enhances our internal research and development and recruiting efforts by aligning us with a world-class engineering school," says Michael T. Strianese, chairman, president and CEO of L-3 Communications, which employs 67,000 employees in 65 divisions worldwide. "This atmosphere of innovation and technology attracts promising and talented students who, we hope, will look to L-3 for career opportunities."

Dean Pines attests to the remarkable nature of the gift. "It is wonderful to see an international corporation recognize the critical need to produce growing numbers of engineers in this country and take steps to address the situation in ways that promise to yield significant results for both institutions."

Twenty percent of the L-3 workforce holds positions in engineering and technology. "From our perspective, this partnership gives us an opportunity to gain firsthand experience with graduate students working in our environment," says Morrish, a member of the Clark School Board of Visitors. "As we get to know students, we can start developing important relationships with them early in their careers."

Morrish's own experiences at Maryland influenced his desire to establish the Clark School relationship. As a doctoral student, he was awarded a NASA Graduate Student Researcher's Award, which allowed him to work in NASA labs and receive core funding for his research.

While many details remain to be finalized, Morrish anticipates an "L-3 Research Day" at the Clark School, during which L-3 staff will visit campus and hear from students about their research. "We may see intellectual property that we are interested in, and students can pursue the possibility of more focused support," he explains. "Ongoing technological development is key to our success, and we need to align with institutions where innovation occurs." ■



TO LEARN MORE ABOUT MAKING A GIFT TO THE CLARK SCHOOL, PLEASE CALL OR WRITE:

Leslie Borak, assistant dean for external relations, Clark School of Engineering, University of Maryland, College Park, Maryland 20742-2831 ■ 301.405.0317 ■ lborak@umd.edu



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Take an Active Role with the Clark School

Dean Darryll Pines and Director of Alumni Relations Josey Simpson invite you to take advantage of some of the outstanding events the Clark School sponsors throughout the year. For a full calendar listing, visit www.eng.umd.edu/events. We look forward to seeing you soon!



7th Annual Engineering Alumni Chapter Golf Tournament Friday, September 24, 8 a.m. UM Golf Course

Connect with old friends and enjoy the newly renovated University of Maryland Golf Course in this event sponsored by the Clark School Alumni Chapter of the UM Alumni Association. (See related story, p. 27.) For more information, see terpnation.net/ClarkSchoolAlumniGolfTournament or contact Josey Simpson, director of alumni relations, at 301-405-2150, josey@umd.edu.

U.S. Science and Engineering Festival www.usciencefestival.org October 10 to October 24 Engineering Expo October 23 and 24 National Mall, Washington, D.C.

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Innovation Hall of Fame Induction Ceremony and White Symposium on Engineering Innovation Thursday, October 21, 4:30 p.m. Jeong H. Kim Engineering Building



Robert Briskman, M.S. '61, electrical engineering, co-founder of Sirius XM Radio, will be honored for his achievements. The 5 p.m. White Symposium focuses on the impact of satellites on society. For more information, contact Missy Corley at 301-405-6501 or mcorley@umd.edu.

Whiting-Turner Business and Entrepreneurial Lecture 1110 Jeong H. Kim Engineering Building

- **Thursday, November 4, 5 p.m.**
University of Maryland President and Glenn L. Martin Institute Professor of Engineering C. Dan Mote, Jr. is the featured speaker.
- **Thursday, November 11, 5 p.m.**
Sen. Ted Kaufman (D-Del.), the only engineer serving in the United States Senate, is the featured speaker.

For more information, contact Missy Corley at 301-405-6501 or mcorley@umd.edu.

Clark School Commencement Ceremony and Reception Sunday, December 19, Time to be determined

The reception is sponsored by the Clark School's academic departments, Corporate Partner companies and the Clark School Alumni Chapter of the UM Alumni Association. For more information, contact Josey Simpson at 301-405-2150 or josey@umd.edu.