

# U.Va. Engineer

FALL 2009

The Alumni Magazine of the School of Engineering and Applied Science

## Energy and Sustainability Innovation at U.Va.

STUDENTS BUILD  
SUSTAINABLE SOLUTIONS  
AROUND THE GLOBE, P. 9

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TECHNOLOGY ENGINEERING,  
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COMES TO THE  
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DEVELOPING LEADERS *of* INNOVATION



## MESSAGE FROM THE DEAN

If I had to give one word that describes what engineers do, I'd say they "innovate." To my mind, that word captures both the challenge and the excitement of being an engineer. Our society turns to engineers when it wants to accomplish something that has never been done before. Right now there's a long list of items on the engineering agenda — from creating sustainable ways to heat our homes and power our cars to developing better ways to help our aging population live longer independently and with dignity. Tackling any of these challenges will require innovation.

But innovators don't pull their ideas out of thin air. Our responsibility at the Engineering School is to give young women and men the knowledge and the skills to be innovators. This means, as it always has, providing them with a solid foundation in mathematics and science, teaching them to frame problems in ways that can be solved and stressing the critical importance of verification and validation.

But today, educating engineers also means providing opportunities for them to learn about business, public policy, international affairs and medicine. Innovators must know how to read a financial statement, address safety and environmental concerns and accommodate the different perspectives of people around the globe.

And finally, we must teach this generation of engineers how to communicate and collaborate with other engineers and with experts from other fields. More than at any other time in history, innovation today lies on the boundaries between the disciplines.

Thanks in great measure to the vision and creativity of our faculty, there is no better place for students to learn to be engineers, I believe, than the University of Virginia.

From Introduction to Engineering to Capstone projects, students are constantly challenged to master a body of knowledge and to use it to create something new. They gain insight into the historical, social and ethical dimensions essential for innovation through courses developed by our Science, Technology and Society faculty and through such recently launched minors as Engineering Business, Science and Technology Policy, and Technology and the Environment. And increasingly, they are taking classes, working in laboratories and collaborating on projects with students and faculty from the College of Arts and Sciences and the Schools of Architecture, Medicine and Commerce.

In short, our students graduate from the Engineering School with the skills and the hands-on experience required for them to be leaders of innovation and to make important contributions to society and to their professions, no matter what career they choose.



**JAMES H. AYLOR**

Louis T. Rader Professor of Electrical Engineering  
Dean of the School of Engineering and Applied Science

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# Rice Hall Elevates Information Technology Engineering, Energy Research

BY CHARLIE FEIGENOFF



“The deployment and successful implementation of these advanced technologies is a key step on the path toward net-zero energy high-performance green buildings.”

—Mitch Rosen, Chief Technology Officer

When Thomas Jefferson designed the Lawn, his goal was to create a machine for learning, albeit a very beautiful one. His arrangement of faculty pavilions and student rooms branching out from a central library accomplished his aim of encouraging faculty and students to work together. But he was not satisfied with a set of buildings that merely sheltered his educational institution. He wanted his buildings to teach. Each pavilion is a textbook example of how to create variety within the Palladian style of architecture he loved so well.

The same spirit animates Rice Hall, which is rising on the south end of the Engineering School Grounds. Made possible by a lead gift of \$10 million from Paul G. Rice (EE '75) and Gina J. Rice through the Rice Family Foundation, Rice Hall not only adds much-needed space for research and education in information technology engineering (ITE), it is itself a teaching tool. “Our goal is to make this building a showcase for the impact that information technology engineering is having on the world,” says James H. Aylor, dean of the Engineering School.

A case in point is the advanced heating, cooling, lighting and energy recovery systems linked to sophisticated controllers that will be deployed in Rice Hall. The Engineering School’s Chief Technology Officer Mitch Rosen notes that “some of these technologies have not yet been widely adopted in the U.S. Our building will be highly instrumented and the energy savings monitored and documented. The deployment and successful implementation of these advanced

technologies is a key step on the path toward net-zero energy high-performance green buildings.” They will also contribute to Rice Hall’s attaining a LEED certification from the U.S. Green Building Council.

Additionally, this sophisticated technology serves as the backdrop for research and education conducted in the Living Laboratory, a series of offices and laboratories devoted to energy management. Associate Professor Ronald Williams, the director of the Living Laboratory, foresees that each laboratory will be equipped with different types of lighting and mechanical systems. “Students will be able to look at energy consumption in these spaces and experiment with different control strategies that could later be adapted for other settings,” he says. Williams envisions that students might be able to conduct similar trials in future generations of the ecoMOD project, the award-winning series of sustainable housing prototypes developed with the School of Architecture in partnership with the Engineering School.

## Expanding the Student Experience

This emphasis on the student experience is part of Paul Rice’s vision for the building. He was president and founding partner of PEC Solutions, which undertook a variety of high-profile information technology and systems engineering projects for the federal government. Over the years, he hired scores of young engineers fresh from college. “I was looking for the best and brightest,” he recalls. “Even though I’m



“Our goal is to make this building a showcase for the impact that information technology engineering is having on the world.”  
 —James H. Aylor, Dean of the Engineering School

Left: Renderings of Rice Hall's atrium and a meeting room. Right: Rice Hall, northeast perspective

a U.Va. graduate, it struck me forcefully when I was hiring, how well the School prepares its students for the workplace.” Rice found that graduates of the Engineering School not only thought in a disciplined way but also could communicate their ideas effectively and work collaboratively with others.

Rice's motivation in funding the building is to enable the School to provide an even stronger background in these skills. “I wanted the design of the building to be inspiring, because good design in itself contributes to productivity and effectiveness,” he says. “At the same time, I wanted to give students a place to work, to exchange ideas and to collaborate on large projects.”

Professor George Cahen, who teaches the computational side of Introduction to Engineering, is particularly excited that Rice Hall will have ample space for the course's workshops, thanks to a gift from Chip Lacy (ChE '67, Darden '69). “We currently have 600 students in 16 workshops, each devoted to a specific design problem,” he says. “Finding room for these workshops is always difficult, but they're absolutely crucial to what we are trying to accomplish.” Giving students exposure to an open-ended engineering design problem early in their academic careers has been proven to increase retention in engineering

programs. These problems range from designing sets for original stage productions to creating robots that can compete in Lego<sup>®</sup> Olympics.

“Our workshops require shop, bench and computation space,” Cahen says. “Rice Hall has all of that and more.” Cahen welcomes features such as a large overhead door that will enable students to move projects from the workshop space out to the building's patio and the large window that gives passersby the ability to track work in progress. “The way the building is designed makes these activities visible so that they can be part of the everyday life of the School,” he says.

### Enhancing Faculty Collaboration

Rice Hall also will encourage greater faculty collaboration. Associate Professor John Lach, a member of the electrical and computer engineering faculty, is among a number of faculty who will be moving to the new building. Lach's research focuses on bridging the gap between the electronics and programming in a computer system. He is engaged in a number of projects with computer science faculty, including one to develop better security for the radio frequency identification tags that are cropping up in a host of applications, from passports to E-Z Pass transportation payments systems.



Paul G. Rice (EE '75)

*Rice Hall, continued*

“On interdisciplinary projects like this, proximity is everything,” he says. “Being in Rice Hall will change the way we interact. All our offices will be together, as will those of our graduate students. In this kind of setting, a community devoted to the research will evolve naturally. It’s an exciting prospect.”

Computer science faculty members see this the same way. What Associate Professor Kevin Skadron calls “the greatest single advantage” of Rice Hall is the prospect of compiler and computer architecture groups in computer science “interacting closely and spontaneously with collaborators in electrical and computer engineering. Right now those faculty and students see each other only infrequently, in scheduled meetings.”

### An Academical Village for the 21st Century

In its own way, Rice Hall fulfills Jefferson’s requirements for an Academical Village, but it does so in ways that have been uniquely configured for the 21st century. Students and faculty will work side-by-side within the building, and through distance learning programs such as Engineers PRODUCED in Virginia that will be based in the building, they will collaborate over the Internet. As Paul Rice points out, “The village won’t simply exist then in these buildings or on this campus, but across the state, across the nation and globe.” ■



Mary Lou Soffa, chair of the Department of Computer Science

## The Computer Science Department Eager to Move to Rice Hall

**F**or Mary Lou Soffa, chair of the Department of Computer Science, the equation is straightforward: The quantity of first-class space allocated for the department in Rice Hall will produce a qualitative difference in its programs. For the first time in decades, the entire department — graduate students, faculty and staff — with all its facilities — offices, laboratories, seminar rooms and lecture halls — will be housed under one roof. In addition, a number of computer engineering faculty will be joining them. “We’ll have the facilities and the critical mass to apply for much larger, center-scale projects,” she says.

And those facilities will be spectacular. “In many areas, the space we currently have available is not equal to our aspirations or our achievements,” she says. Rice Hall will change all that. It includes laboratories for visualization, wireless sensor networks, graphics, and real-time computing, as well as two conditioned machine rooms. Faculty will be able to make the case to funding agencies that they can accommodate larger, more ambitious projects.

As the pace of research picks up, people will want to come to the department. “I believe that we will find it easier to attract and retain great students and faculty,” Soffa says. And the auditorium and great meeting spaces will heighten the level of collaboration. “Rice Hall will enable our faculty to engage more deeply with faculty across the University,” she says. “It will help us create a much deeper culture for computer science and computer science research.” ■

# Developing Safe, Secure Nuclear Power Plants


BY KATHLEEN VALENZI KNAUS

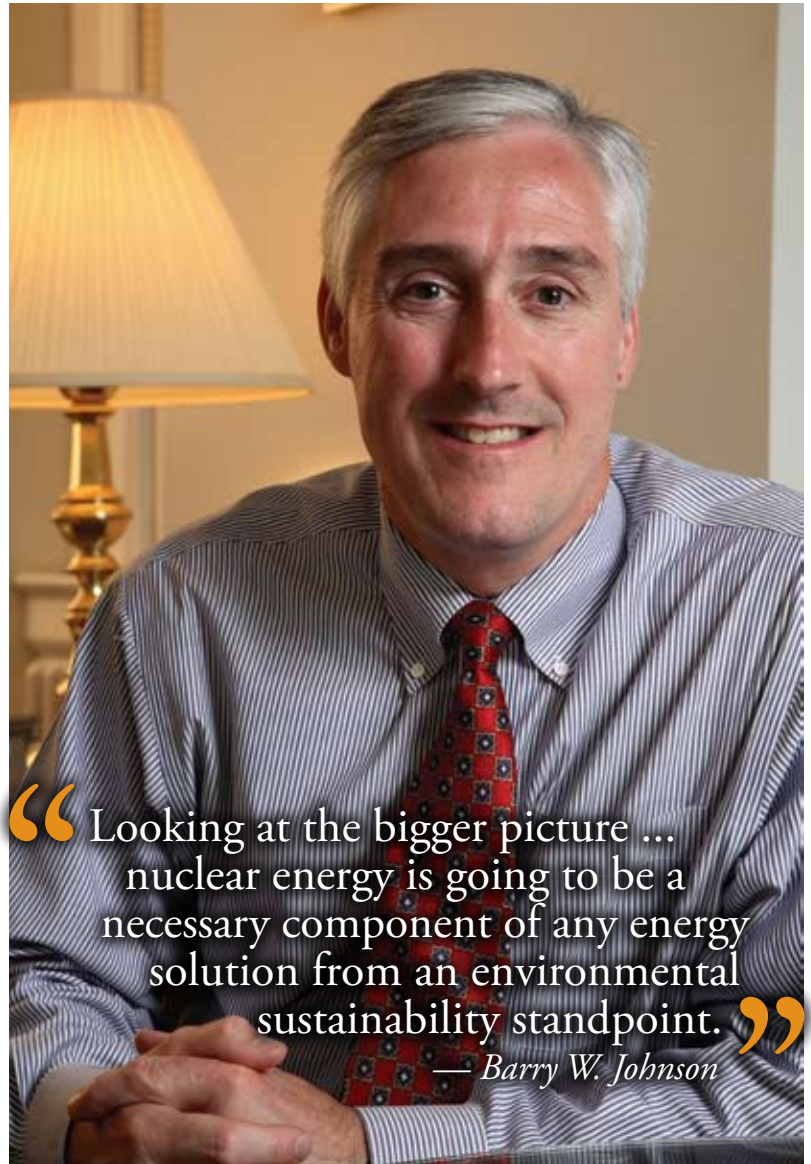
Ever since his first engineering job designing flight control systems for Harris Corporation, Senior Associate Dean Barry W. Johnson (SEAS '79, '80, '83) has maintained an unwavering research interest in safety-critical and fault-tolerant computer systems. Over the years, his research has developed techniques for modeling, analyzing, and predicting their safety and security. His research results have been applied to many industrial systems, including nuclear digital control systems.

Johnson's interest in nuclear control systems was sparked in 1997, when the Nuclear Regulatory Commission approached him for help. The techniques Johnson developed for modeling and predicting safety have since been applied to the instrumentation and control systems of actual nuclear power plants to see how well they measure up.

A year ago, Johnson joined efforts to create an advanced nuclear research and education facility in Bedford County, Va., near Lynchburg. The facility — the first of its kind in the United States and only the second one in the world — is being funded by both public and private money, including a grant from the Virginia Tobacco Commission consisting of proceeds from the national tobacco settlement, and gifts from industry partners like AREVA and Babcock & Wilcox. Its research showpiece will be the newly established Center for Safe and Secure Nuclear Energy.

The center will feature a replica of a real nuclear power plant in every aspect but one: There will be no nuclear reactor. Its highly configurable, full-scale nuclear instrumentation and control room, together with other technologies, will allow Johnson, as well as other researchers from U.Va., Virginia Tech, and elsewhere, to engage in collaborative research related to nuclear safety, security and human-machine interface. They also will use the space to develop complex models and simulations necessary for the design of future generations of nuclear reactors.

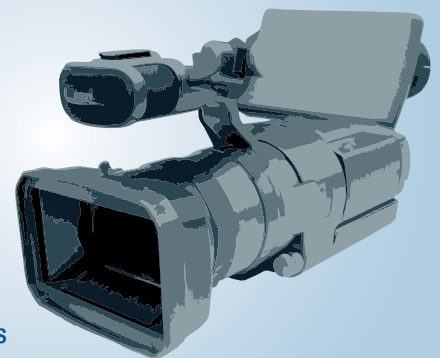
"Looking at the bigger picture, there are a lot of folks, myself included, who believe that nuclear energy is going to be a necessary component of any energy solution from an environmental sustainability standpoint," Johnson says. "It's a technology we know how to do today. The only missing piece is our ability to demonstrate that we can continue to do it safely and securely. The research we engage in with our colleagues in Lynchburg will address that." 



“Looking at the bigger picture ... nuclear energy is going to be a necessary component of any energy solution from an environmental sustainability standpoint.”  
— Barry W. Johnson

## WHY DO WE DO IT?

View the winning video produced by Engineering School students in the first undergraduate video contest. “Why Do We Do It?” is a realistic, sometimes humorous, take on life at the Engineering School from a student's perspective. You'll find the winning one-minute video and other videos on the Engineering School at [www.seas.virginia.edu/admissions.php](http://www.seas.virginia.edu/admissions.php).



# Rolls-Royce Partnership Giving Aerospace Research a Boost

BY JOSIE LOYD

Fostering discovery in creation of more-efficient and more-effective jet-engine propulsion systems is the aim of the Commonwealth Center for Aerospace Propulsion Systems (CCAPS).

The virtual center is a part of a strategic partnership between Rolls-Royce, the U.Va. Engineering School and Virginia Tech's College of Engineering.

For U.Va., the partnership benefits include three endowed professorships to support faculty members with expertise in areas of interest to CCAPS and the Commonwealth Center for Advanced Manufacturing (CCAM), an applied research center associated with the partnership that is under construction in Prince George County, Va.

CCAM will engage universities throughout the Commonwealth in cross-industry research areas including logistics management, precision manufacturing and high-performance manufacturing. The center will also be home to Engineers PRODUCED in Virginia courses, which allows students in the Virginia Community College System to earn a four-year engineering degree without leaving their communities. (See p. 9 for more on PRODUCED.)

Additional benefits of the partnership for U.Va. include endowed graduate fellowships, endowed internships, renovation of mechanical engineering labs at U.Va. and Virginia Tech and enhancements to the manufacturing programs at U.Va.

The partnership was announced in November 2007 and included a donation of 10 acres of land in Prince George County to house the center and to facilitate undergraduate and graduate courses in engineering. On October 19, Rolls-Royce broke ground for a 1,000-acre site called "Crosspointe," which will house CCAM and the company's new North American manufacturing facility.

The first U.Va. faculty member to be hired under this program will arrive in spring. Professor Eric Loth will join the Department of Mechanical and Aerospace Engineering, where he will continue his research endeavors in fluid dynamics in such areas as energy and supersonics.



Top: Gov. Timothy M. Kaine. Bottom: Rendering of Crosspointe facility.

"This partnership is very important to our School and these are exciting times," says James H. Aylor, dean of the Engineering School. "The possibilities we were talking about in 2007 are beginning to take shape in the form of research centers, manufacturing facilities and educational collaborations. This will create jobs and boost the economy while furthering the field of aerospace propulsion and manufacturing research." ■

## Esteemed Researcher in Fluid Dynamics Joins Faculty

Professor Eric Loth is a graduate of the University of Michigan, where he earned a Ph.D. in aerospace engineering with a dissertation on experiments of multiphase supersonic turbulent flows. He holds degrees in aerospace engineering from West Virginia University (B.S.) and Pennsylvania State University (M.S.) and has conducted extensive research in the area of aerodynamic simulations.

Professor Loth comes to U.Va. from the University of Illinois, where he has served as a Willet Faculty Scholar of the College of Engineering and associate head of undergraduate studies. In addition to conducting research at U.Va., Loth will serve as associate chair of the Department of Mechanical and Aerospace Engineering. His responsibilities will include developing the Engineering School's aerospace engineering program.

Loth previously served at the Naval Research Laboratory and has held visiting appointments at Cambridge University, Brown University, University of California—San Diego, the National Energy Technology Laboratory and the Arnold Engineering and Development Center. ■

# PRODUCED in Virginia

## Developing Innovative Solutions for Educating Engineers at a Distance

BY KATHLEEN VALENZI KNAUS

To help meet the demand for engineers, in 2007 the U.Va. School of Engineering and Applied Science launched “Engineers PRODUCED in Virginia” in partnership with the Virginia Community College System. The program is making engineering more accessible by providing undergraduate engineering education fully at a distance.

This fall, the first group of students, studying from their local communities, has begun working on a bachelor of science degree in engineering science through the program, according to program director James Groves, assistant dean for research and outreach at the Engineering School. Groves would like to expand the program in a few years to offer additional degrees in civil, mechanical and electrical engineering.

Such expansion poses a daunting challenge: “We need to come up with a set of solutions for delivering substantive lab experiences at a distance that meet ABET criteria for learning outcomes,” Groves explains. (ABET, formerly the Accreditation Board for Engineering and Technology, provides specialized accreditation for engineering education.)

To that end, Groves is developing plans for “The IDEA Factory,” which will be located at Rice Hall. The IDEA Factory will provide dedicated space where researchers can design multiple virtual immersive environment laboratories that allow students to engage in lab experiences while continuing to reside in their local communities.

As an early start to this effort, Groves is seeking resources to fund creation of a power electronics lab at the Center for Advanced Engineering and Research, which is being built in Bedford County, Va. The lab would contain electrical motors that students could run remotely from their home computers in pursuit of specific electrical engineering learning objectives.

“If we are successful, we will overcome a barrier that no one has been able to surpass so far, as there are no fully distant, ABET-accredited engineering programs in the United States for undergraduates,” Groves says. “Some engineering schools — five out of 200 — offer part of their undergraduate programs at a distance, but students must still come to the campus for lab classes. So far, no schools offer accredited engineering degrees fully online. We have an opportunity to be the first. If we bring education to students, rather than require them to come to education, that flexibility will bring more people into the pipeline.” ■



James Groves, assistant dean for research and outreach

## RideForward Students are Helping Transform Transportation

BY ZAK RICHARDS

Students on the U.Va. RideForward team are driven to create a more sustainable transportation system for the University, and perhaps a model for the world. During the past two semesters, the group of about 30 students has initiated a number of projects, including converting gas vehicles to electric power and installing photovoltaic systems to offset the use of fossil fuels for electricity.

To date, the group has converted a Honda Accord and has an agreement with a nearby resident to install solar panels on their rooftop. Last spring, the group won a \$25,000 grant from the first Translational Seed Grant Competition sponsored by the Engineering School. The money, which was donated by Doug (SE '87) and Lois (CS '83, '87) Garland, will fund conversion of a Ford Ranger as part of a research project aimed at creating a company that converts fleet vehicles to electric power.

Adam Burton (EE, Econ '10) started working on cars with his friends while in high school. Last year, he was able to apply that experience and passion to converting the Honda's drive train, motor controller and transmission. This year, he is making sure the car is in top working order before its first long-distance road trip. He also is researching customization options for electric motors and controllers.



RideForward team with a Honda Accord they are converting to electric power in the decommissioned nuclear reactor on Observatory Hill. Determined to help reduce emissions and fossil fuel use at U.Va., the group's other sustainable initiatives include installing solar panels for Charlottesville homes and conducting electrical vehicle research.

“It's really helpful to learn practical things by working on a team and with suppliers and machinists,” Burton says. “These are things you don't normally do as a student. On top of that, you are working on sustainable solutions that could have a huge impact on the world.” ■

READ MORE: [www.rideforward.org](http://www.rideforward.org)

# The Information Highway Comes to the Interstate

BY CHARLIE FEIGENOFF

“Real-time data generated by vehicles could also enable agencies to adjust signal timing and take other measures to prevent congestion, saving billions of gallons of fuel and protecting the environment.”  
 — Brian Smith, Associate Professor of Civil Engineering

You may not be aware of it, but the difference between your car and your smartphone is getting smaller by the minute. You can now order a car with a GPS system to help you get around, a video camera to help you back up and an emergency alert system that calls automatically for assistance in the event you have an accident or breakdown. And of course, every car now has an onboard computer that tracks your car's condition, helping mechanics to keep the vehicle in good running order.

Associate professor of civil engineering Brian Smith is helping the Department of Transportation (DOT) make your car even smarter by embedding it in a communication network devoted exclusively to transportation. The capacity to build this network already exists. In 2003, the Federal Communications Commission reserved part of the broadcast spectrum for dedicated short-range communications between vehicles and between vehicles and the transportation infrastructure. Smith is trying to envision how such a system, part of DOT's IntelliDrive<sup>SM</sup> program, could be used to make our highways safer, smarter and greener.

Smith notes that automatic vehicle-to-vehicle communication could significantly reduce accidents, citing the example of a car hitting an icy patch of highway. “When its antilock brakes engage, it could send a signal to cars behind it warning them of the hazard ahead,” he said. “Real-time data generated by vehicles could also enable agencies to adjust signal timing and take other measures to prevent congestion, saving billions of gallons of fuel and protecting the environment.”

Smith has been awarded a \$700,000 grant from the Federal Highway Administration and six states (Va., N.Y., Mich., Calif., Texas and Fla.) to identify the highest potential near-term IntelliDrive applications, determine the infrastructure required to deploy them and develop prototypes of these applications to see if they will work. In addition, along with Assistant Professor Brian Park, a colleague in the civil engineering department, and Malathi Veeraraghavan, a professor of electrical and computer engineering, Smith also has been awarded a \$500,000 Exploratory Advanced Research Program grant from the Federal Highway Administration to explore ways to improve ramp merging operations with IntelliDrive.

One of the challenges that Smith and his colleagues face is determining how best to use the greatly enlarged data stream that



IntelliDrive will produce. For instance, automatic signal controls are currently based on algorithms that use information generated by sensors in the roadway and to a lesser degree by traffic cameras. “IntelliDrive data will give us a vastly more comprehensive understanding of the traffic flow,” Smith says. “Among other things, we will know where each car is located and be able to track its acceleration and deceleration rates. Our charge is to find ways to use this much richer data set to make traffic control and management more effective.”

Smith is the first to admit that achieving this new vision of transportation will be no easy task, requiring input and resources from many sources. Accordingly, the IntelliDrive coalition includes federal, state and local transportation agencies, automobile manufacturers and trade associations. But Smith feels confident that surface transportation is on the verge of a dramatic transformation. “Driving hasn't changed much in the last 50 years,” he says. “In the next 20 years, the experience of the average traveler will be very different than what it is today.” ■

# U.Va. Engineering Students Engage in International Sustainability Projects

BY ZAK RICHARDS



L to R: Omar Coronel, an Argentinian engineer, works with U.Va. Engineering student Gina Ou and alumnus Eric Harshfield on a filter to mitigate arsenic contamination for a community in Santiago del Estero, Argentina.

Whether researching energy policy at the U.S. Embassy in Paris or working on water projects in Latin America, U.Va. Engineering School students are broadening their understanding of sustainability while contributing to solutions at an international level.

This past year, there were more than 20 students working on international sustainability development projects.

Stephanie Paredes (CE '10), Betty Chen (ChE '10), Eric Harshfield (ChE '09) and Gina Ou (Econ '10), worked over the summer in Santiago del Estero, Argentina, assessing and mitigating arsenic contamination in the region's water supply.

The project required working closely with a small community and the government office of sanitation. Before group members could apply their engineering skills to the arsenic problem, they had to understand the region's culture.

"We were working to address a global issue at a very local level," says Paredes.

They created a point-of-use filter for the community with local materials. The

filter used a layer of sand and activated carbon to remove bacteria; a top layer of oxidized scrap metal removed the arsenic.

While one student group worked on ground-level development projects, another traveled to Europe to gain an understanding of climate change policy.

Borna Kazerooni (Engr Sci '11) was one of two students who traveled to Paris this summer as part of the Science and Technology Policy Internship Program. Interning at the French Ministry of Higher Education and Research, Kazerooni explored how to organize international climate change research while immersing himself in the country's culture.

"True discussion and dialogue between nations occur not only at the highest levels of governments, but also in living rooms, restaurants and bars around the world," Kazerooni says. "We must begin to think of ourselves as citizens of the world first, and individuals second, if we are to truly address the historic technical and social challenges we face as a civilization." ■



## 2009 U.Va. Science & Technology Policy Interns

(Listed Alphabetically)

### Yi Cai (BME '11)

Institute of Medicine

*Alternative Transportation Fuels and Health*

### Matthew Chester (ME '11)

Environmental and Energy Study Institute

*Energy Efficient Buildings*

### Matthew Hanna (ME '10)

National Science Foundation Europe Office and U.S. Embassy, Paris

*French Environmental Policy*

### Borna Kazerooni (Engr Sci '11)

French Ministry of Higher Education and Research, Paris

*Research Collaboration on Climate Change Between France and Developing Countries*

### Laura-Eiisa Montealegre (SE '11)

European Union Delegation to the United States

*How the Science Community Affects U.S. Climate Policy*

### Whitney Morgan (SE '10)

Senate Committee on Health, Education, Labor and Pensions

*Education Reform: The Need for the International Perspective in United States K-12 Science, Technology, Engineering and Mathematics Education*

### Jacquelyn Piccolo (ChE '11)

National Institute of General Medical Sciences

*Social Networking Among Graduate Students*

### Christopher Reilly (SIE '11)

National Science Foundation

*Survey of Divisional Accommodations for Transformational Research*

### Joshua Scott (EE '11)

Office of Rep. Nancy Pelosi

*Smart Grid: National Transmission Policy*

### Rohan Sebastian (CE '11)

Office of Sen. Mark Warner

*Cyber Security*

### Grace Stuntz (BME '10)

National Commission on Energy Policy

*Reducing Emissions from the Transportation Sector*

### Amit Talapatra (ChE '11)

Federation of American Scientists

*Building Codes and Energy Efficiency*

### Ryan Turner (EE, CS '10)

Office of Rep. Tom Perriello

*Rural Education and Broadband*

### Jessica Vasconcellos (CS '10)

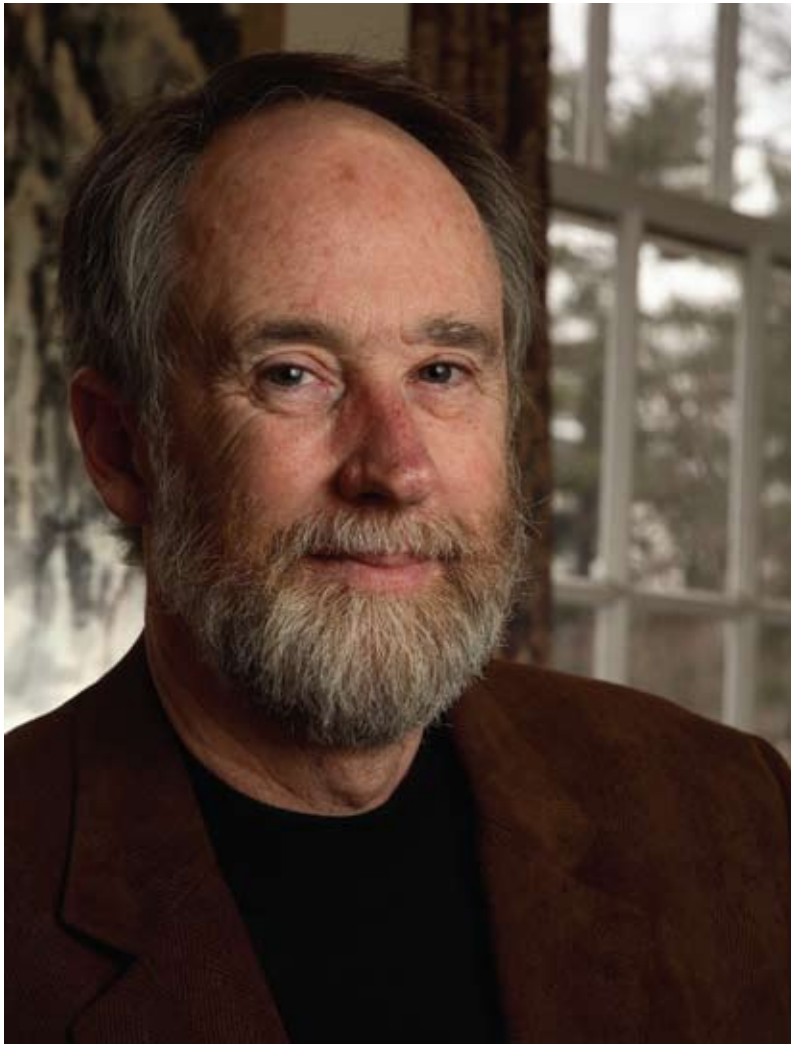
Commonwealth of Virginia Liaison Office Home

*Monitoring of Electricity Consumption Using the Internet*

READ MORE: [www.sts.virginia.edu/pip](http://www.sts.virginia.edu/pip)

# My Favorite Professor: Paxton Marshall

Engineering School professors make an impact on their students each and every day. Sometimes the experiences are unforgettable, as were those of Ben Foster (EE '04, '07) with Paxton Marshall, professor in the Charles L. Brown Department of Electrical and Computer Engineering.




**P**rofessor Marshall had a big influence on my undergraduate and graduate experience and gave me opportunities that prepared me to be the engineer I've become.

As dean of undergraduate admissions, he was flexible and creative in helping me to adjust my coursework to align with my interests. He was accommodating and inspiring both in his grasp of what I needed to learn and in his understanding about what avenues were available to me that I would not have pursued without his encouragement.

He invited me to develop my interest in theatrical lighting in his Introduction to Engineering class, which grew into a successful, multi-year project titled "Inside the Box." He gave me the opportunity to teach and to lead in that class and later he invited me to get involved in ecoMod, the ongoing construction of sustainable, energy-efficient houses designed and built in collaboration with the School of Architecture. This ultimately became my master's thesis, and it is an effort I continue to be involved with to this day.

Professor Marshall's greatest strength is his willingness to roll up his sleeves, dive in and get things done. He teaches you engineering concepts and theory and at the same time helps you discover for yourself how engineering connects to real-world problems.

Many students have worked with him on ecoMod, Inside the Box and the Learning Barge. Like me, each of them has him to thank for the valuable learning that participation in these projects provides.

I am deeply grateful for the experiences I had with him, for the fun I experienced and for the real-world lessons I learned. 

*Ben Foster (EE '04, '07)*



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Respond and read classmates' responses to the dean: <http://www.seas.virginia.edu/enews/qotm/>

## U.Va. Alumna Combines Engineering and Business to Create HitFix



**Jennifer W. Sargent** (EE '98) didn't realize that her first-year design course in engineering, where she learned to program an HTML Web site, would lead to the launch of a successful new company, HitFix, in the entertainment arena.

HitFix fills the gap between gossip sites like TMZ.com for Hollywood fans and trade magazines (such as *Variety*) by bringing insider analysis and breaking news from Hollywood, without the gossip. HitFix provides entertainment fans with an effortless way to learn about local and national events that can be catered specifically to their interests and personal preferences.

Sargent, who holds an M.B.A. from Harvard, was the head of online marketing and development for Reed Business Information (parent of *Variety.com*) before launching HitFix in December 2008. She lives in Washington, D.C., with her husband, Pete.

### 1960s

**Philip M. Chen** (ME '68) had his cartoons featured in *The New York Times*' neighborhood blog, "The Local," as part of a cartoon caption contest. His cartoon blog is [strangenessinuniverse.blogspot.com](http://strangenessinuniverse.blogspot.com).

### 1970s

**Jill S. Tietjen** (Applied Math '76) was named to the Colorado Women's Hall of Fame. Also, she was re-elected to a three-year term on the board of directors of the Georgia Transmission Corporation, a not-for-profit cooperative in Georgia. Tietjen is president and chief executive officer of Technically Speaking, a member of the SEAS Trustees and chair of the board of advisors of the Colorado Coalition for Gender and Information Technology. She is featured in the book *Changing Our World: True Stories of Women Engineers* and co-authored the bestselling book *Her Story: A Timeline of the Women Who Changed America*.

**John E. Valliere** (Aero '76) is the lead program analyst in the disaster recovery office of the U.S. Small Business Administration in Washington, D.C. He and his wife, Shirley Hottot, reside in Montclair, Va.

**Richard O. Mines, Jr.** (CE '77) is director of graduate programs and a professor of engineering at Mercer University in Macon, Ga. He is the primary author of *Introduction to Environmental Engineering*, a text published by Prentice Hall in 2009.

### 1980s

**James Moore** (CE '84) retired after a 22-year career as an AV-8B Harrier pilot in the U.S. Marine Corps. He now spends his time caring for his two young daughters.

**Brenton Sadauskas** (Nuc '89) and Rachel Sadauskas (Educ '00) welcomed a son, Johnas Christian, in May 2009.

NASA astronaut **Thomas H. Marshburn** (Engr Physics '84) celebrated the 40th anniversary of the first human moon landing in July with a spacewalk outside the international space station.

**Carolyn Deforge** (SE '85) was promoted to chief of the Aviation Engineering Division at the National Transportation Safety Board. She is responsible for the management of division's investigative support for major and regional aviation accident and incident investigations involving both domestic and foreign carriers. She and her husband, Col. Robert Deforge, USMC, reside in Alexandria, Va., with their son, Zachary.

**Christopher T. Dwyer** (EE '85) was a finalist for a Service to America Medal from the Partnership for Public Service. The award recognizes federal workers who have made significant contributions to the nation.

**Larry Thomas** (ChE '85) joined Primet Precision Materials as its president and CEO. Primet is a specialty materials and nanotechnology company located in Ithaca, N.Y. Previously he was with Air Products & Chemicals Inc. for 17 years.

### Our Apologies & Appreciation

Some names were inadvertently left out of the 2007–08 Annual Report.  
Douglas Miller—Thornton Society member  
Charles P. DiMeglio (eight-plus years of consecutive giving)

GOT MARRIED? GOT A NEW JOB?  
HAD A BABY? LET US KNOW.



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Send responses to articles you've read in this magazine to [seas-info@virginia.edu](mailto:seas-info@virginia.edu).



**Michael B. Russell** (CE '87) received the Louis C. Brown Vanguard Award from the Morehouse School of Medicine in recognition of his work as co-chair of the Greater Grady Task Force, created by the Metro Atlanta Chamber of Commerce. The task force guided Grady Memorial Hospital through transition, ensuring quality health care for all Georgians. Russell is chief executive officer of H.J. Russell & Co., a former member of the SEAS Trustees and a member of the board of the Grady Memorial Hospital Corp.

## 1990s

**Patricia T. Waugh** (Aero '90) and her husband, Steve Waugh, welcomed their third and fourth children, Virginia Elizabeth and William Thomas, in October 2008. Ginnie and William join brothers Robbie, 5, and Michael, 3. The family resides in Lorton, Va.

**Robert T. Gatewood** (Aero '91) and John Blackburn, Jr. (Col '91, Grad '96) ran the Boston Marathon in April 2009. They raised more than \$24,000 for the Dana-Farber Cancer Institute in memory of Jack Blackburn, U.Va.'s former dean of admission.

## It's a Family Affair



**Thomas D. Burns, Jr.** (Nuc '95, '99) was the first in his family to attend U.Va. He played football under George Welsh and was an Academic All-American. Pictured here is the Burns family of U.Va. graduates.

Left to right: **James T. Burns** (MSE '06, '11), **Nicole M. Burns** (Engr Sci '96, ME/SE '05), **Christina M. (Burns) Brox** (Engr Sci '01), **Laura Marie (Burns) Sullivan** (Col '05), and **Thomas D. Burns, Jr.** (Nuc '95, '99)

Allison Smith Knab (Col '97) and Brian R. Knab (Col '97) welcomed their second daughter, Evelyn Louise, in December 2008. She joins a sister, Clara Annabelle, 3. The Knab girls are the nieces of **Christine A. Smith Hogan** (ME '91), Stacy Smith Kesten (Col '93) and Daniel Kesten (Col '93).

**Joseph B. Bailey** (ME '09) and **Ryan D. Cronk** (SE '09) participated in the U.S. Navy's Pacific Partnership Humanitarian Mission in the Solomon Islands in July.

**David Walsh** (ME '91) received a master of science degree in technical management from Johns Hopkins University. He is currently assigned as the director of operations at the U.S. Navy's Fleet Readiness Center East and resides in North Carolina with his wife, Christina, and their two sons.

**Simone Pollard** (ChE '94) is the assistant dean of Graduate Business Programs at Villanova University. Simone joined the Villanova School of Business in summer 2006. Previously she worked in production/manufacturing at Monsanto and in consulting at Sibson Consulting. She earned an M.B.A degree from the University of Michigan's Ross School of Business. She and her husband, James, live in the Philadelphia suburbs.

**Meredith R. Burkitt** (CE '96) and her husband, Todd, welcomed their first daughter, Mary Stewart, in September 2008. Mary Stewart joins brother Luke, 3. The family resides in Charlotte, N.C.

**Amy W. Almquist** (CE '98) and **David Almquist** (ME '99) welcomed their first son, Ryan Matthew, in January. Ryan joins a sister, Kate, 2. The family lives in Richmond, Va.

**Nicholas A. Wasko** (SE '98) and **Adrienne E. Wasko** (Aero '00) welcomed their daughter, Violet Sophia, in March. Violet joins a brother, Luke, 4.

**Christopher M. Weil** (SE '98) and his wife, Jennifer, celebrated the birth of their first child, Katherine Elizabeth, in March. The couple resides in Chicago.

**Victoria S. Habas** (SE '99) and her husband, Bryan, celebrated the birth of their first child, Carson Daniel, in January.

**Michelle M. Heimgartner** (CE '99) and Glenn Heimgartner (Col '00, Arch '09) welcomed their first child, Owen Glenn, in November 2008. She is an environmental engineer for the U.S. Department of Transportation's Volpe Center.

Theresa Titolo Roche (Col '98) and **John Daniel Roche** (CS '99, GSBA '10) welcomed their first child, Megan Grace, in September 2008. Mr. Roche is a senior manager at Sapien Corp. The family resides in Arlington, Va.

## U.Va. Members of the 2009 U.S. Air Force Pilot Training Program



U.Va. graduates shown here at U.S. Air Force Initial Flight Screening will enter into a yearlong undergraduate pilot training program to earn their wings in the U.S. Air Force.

Left to right: **2nd Lt. Christopher K. Umphres** (Aero '08), **2nd Lt. Alex J. Benson** (CLAS '08), **2nd Lt. Mitch Rosenthal** (CLAS '08), **2nd Lt. Evan G. Fillman** (CS '08), **2nd Lt. Ian J. Morris** (EE '08), and **2nd Lt. Taylor M. Wilson** (Aero '08), [Not pictured] **2nd Lt. Carl J. Price** (ChE '08).

### 2000s

**Aimee (Jennings) Bednar** (CE '00) married Filip Bednar in June 2007. The couple resides in Ann Arbor, Mich.

**Matthew S. Hickey** (CE '00) is a structural engineer in the Charlotte, N.C., office of Clark Nexsen, an architectural, engineering, interior design, planning and landscape architecture firm. He is a licensed professional engineer in North Carolina and Virginia.

**Michael V. Homenick** (CE '00) and his wife, Elizabeth, announce the birth of their daughter, Avery Grace, in March.

**Daniel E. Rubin** (CS '01) and Emily Krause (Col '02) announce the birth of their daughter, Lily Alice Rubin, in November 2008.

Lara Bjorkquist (Col '01) and **Matthew L. Gehl** (ChE '02) were married in April 2008. The couple resides in Thousand Oaks, Calif. He is a senior associate in manufacturing at Amgen Inc. and is pursuing a master of science degree in biomedical engineering at the University of Southern California.

**Thomas Jenkins, Jr.** (CE '02) was promoted to bridge construction quality assurance engineer with FIGG Bridge Engineers, where he is working on the I-35W St. Anthony Falls Bridge Replacement Project. He lives with his wife, Bonnie, and son, Kevin, in Tallahassee, Fla. He is the son of **Tom Jenkins, Sr.** (EE '70) and Peggy Jenkins, of Franklin, Va.

Kristin Noelle Lepore (Col '03) and **Matthew C. Hyman** (Eng Sci, BME '03) were married in April 2008. The couple resides in Ann Arbor, Mich., where Mr. Hyman is a medical student at the University of Michigan.

**Jeffrey E. Erickson** (EE '04) received his Ph.D. from Rutgers this year. "I was among the best-prepared students in my entering class at Rutgers and I attribute this to my extensive undergraduate education," he said.

**Sarah J. Walls** (ME '04) earned her professional engineer licensing in the state of Virginia. She works for Jacobs Technology at NASA Langley Research Center in Hampton, Va., as a mechanical engineer.

**Alan Zimmerer** (ME, Aero '04) has launched an online workout-plan company: [www.LeanDream.com](http://www.LeanDream.com).

**Andrew D. Perreault** (CE '05), of Los Angeles-based Proactive Pictures, produced an independent feature film, "Bureaucracy," which premiered in the Los Angeles area in April at the Riverside International Film Festival. It has been screened at seven film festivals, including the Bare Bones International Film & Music Festival.

**Alex N. Chapin** (CE '07) is a member of 2rw Consulting, a mechanical, plumbing and electrical engineering firm in Charlottesville, Va. He has become the company's fourth LEED Accredited Professional Engineer. His responsibilities include computer modeling to predict energy use and cost in commercial buildings.


**Keshia M. Ashe** (BME '08) is pursuing a chemical engineering doctorate at the University of Connecticut, in laboratories overseen by Cato Laurencin, M.D.

**Devra M. Bardi** (ME, Aero '08) married Jay Brusso in September. The couple resides in Maryland.

**Brandon R. Walker** (Eng Sci '08) is a government consultant in information technology for Booz Allen Hamilton in McLean, Va.

**Tucker S. Moore** (ME '09) married Jessica Harvell in June, in Richmond, Va. The couple resides in Columbia, Md. He is a consultant for Northrop Grumman in Chantilly, Va.



**Ricky Sahu** (SE '09) has created an iPhone App called Galaxi. The puzzle game includes a sun that emits light, black holes that absorb the light and a planet that needs the light. It uses magnets, projectors and wormholes to direct the light. 

## Serving Those Who Served

The Accelerated Masters Program for Veterans (AMP-V) in Systems Engineering has been created to meet the educational needs of recent U.S. military veterans as they reenter civilian life.

Built on the 10-year-success of the U.Va. Engineering School's current Accelerated Master's Program in Systems Engineering—which annually brings about 45 working professionals to Grounds for an intensive set of courses that lead to a master's degree in systems engineering—AMP-V is now recruiting students for its inaugural class set to begin in May 2010.

The Engineering School has initiated a fundraising campaign to provide scholarships for eligible veterans. These scholarships would help offset the tuition reimbursement gap not covered by the Post-9/11 G.I. Bill.

**READ MORE:**


[www.sys.virginia.edu/accelerated/](http://www.sys.virginia.edu/accelerated/)



## Join the Society.

The Thornton Society at the University of Virginia School of Engineering and Applied Science is a community of alumni, parents and friends who provide leadership support to the Annual Fund.

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 To donate by phone, or for more information, please contact **Truin Huntley** at **434.924.3551**.



# IN MEMORIAM



## Faculty & Friends

**Henry Lee Kinnier** (CE '42) of Charlottesville, Va., died in May. He was one of the U.Va. School of Engineering and Applied Science's oldest and most loyal alumni. He was a student, a member of the faculty and a lifelong supporter of the School. He was also a member of the Seven Society, a secret society at the University of Virginia founded in 1905, whose members are revealed only after their deaths. His honors include the U.Va. Alumni Association Distinguished Professor Award, the Raven Award, the IMP Faculty Award, the Mac Wade Award and the Distinguished Service Award of the Virginia Engineering Foundation, on whose board he served. He was a Lifetime Member of the SEAS Trustees and he served on the state board of engineering examiners. The Henry L. Kinnier Professorship in Civil Engineering was established in 1989, and one of his former students anonymously established an endowment fund for the Henry L. Kinnier Scholarship for undergraduate students in civil engineering. Survivors include daughters Anne Kinnier Driscoll (Educ '70) and Elizabeth Kinnier Hiles (Educ '72, '74); a son-in-law, Irving Sears Driscoll, Jr. (Educ '70, '79); granddaughters Sarah Kinnier Huitt (Col '98) and Frances Elizabeth Hiles (Col '05); and a grandson, Sears Driscoll III (Col '97, GSBA '06).

**Robert P. Englander** (ME '42) of Richmond, Va., died in April. He was a member of the boxing and football teams, T.I.L.K.A., the IMP Society, Trigon Engineering Society, the Honor Committee and Omicron Delta Kappa, a national leadership fraternity. He had a long career in life insurance, serving as a general agent for Southwestern Life Insurance in Charlottesville, Va., at the Englander Agency. He was a former trustee of the School of Engineering and Applied Science and past president of the Board of Managers of the Alumni Association. Survivors include a son, Robert P. Englander, Jr. (Col '71); and a grandson, Robert O. Englander (Col '97).

**William L. Viar** (ME '52) of Charlottesville, Va., died in February. He served in the U.S. Army during the Korean War. At the University, he served on the Honor Committee, was a member of the Raven, Thirteen and IMP societies and lettered in boxing. He worked at DuPont, then returned to the University as an adjunct faculty member in the mechanical engineering department. He also was the superintendent of power facilities for U.Va. and an energy management consultant for the state of Virginia. He co-founded Waterland, Viar and Associates, a private energy conservation consulting firm, and published more than 70 papers.

## 1920s

**Gilbert C. Unger** (Engr Undeclared '28) of Franklin, N.C., died in March. He served in the U.S. Army Corps of Engineers and celebrated his 101st birthday shortly before his death.

## 1930s

**Wilbur W. Scott** (Engr Undeclared '32) of Wilkes-Barre, Pa., died in March. He served in the U.S. Army Air Forces and U.S. Air Force Reserve. He worked in D.T. Scott & Sons, a real estate and insurance firm.

**Harry F. Langhorne** (Engr Undeclared '38) of Lexington, Va., died in January. He was a former president of the Trigon Engineering Society and a member of the Zeta Psi fraternity. He worked as a meteorologist for Pan American Airways and was a U.Va. civilian pilot instructor. After serving in the U.S. Army, he became a dairy farmer in Albemarle County.

## 1940s

**James P. Borden, Jr.** (ME '43) of Fairport, N.Y., died in January. He served in the U.S. Navy, then worked in the paper division of the Eastman Kodak Co.

**Kenneth E. McCollum** (ME '46) of High Point, N.C., died in February. He served in the U.S. Navy and worked for 40 years at the Bahnson Co.

**Briscoe B. Guy** (CE '47) of Richmond, Va., died in May. He served in the U.S. Army. He was president of Alpha Tau Omega and Trigon Engineering Society. He worked for Stone & Webster, and then Conquest, Moncure & Dunn, where he became president and chairman of the board emeritus.

## 1950s

**Don. O. McCauley** (ME '50) of Dunnsville, Va., died in January. He served in the U.S. Army Air Forces and went on to a career in engineering.

**William F. Muller** (Engr Undeclared '50) of Charlottesville, Va., died in February. At the University, he was a member of the ROTC and the Raven Society.

**Charles L. Pitzer** (EE '50) of Hagerstown, Md., died in April. He served in the U.S. Army and then managed his family's real estate business in Hagerstown. Survivors include a son, **William G. Pitzer** (EE '75).

**Stephen Bendel, Jr.** (EE '51) of Concord, Mass., died in April. He served in the U.S. Army Air Forces during World War II. He retired in 1987 after more than 25 years of working as an electrical engineer with Raytheon Co.

**Colgate W. Darden III** (EE '53, Col '54) of Lexington, S.C., died in March. He worked at the Savannah River National Laboratory, then as a professor of physics at the University of South Carolina in Columbia. He participated in U.S. government projects, including the Los Alamos National Laboratory, Fermilab and DESY Laboratory in Germany. He helped establish the New Morning Foundation, which works to reduce teen pregnancy, and served on the boards of the South Carolina Institute on Poverty and Deprivation and the South Carolina Commission on Higher Education.

**Carleton "Sonny" H. Vail, Jr.** (Engr Sci '57) of Panama City, Fla., died in May. He was a member of Sigma Chi fraternity and served in the U.S. Air Force, where he received the Distinguished Flying Cross, the Bronze Star and the Air Force Commendation Medal.

**Arthur D. Hancock II** (CE '58) of Bluffton, S.C., died in May. He served in the U.S. Coast Guard and was a member of the Beaufort County Planning Commission and the Bluffton Historical Preservation Society.

**William M. Smith** (Engr Undeclared '59) of Charleston, W. Va., died in January. He was a member of Delta Kappa Epsilon fraternity, was a sales engineer for Kanawha Manufacturing Co. for 44 years and served as vice president of Kanawha Roxalana Co.

## 1960s

**Willard F. Duffer, Jr.** (Engr Undeclared '60) of Houston, died in March. He served in the U.S. Air Force and worked at M.D. Anderson Cancer Center for 28 years.

**Richard D. Rogers, Jr.** (CE '66) of Stuart, Va., died in May. He practiced law and taught regulatory law courses. He also served as general counsel for the Virginia State Corporation Commission.

**Eugene Dudley Arnold, Jr.** (CE '68) of Charlottesville, Va., died in April. He served in the U.S. Army and worked at the Virginia Transportation Research

Council. He served as secretary/treasurer, vice president and president of the Southern District of the Institute of Traffic Engineers.

**John M. Crymes, Jr.** (EE '68) of Marin County, Calif., died in May. A pioneer of professional remote audio recordings, he designed and built the world's first mobile audio recording truck in 1974. He worked with, among others, Bob Dylan, Bruce Springsteen, Eric Clapton, Paul McCartney, Natalie Cole and the Grammy Awards.

**John K. Humphreys** (ME '68) of Bellvale, N.Y., died in January. He served in the U.S. Navy, was a consultant to the nuclear power industry and worked at Burns & Roe in Oradell, N.J., and the Millstone Nuclear Power Plant in Waterford, Conn.

## 1970s

**Howard J. Rubenstein** (BME '72) of Bloomington, Ind., died in May. He taught biomedical engineering in Cologne, Germany, and Long Island, N.Y., and he founded Suburban Orthotics Services.

**Jeffrey B. Wood** (EE '75) of Richland, Wash., died in May. He served in the U.S. Navy and worked at Babcock & Wilcox Co. and for Portland General Electric, Illinois Power, United States Enrichment Corp. and Fluor Hanford.

**Steven L. Silverman** (Aero '77, '81) of Seal Beach, Calif., died in February. He worked in the aerospace division of the Boeing Co. for 25 years.

## 1980s

**James K. Coppola** (CE '82) of Fredericksburg, Va., died in April. He worked as a civilian with the U.S. Army in Germany for five years before transferring to the Corps of Engineers' headquarters in Washington, D.C. He worked for more than 20 years co-managing the multibillion-dollar Formerly Used Defense Sites program.

## 1990s

**David S. Bognaski, Jr.** (MSE '99) of Suffolk, Va., died in February. He was an information technology consultant for Bon Secours Maryview Medical Center. ■

# A Career of Calculated Risks

BY WILLIAM S. GARRETT, JR. (ChE '69)

When I arrived at the Engineering School some 45 years ago, I didn't really know where life's journey would take me. What I did know was that science and math were my strong suits and that solving problems and building things were my passions. At U.Va., I discovered that if you are willing to learn new things and take calculated risks, there is a multitude of interesting opportunities to discover and explore. Looking back, I see that the Engineering School gave me not only the insights to make this approach possible, but also an excellent foundation upon which to build a satisfying, purposeful and rewarding career.

Over the course of my life, I've been the chief engineer of a nuclear missile submarine, worked in the nuclear services industry, developed independent power plants, built oil and gas pipelines and liquid natural gas facilities, and started a biodiesel company. I've been an engineer, inspector, project manager, salesman, negotiator, senior corporate officer and chief executive. I've built power plants and energy facilities in the United States, South America, Mexico, Australia, China and Europe. Mastering new businesses, preparing to assume new responsibilities and learning about different cultures have been and continue to be an everyday challenge.

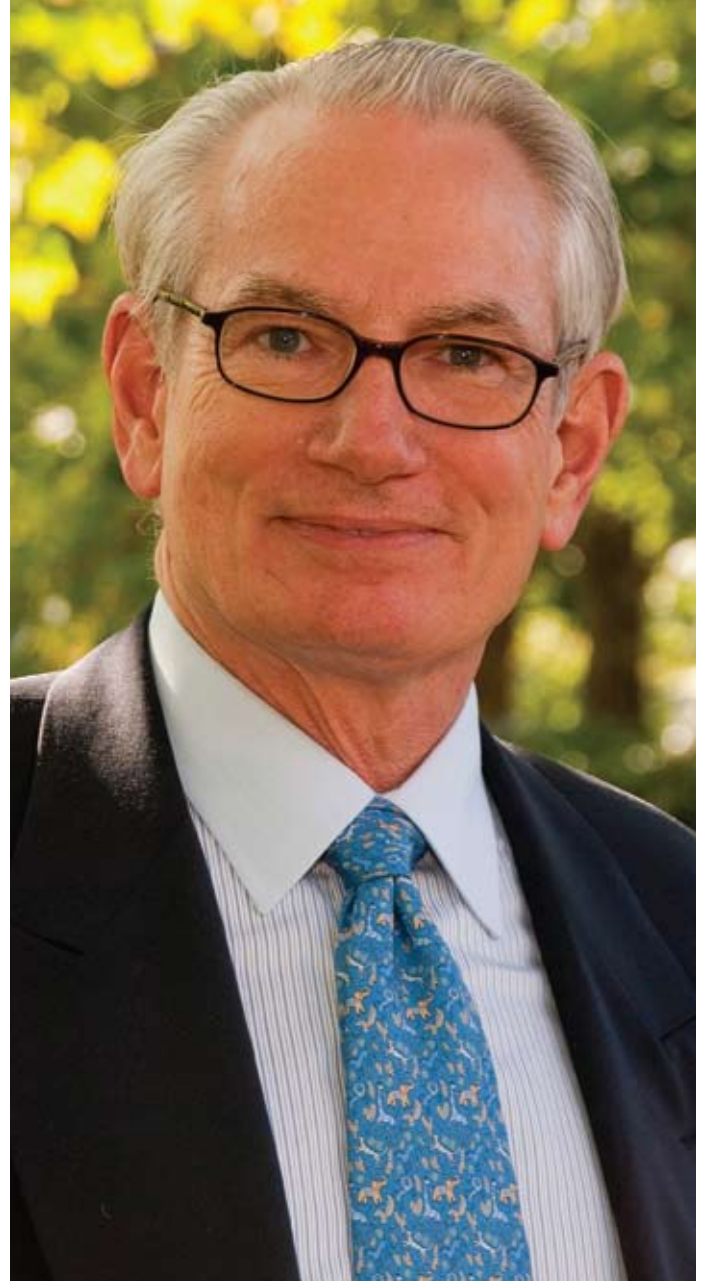
One of the most important things I learned at U.Va. is that knowledge is not an end unto itself. Rather, it's a starting point and the foundation for building one's career. I majored in chemical engineering, but I quickly discovered that the process chemistry business was not for me. One of my professors urged me to stick with it, persuading me that the thermodynamics and basic engineering principles that I was learning would open doors to many different career opportunities — and he was exactly right.

The same thing happened in mathematics. I really loved math, and took as many advanced math electives as I could fit into my schedule. I didn't go on to become a mathematician, but my knowledge of math made analyzing complex project economics and new businesses much easier.

Another thing I learned at the University is that the world is incredibly diverse and that to excel, one must sometimes be willing to depart from the status quo and venture beyond one's comfort zone. I grew up in Montgomery, Ala., which was a small town then by most standards, and coming to the University and meeting people from around the country tremendously expanded my horizons. There are many perspectives and ideas you will never encounter if you spend your life just associating with people who are like you. To identify and successfully pursue opportunities, you need to evaluate and understand both the specific details and the big picture.

Finally, the Engineering School taught me how to analyze a problem and to communicate a solution clearly and persuasively. If you're going to build a career on taking calculated risks, then you'd better understand how to analyze them, mitigate them and communicate your approach effectively to others. In fact, there are very few things these days that you can do on your own. You have to be able to convince investors, boards of directors, managers and employees that your ideas are not simply viable but desirable and worthy of their support.

For young people today who are not yet sure where life's roads will take them, the Engineering School is a perfect place to start the journey. It will provide you with a solid foundation upon which to build your dreams. ■



## THERE'S MORE TO THE STORY...

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**“It is wonderful how much may  
be done if we are always doing.”**

*— Thomas Jefferson, 1787*




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