

# ENGINEERING

## VANDERBILT

### Engineers at the Helm

It's not unusual to find VUSE graduates heading up engineering or technical firms, but increasingly, nonengineering companies tap Vanderbilt engineering alumni as CEOs, presidents and division heads.

Companies headed by Vanderbilt-trained engineers benefit by having chief executives who bring problem-solving ability, innate curiosity, aptitude for collaboration and strong leadership skills to senior management. In such corporate culture, innovation and good ideas thrive.

"As engineers, we're not inclined to accept the status quo," says David Dyer, BE'71, president and CEO of Chico's FAS Inc., an upscale clothing retailer. "We use a company's past performance not as an anchor, but as a platform to catapult it into the future." Dyer also served as CEO of apparel and consumer companies Lands' End and Tommy Hilfiger and is credited with the successful turnaround of those brands.

Vanderbilt engineering alumni in senior positions say the basics they learned in engineering—the ability to analyze, maintain macro and micro viewpoints concurrently, and craft thought-out solutions that stretch beyond the balance sheet—naturally translate to management roles.

#### Seeing the Big Picture

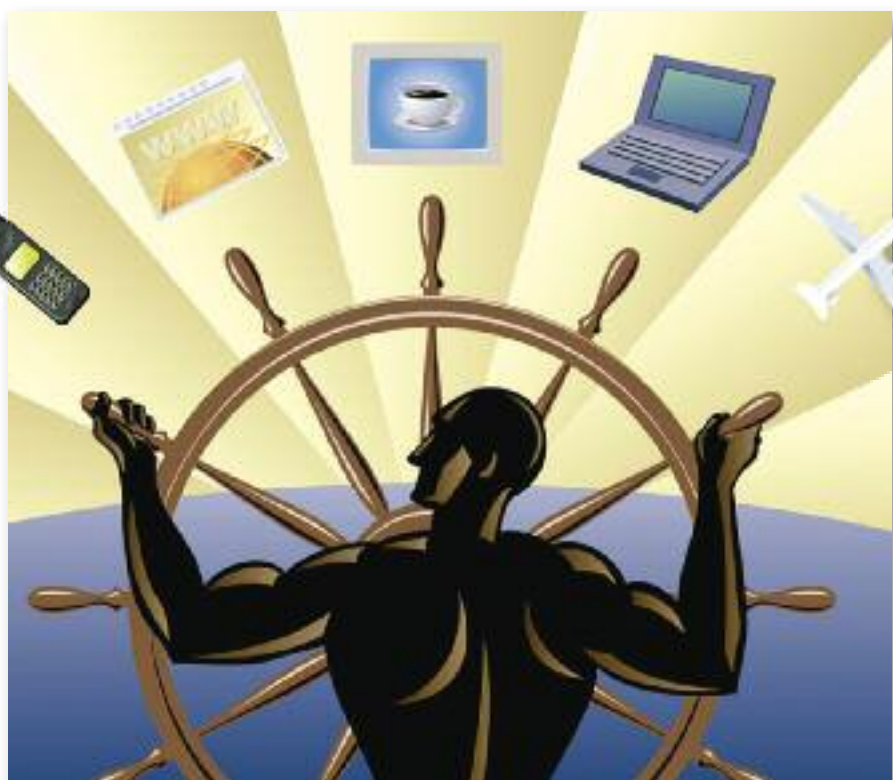
"Engineering is ultimately about generating alternatives and analyzing options. We evaluate the whole picture, we don't jump to conclusions," says Ed Clark, BE'76, president and CEO of FedEx Trade Networks. "These are the same skills that make a successful senior executive."

Kelley Golden Zelickson, BS'79, is sector vice president and general manager of integrated air, space and missile defense for Northrup Grumman Corp. "Engineers want to gather information and think logically. That allows managers to solve problems better, and understanding the big picture allows them to address issues with a more strategic vision," she says.

Books-A-Million President Sandra Brophy Cochran, BE'80, says that ability to work hard and attend to detail are necessary for both CEOs and engineers. "All successful people work hard and

strive to do their best. An engineering degree shows a level of intellectual rigor," she says. "Success is fundamentally a result of attitude, honesty, perseverance and hard work."

John Hall, BE'55, retired chairman and CEO of Ashland Inc., urges engineers who want to head up companies to look at the big picture. "Engineers can be shortsighted. Compensate by learning about your company," he



says. "If you're designing a distillation tower, you need to know not only how to do it, but also how it fits into a company's strategic plan."

Hall and other top leaders say it is also valuable not to limit oneself to engineering tasks. "Work as a staff person for a senior executive. Know the balance sheet and what drives earnings and stockholder issues," says Hall, who served more than 40 years with Ashland, 16 of those as its top executive.

Clark agrees. He joined FedEx in the early 1980s and used his passion for learning the company as a springboard to jobs ranging from investor relations to financial analyst. When the company opened Hong Kong operations in the early 1990s, the civil engineer spent three years as the unit's vice president of finance.

John Gass, BE'74, president of Chevron Global Gas, says his career path was shaped by recognizing opportunity. During his 35 years with Chevron, he has risen from designing drilling platforms to working nontechnical jobs to running the company's worldwide natural gas business. "Moving up in an organization isn't about creating a lock-step plan for yourself. It's about saying yes when the opportunity fits your long-term goals," he says.

Gass found opportunity often meant being willing to relocate. "In my business, having international experience is essential," says Gass, who has managed Chevron operations in Indonesia, the United Kingdom, Australia and Africa. "It shifts your viewpoint. You come to appreciate the different approaches in business and in life that other countries have."

#### Integrity and People Skills

Although knowing how to analyze and solve problems predisposes engineers to succeed in management, other skills are

needed. "We're only as good as the people around us," Zelickson says. "No leader does the job alone. If you want to be an effective leader, you have to treat people with respect and earn their trust, have integrity. You have to be able to energize people to work as a team."

Gass emphasizes the importance of a professional work ethic and improving communication ability. "Don't underestimate softer skills like team building and giving pinpointed performance feedback," he says. "People respond to leaders who are candid about what they do well and where they can improve. Deliver on your commitments. Always do what you say you're going to do. It all matters."

#### Once an Engineer

Despite the CEO title, Dyer says that he'll never lose the engineer's tendency to be hands-on. He regularly visits Chico's stores to talk with salespeople and customers. "Front-line employees will tell you the truth," he says. While at Lands' End, the company's pursuit of better bed linens led Dyer to go to a textile mill. There, a chance conversation with a mill employee ultimately changed not only Lands' End's product line, but also the marketplace by improving the way fitted bedsheets are manufactured.

Even as responsibilities carried him away from the technical role of an engineer, Clark says he called upon those skills when he talked directly to staff in airplane maintenance about issues they face. He recalls using his knowledge of structural integrity to discuss the impact of maintenance cost on airplane pricing. "We live in a technical world," he says. "If you can explain prices and investments in terms of the impact of technology, people listen and you gain credibility in the process."

—Mardy Fones



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Ed Clark, BE'76



Sandra Cochran, BE'80





David M. Bass

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## Why Eliminating Need-Based Loans Matters

Since Vanderbilt's *Shape the Future* campaign was launched, scholarship support has been a top priority. And already in this campaign, generous scholarship gifts from our School of Engineering alumni, parents and friends have totaled almost \$14 million, directly benefiting outstanding engineering students.

Last October, Vanderbilt announced a bold initiative to strengthen our commitment to accessibility and affordability as the university will replace all need-based loans in undergraduate financial aid packages with scholarships and grants. Particularly in the midst of challenging economic conditions, this expanded financial aid program will give talented students new opportunities to consider career choices and educational dreams without the prospect of significant debt.

With this announcement, Vanderbilt builds on its need-blind admissions policy and on the success to date of *Shape the Future*. As one of only a handful of U.S. universities with need-blind admissions, Vanderbilt admits students based on talent and ability, rather than ability to pay—and commits to meeting the demonstrated financial need of admitted students. Scholarship gifts and pledges to *Shape the Future* over the past seven years have already made it possible to reduce students' overall average indebtedness by 17 percent. With this

momentum, Vanderbilt was able to take the bold step of eliminating student loan debt altogether.

### Impact and Opportunity

This expanded aid program took effect in January when spring 2009 need-based loans for seniors slated to graduate in May were replaced with Vanderbilt grants or scholarships. Beginning in the fall of 2009, all undergraduate students who would have received need-based loans will, instead, have that money replaced by a grant or scholarship.

The program impacts the School of Engineering in important ways. It guarantees that all engineering students have enhanced opportunity for intellectual growth, discovery and maximization of potential by ensuring they are surrounded by their intellectual peers. It affords students the opportunity to pursue their educational passions without consideration of debt.

It also presents a significant challenge to the school's budget.

As part of Vanderbilt's existing debt-reduction plan for students, the School of Engineering's operating budget is already responsible for covering the financial need of engineering students that cannot be covered by endowed scholarships. Last year this cost the school approximately \$11 million—and we expect that amount will increase with the implementation of the

expanded aid program. Our financial needs will therefore also increase.

### Goal of \$100 Million

Initially, the expanded aid program will be funded by strategic reallocations of institutional funds. Its future will be sustained by new generosity, however—specifically, a goal of \$100 million in new gifts and pledges for undergraduate scholarship endowment.

I am grateful for the generosity of alumni, parents and friends, which has made this program possible, and for your continued support, which will make it sustainable.

My staff and I are honored to have helped many generous individuals establish their legacies at Vanderbilt by creating endowed scholarships in the School of Engineering. We look forward to continuing to serve you and the school in this capacity.

To become involved in this historic effort to guarantee affordable education for all deserving Vanderbilt engineering students, please contact one of us in Engineering Development at 615-322-4934. For more information on the expanded aid program, visit [www.vanderbilt.edu/expandedaidprogram](http://www.vanderbilt.edu/expandedaidprogram).

—David M. Bass,  
Associate Dean for Development  
Vanderbilt University School of Engineering

## Institute Generates Big Change for Environmental Leader

There have been very few slow moments for George Hornberger in the past year. Instead, the new VUSE faculty member experienced life-changing events unfolding quickly, sometimes in days.

"That's very fast for an academic," he says with a quick laugh.

Last May, Vanderbilt colleagues called on Hornberger, then the Ernest H. Ern Professor of Environmental Sciences at the University of Virginia, bearing a vision document.

Vanderbilt had growing interest in creating a new university wide initiative, the Vanderbilt Institute for Energy and Environment (VIEE). The institute would facilitate innovative research, education and outreach to explore and solve modern environmental and energy problems worldwide. Would the noted international leader in hydrology and environmental engineering consider a leadership role?

"If my wife had expressed even a scintilla of doubt," he says. "But Joan said, 'That sounds exciting. What a great new adventure.' With that kind of support, what could I do?"

Now it was mid-June. The Hornbergers had lived in Charlottesville, Va. since the 1970s. "We lived in a big, old house, the same old house for 35 years," the Pennsylvania native says. Their house went on the market on a Tuesday; on Saturday they had a con-

tract. Six weeks later, they were living in Nashville and George was a University Distinguished Professor in the Department of Civil and Environmental Engineering with a joint appointment in Earth and environmental sciences.

### Deadline Pressure

Other opportunities snowballed. A Web site ([www.vanderbilt.edu/viee](http://www.vanderbilt.edu/viee)) was up in August. The original vision document morphed into a strategic plan to meet an October 10 proposal deadline for the National Science Foundation (NSF).

Hornberger joined David Furbish, chair of Earth and environmental sciences; David Kosson, chair of civil and environmental engineering; and Michael Vandenberg, professor of law and director of the Vanderbilt Climate Change Research Network, in a race to write and submit a pre-proposal to have the VIEE become an NSF Science and Technology Center.

Simultaneously, Eugene LeBoeuf, associate professor of civil and environmental engineering, joined the colleagues in submitting a full proposal to the NSF for Integrative Graduate Education and Research Traineeship funding. The program supports research to underwrite graduate student education.

"The NSF deadlines focused everyone's attention. That gave us the quick start we needed," Hornberger says.

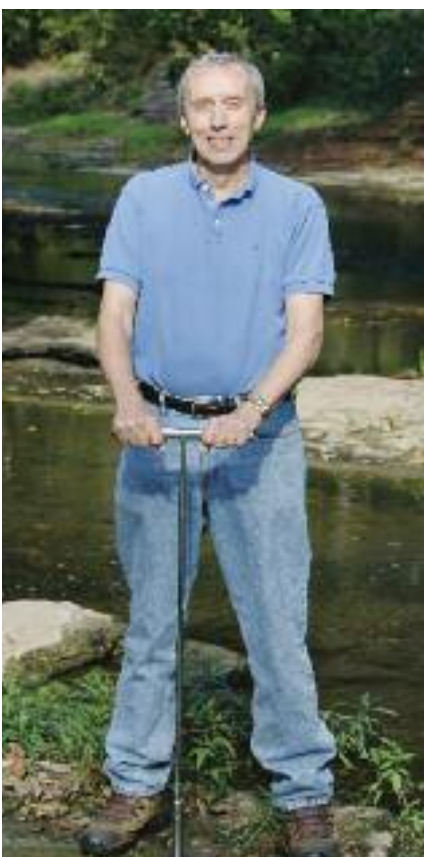
### Launch of an Institute

Other components came together. Development and Alumni Relations began fundraising. The university began recruiting a senior scholar in the field of environmental social sciences. The institute's eight-member leadership committee initiated contact with a number of U.S. and international institutions to develop collaborations.

"The institute's aim is to promote genuine interdisciplinary work involving faculty and students in law, business, natural and social sciences, humanities and engineering," says Hornberger, the inaugural director of VIEE. "Its applied and basic research will affect policy because we intend to involve policymakers in the research." Outreach is planned at many levels, from existing Vanderbilt centers and institutes to government agencies and from national media to middle school students.

A good deal of progress has occurred in a brief period—with the expected amount of stress. "The move was the most stressful—sorting through all the stuff in our old house," Hornberger's voice trails off and then he smiles. "We are really enjoying Nashville. Everyone is so friendly, and we like our Sylvan Park neighborhood. Now we live in a new house in an old neighborhood."

—Brenda Ellis



George Hornberger





## Four Faculty Named to Endowed Chairs

**F**our acclaimed faculty members of the School of Engineering have been awarded endowed chairs.

Michael Goldfarb is the H. Fort Flowers Professor of Mechanical Engineering, Ronald Schrimpf is the Orrin Henry Ingram Professor of Engineering, Peter N. Pintauro is the H. Eugene McBrayer Professor of Chemical Engineering and George M. Hornberger is the Craig E. Philip Professor of Engineering.

“These are terrific faculty members—good teachers, excellent mentors of students, and internationally known for their research and scholarship,” says

**“These are terrific faculty members—good teachers, excellent mentors of students, and internationally known for their research and scholarship.”**

—Dean Kenneth F. Galloway

Kenneth F. Galloway, dean of the School of Engineering. “We are fortunate to have them at Vanderbilt, and I am very pleased that we can acknowledge their contributions with endowed chairs.”

Endowed chairs are a centuries-old tradition in higher education, signifying that the faculty member holding the chair is a leader in scholarly achievement, distinction, discovery and teaching. An endowed chair, or professorship, links exceptional accomplishment with the name of the chair, creating a lasting legacy for the donor and honoree.

### H. Fort Flowers Chair

The H. Fort Flowers Chair honors the late H. Fort Flowers, a highly successful engineer, inventor, manufacturer and philanthropist. Founder of the Differential Steel Car Company, Flowers, BE’12, ME’15, invented the side-dumping gondola railroad car for transporting and delivering bulk materials.

Goldfarb joined the engineering school in 1994 and is director of Vanderbilt’s Center for Intelligent Mechatronics. His research focuses on design, modeling and control of electromechanical devices. Currently, he is perfecting a rocket-powered prosthetic arm and hand he has designed for amputees.

### Orrin Henry Ingram Chair

Orrin Henry Ingram served on the Vanderbilt Board of Trust from 1952 to 1963 and founded what became one of the nation’s largest privately held corporations. His son, E. Bronson Ingram, served as board chairman from 1991 until his death in 1995. Bronson Ingram’s wife, Martha R. Ingram, is the current chairman of the Vanderbilt board.

Schrimpf joined the School of Engineering in 1996. His research focuses on microelectronics and semiconductor devices; most recently, he has been conducting research on the effects of radiation on semiconductor devices and integrated circuits. Schrimpf directs the Institute for Space and Defense Electronics, which performs design, analysis and modeling work for a variety of space- and defense-oriented organizations.

### H. Eugene McBrayer Chair

H. Eugene McBrayer, BE’54, joined Exxon Chemical Company after graduation from Vanderbilt and worked his way to the top of the corporation. He retired as president in 1992. McBrayer was inducted into the School of Engineering’s Academy of Distinguished Alumni in 1987 and received the 1992

Chemical Industry Medal for outstanding distinction.

Pintauro, chair of the chemical and biomolecular engineering department, is nationally recognized for his work in fuel cell membranes and electrochemical engineering. He joined the faculty in 2008 and is the first person to hold the H. Eugene McBrayer Chair. He is the author or co-author of nearly 100 scientific papers and a listed inventor on six patents.

### Craig E. Philip Chair

The Craig E. Philip Chair honors the president and CEO of Ingram Barge Company. Philip is also a member of the School of Engineering’s Committee of Visitors.

Hornberger, an international leader in hydrology and environmental engineering, is the first person to hold the Philip chair. A member of the National Academy of Engineering, he joined the engineering faculty in 2008 as a University Distinguished Professor. He holds an appointment in the College of Arts and Science as a professor of Earth and environmental sciences and serves as the director of the new Vanderbilt Institute of Energy and Environment.

## From Laboratory to the Marketplace

*Company started by VUSE researchers receives \$5.2 million in venture capital.*

**A** computer-aided liver surgery system stemming from research at the Vanderbilt School of Engineering could soon be in operating rooms, thanks to a \$5.2 million infusion in venture capital.

Pathfinder Therapeutics Inc. (PTI), a company built on the work of School of Engineering researchers and their medical colleagues, recently received venture capital funds to enable PTI to take its image-guided liver surgery navigation system to market.

“The venture capital does two things,” says Robert Galloway, professor of biomedical engineering and co-founder of PTI. “First, it provides capital to build, test, sell and support the system. Second, it means that hard-eyed people with no stake in the system looked at the product and the company and determined both were worthy of the investment.”

Marketing of the 5-year-old company’s technology is expected to begin this year. The system has two components, PlaniSight Linasys for preoperative planning and SurgiSight Linasys for real-time, 3-D views of surgery. Both components have received Food and Drug Administration clearance as medical devices.

### Liver 101

PTI’s system has the potential to radically change the way liver surgery is performed. For people with liver tumors, it could be life-changing.

The liver is a solid, opaque organ rich in vessels and arteries, making surgery problematic. “If, as they operate, surgeons can’t see the tumor, or tumors, and the blood vessels that feed

it and drain, they can only take out that small part of the liver in which the tumor resides,” Galloway says, risking tumor regrowth. “The Pathfinder system acts like a GPS unit for surgery. It shows the surgeon—in real time and in three dimensions—the location of the surgical instruments in relation to vessels and the tumor, just as an auto’s GPS unit shows the driver the car’s relative position to roads and landmarks.”

Currently, only about 20 percent of people with liver tumors have surgery because of the risk of damaging vessels and arteries that crisscross the liver. Galloway predicts the PTI products could increase the percentage of people having surgery up to 80 percent.

### Learning from the Process

Galloway, who directs the Vanderbilt Center for Technology Guided Therapy, advocates involving students in early research where the outcome and potential is unknown. “Think how much richer the academic environment is when students see the struggles and process of a new medical way of thinking. There’s the value of students observing real-time engineering, business, management, medical and ethics questions being played out,” he says. In PTI’s case, students were involved in the research process from the beginning and were instrumental in the company’s development. One student, James Stefansic, MS’96, PhD’00, helped co-found PTI and serves as its chief operating officer.

One of the struggles Galloway has observed involves pioneering technology that could supplant the tried and



Robert Galloway uses a model of a liver to demonstrate PTI’s Pathfinder system.

true. “There are challenges in being one of the first companies out the door with a product,” he says, including difficulties in finding investors or dealing with people who don’t understand the prod-

uct or its potential. “As a friend once said, ‘the way you know you’re a pioneer is by the number of arrows in your chest,’” Galloway says.

—Mardy Fones



# Biomedical Engineering Service-Learning Classes Are Education in Action

When Cynthia Paschal created a new biomedical engineering service-learning course last fall, she hoped that 15 students would enroll. For the spring 2009 follow-up, she hoped to have 12 students, which would be a manageable number to take on an international project in Guatemala for a week.

Then 46 students registered for the fall semester of BME 290A Service Learning and Leadership. “Three times as many students!” says Paschal, associate professor of biomedical engineering. Clearly interest exceeded capacity. Twenty-one students squeezed into the course.

Paschal had searched more than a year for ways to engage BME students in international work and service learning, courses that involve students in community service activities while helping them

apply the experience to personal and academic development. One challenge was to find a balance in time and involvement. “Vanderbilt’s VISAGE program is great, but its one-year commitment can be challenging for engineering students who have such demanding curricula,” Paschal says. “I wanted to do something shorter than a year but with more engineering depth and duration than a week-long project.”

## Service at Home and Abroad

Attending a Latin American health initiatives symposium at the Vanderbilt Nursing School in April 2008 helped Paschal configure the course. “I wanted the service-learning projects to fit problems in Central America. The need is so great and it’s so close,” she says. Then in

May 2008, Paschal traveled to Guatemala City to visit Manos de Amor, a medical clinic in need of laboratory equipment; the Shalom Surgical Center, a venture involving the Monroe Carell Jr. Children’s Hospital at Vanderbilt; and the School of Engineering at Universidad del Valle de Guatemala, a private university. The clinic, Shalom Foundation and the university would become partners in the on-site international component taking place in spring 2009.

Paschal developed a fall three-credit hour course dedicated to working on projects that could be completed in the Nashville area. BME 290F, a spring course, would be a one-hour credit course involving travel.

Nine organizations became part of the course based on student interest in the nonprofits’ projects and needs. Service-learning projects ranged from repairing equipment for Project C.U.R.E., the largest supplier of donated and surplus medical equipment to the developing world, to creating computer-based training for physicians volunteering at Nashville’s Siloam Family Medical Center. Other projects involved designing a cost-effective ambulance for rural Mexico, researching laboratory options for developing countries, and investigating paper X-rays. One student designed a hand cranked otoscope for use in developing countries. (See story below)

Two students secured donated equipment for the Manos de Amor clinic. Professor Emeritus of Electrical Engineering Edward White, Paschal and the students in the spring BME class delivered the collected equipment to Manos de Amor during spring break. While in



Cynthia Paschal and student Chris Madison pack donations to take to Guatemala.

Guatemala, students worked in a Guatemala City public hospital and also visited and gave presentations at a mini-conference of engineering students and faculty at the Universidad del Valle.

## Course Adjustment

The fall service-learning class required some retooling, Paschal says. “We had a big ‘course correction’ mid-semester.” She laughs at the pun. “In addition to the projects and bi-weekly journal entries, the inaugural course had a leadership component offered by invited speakers, role-playing exercises around ethical issues, and sessions devoted to grant writing for nonprofits. The workload was just too much,” she says. “Thankfully, the students spoke up and I adjusted the requirements.”

Although the students found the heavy workload problematic, their evaluations at the end of the semester uniformly praised the course. “It was,” they agreed, “a nice change of scenery from the usual engineering classes.”

—Brenda Ellis



During spring break, Vanderbilt volunteers brought an incubator, centrifuges and other donated items to Manos de Amor Clinic in Guatemala City. From left, kneeling: Rosie Korman; clinic founder Alvaro Perdomo; and Cynthia Paschal, associate professor of biomedical engineering. Middle row: Sung Hoon Bae; Wade Allen; Garrett Spiegel; Paul Guillod; Karen Baker; Katherine Gray; and Jessica Keener. Back: Chris Madison; Ed White, professor of electrical engineering, emeritus; Jessica Paulsen; Jim Clear; and Lauren Nichols.

# Dynamo-powered Otoscope Delights Doctors

BME service learning project earns praise for senior’s device.

Conducting even the most basic medical exam can be a challenge in remote, poor locations where electricity or batteries are nonexistent. In such settings, a vital piece of medical equipment—the otoscope—can be rendered useless.

The importance of an otoscope extends beyond the general examination of eyes, ears and throats. It can help medical practitioners see the borders of skin lesions and find infants’ small, deep veins, which appear to the naked eye as dark lines.

“Electricity, if even available, is unreliable. I worry about where I’ll charge my batteries when I go to Ecuador,” says Ken Watford, MSN’96, a Vanderbilt Medical Center Department of Otolaryngology nurse practitioner who travels to Latin America annually to provide health care.

Senior biomedical engineering student Heather Stone adapted a standard otoscope to use in remote or underdeveloped areas as a project for her service learning and leadership class. The project was suggested by Engineering World

Health, an organization that uses the resources of university engineering programs to improve healthcare in developing nations.



Heather Stone’s otoscope self-generates power.

The project requirements were set: the adapted otoscope should operate by cranking, shaking, pulling or otherwise generate energy without batteries or access to electricity. Only the device’s energy storage and delivery apparatus were to be adapted, not the optical sections. The revised device must cost less than \$100 in quantities of 10 or more.

## Exceeded Expectations

Stone’s solution uses a small dynamometer to produce direct current, making the otoscope a self-generating product. It is charged by cranking a handle, similar to the power produced by a dynamo inside the body of a hand-cranked flashlight.

“I was interested in three projects listed by EWH, but I had to choose one,” Stone says. “This project seemed to be one with the greatest potential impact.”

Stone’s initial aims were for the otoscope’s light to stay on with one minute of shaking or cranking, to seek and receive the approval of 10 VUMC doctors, and keep the cost of production supplies low.

The result surpassed expectations. The brightness needed for examinations lasts 1.26 minutes with only 20 seconds of cranking. The device stays on for 28 hours, and the total cost of the prototype is \$4.50. All but one of the 19 VUMC doctors reviewing the device approved it.

## Patent Pending?

Watford is impressed by the otoscope. “I love it. Although it’s not quite as bright as I’m used to, it’s better than what I use in Ecuador,” he says. Dr. Steven Goudy and Dr. Robert Labadie of VUMC’s otolaryngology department say Stone’s device allows them to see all the structures they need to see, and that the light is adequate to diagnose common pathologies. Labadie suggested Stone patent the device.

The young engineer is investigating patenting, even as she seeks to improve her device. “I know I can make it smaller and more durable and get a brighter light,” she says.

—Brenda Ellis





## Inspired by Nature

Mix of spinach and gold generates intriguing possibilities for renewable energy.

Capitalizing on nature's own photosynthesis, a group of students and faculty is using inexpensive gold electrodes and spinach leaves to convert light to power, potentially developing a new direction for renewable energy.

"Solar energy is the only alternative energy with the capacity to meet the world's long-term energy needs," says G. Kane Jennings, associate professor of chemical and biomolecular engineering. "Our approach is unique in that we use nature's own photoactive elements that have been optimized to harvest energy from the sun."

The researchers extract a key protein complex, Photosystem I (PSI), from spinach leaves and use it as the active component in a cell that converts light into electricity. When PSI is assembled on a prepared surface covered with inexpensive gold leaf, it remains active and enables energy to flow in a process comparable to photosynthesis.

The process was recently featured in the scientific journal, *ACS Nano*, as well as in *New Scientist*, an Internet-based technology journal.

The research team also includes Associate Professor of Chemistry David E. Cliffel, graduate students Peter Ciesielski and Christopher Faulkner, then-graduate student Brad Berron, PhD'08, and senior chemical engineering major Amanda Scott. Collaborating with Cliffel and capitalizing on his expertise in electron transfer from a surface to a protein was key to the group's findings, Jennings says.



Kane Jennings

### Natural and Low Cost

The overall goal of the research is to use and improve the protein's energy transfer ability as part of a low-cost energy source. "Unlike some current expensive photovoltaics [solar cells], our chief component—plant leaves—literally grows on trees and is biodegradable and nontoxic," Jennings says. "Our research could enable the mass production of inexpensive solar cells that would be economically accessible for poorer nations. The fabrication and mass production of these biologically inspired

solar cells could bring new industry into these areas."

Starting with gold leaf that is a 50/50 alloy of gold and silver and available from a consumer craft Web site, the researchers used nitric acid to leach out the silver and expand the porous structure of the gold. The porous rich, ultra-thin (only 100 nanometers thick) gold leaf is then chemically bound to glass. The resulting gold film costs about 6 cents per centimeter squared. "That's an inexpensive way to create an electrode," Jennings explains.

"We then extract the PSI from spinach cells and assemble the nanoscale proteins within the (gold) film," Jennings says. "When light strikes the prepared surface, the PSI electrons are transferred from one side of the protein to the other and then captured and routed to a separate electrode to produce current. To date, our typical cell can produce approximately 2 microamperes of current per square centimeter of electrode area, enough to power an inexpensive hand calculator."

### Distant but Promising

While it could be some time before salad greens and a precious metal power residential lighting, the findings are promising. "We're still a couple orders of magnitude away from a commercially viable product. Even so, we have improved our performance by three orders of magnitude in the past three years," Jennings says. New challenges include discovering how to speed up the transfer of electrons from the protein to the secondary electrode.

"There's no way to know if, in the future, solar cells will be made of plant components," he concedes, but adds that the negligible environmental impact of the process and recent success justify continued study. "The knowledge we are gaining could have huge impact on the design of other solar cells."

—Mardy Fones

## Of Robots, Research and Responsibility

NASA academy boosts student's passion for learning and leadership.

Biomedical and electrical engineering major Charreau S. Bell spent part of her summer at the NASA Robotics Academy at Goddard Space Flight Center in Maryland. The intensive residential research and educational program selects participants based on their high academic standing, interest in robotics and demonstrated ability for teamwork. Bell was named a team leader for the 2008 program. She attended lectures and workshops, visited some of the nation's top robotics labs, and most significantly, conducted research on one of NASA's current robotics projects. Engineering Vanderbilt asked her to reflect on what she experienced.

All I have ever really wanted to know was how to think. And from there, to learn how to solve a problem, especially in the absence of full information about the situation. This summer, I was able to work with NASA. I pursued the opportunity because it dealt with solving problems in the absence of the known: To me, what could be more mysterious or unknown than space and its exploration? How much forethought and planning must precede the construction of spacecraft, life support systems and robots that explore other planets?

I worked at the Goddard Space Flight Center on a research project related to the use of robots to efficiently find appropriate samples for analysis from a body in space. As the team lead, I was responsible for deciding what direction our team would pursue, and for weighing the capabilities of the team members to produce the best work.

Such activities really tested my abilities



Charreau Bell and her team visit Johnson Space Center in Houston.

as a leader. Fortunately, my experience in student government, especially as president of the Engineering Council, enabled me to manage difficult arguments (those discussions were always quite . . . interesting) and to organize the flow of the project.

Our project required a significant amount of fundamental knowledge in computer science. We were tasked with

**This summer, I was able to work with NASA. I pursued the opportunity because it dealt with solving problems in the absence of the known.**

having our robot efficiently traverse a terrain. To do that, we had to understand and consider a number of algorithms, and then integrate, program and implement these algorithms both in a simulation and on an artificial Mars terrain. This was a challenging sit-

uation for the team—the majority of the team members had extremely limited experience with programming, including me: I'm not a computer science major. The one word that stands out in my mind as a description of those 10 weeks is intense. Most *definitely* intense.

Fortunately, I was saved by my Vanderbilt education. More than I actually had known, my Vanderbilt engineering education had endowed me with fundamental problem-solving techniques as well as teaching me how to learn and how to apply knowledge in the absence of direct instruction. Vanderbilt had taught me how to take information I had already learned, whether it was about cells or diffusion or circuits, and apply that same *process* of learning and analyzing to other information.

The experience has changed my life. It inflamed a passion for robotics and artificial intelligence and renewed my desire and pursuit of knowledge. At Goddard, I recognized how much I truly appreciate my Vanderbilt engineering education. I also realized I've learned what I always wanted to know—because Vanderbilt has truly taught me how to think.

—Charreau S. Bell





# The Technology of Facebook

Jeff Rothschild manages innovation and high performance on a massive scale.

If one Internet site could be said to have revolutionized and united the way people communicate, it would be the social networking site Facebook. Since its inception in 2004 as a college-based forum, Facebook has grown to be one of the top-trafficked Web sites in the world.

One of the key executives behind Facebook's technology and engineering, Jeff Rothschild, BA'77, MS'79, knows firsthand about computers and revolution: He personally experienced the transforming power of computers when he was an undergraduate at Vanderbilt.

"The first computer I worked on was at the Vanderbilt computing center—a Xerox Sigma 7. I helped in psy-

**"The first computer I worked on was at the Vanderbilt computing center—a Xerox Sigma 7. I helped in psych research by doing statistics on results sets."**

chology research by doing statistics on results sets," says Rothschild, Facebook's vice president of technology. "I found I was more curious about the computers I used than about the psych results." Then a psychology major, Rothschild turned to computers, earning a master's degree in computer science in the School of Engineering.

With the explosive growth of technology and the Internet on the horizon, Rothschild parlayed his computer science degree into a storage management and later Internet services specialty, working initially at Honeywell and



Jeff Rothschild, BA'77, MS'79

Intel. He co-founded Veritas Software, where he was responsible for product strategy and architecture. He also co-founded Mpath Interactive/HearMe, an Internet multiplayer games and voice chat service. He was introduced to Facebook through his role as a consulting partner with Accel Partners in 2005.

## Passion for Coding

At Facebook, passion for finding new solutions is perpetual. "Every six weeks or so our engineers have a hack-a-thon," he says. The all-night coding event allows engineers to create working prototypes of projects that they have wanted to develop but couldn't because of existing job tasks. "We want

work that's innovative and creative," Rothschild says. "A lot of what we do at Facebook comes out of those sessions." A variety of new Facebook features, such as Facebook Chat and Facebook's video service, started out as ideas during hack-a-thon.

Such features and rapid improvements have helped Facebook become a worldwide phenomenon with an estimated 175 million active users.

Although Facebook is famous for the youthfulness of its founders, Rothschild says that at the company itself, age is irrelevant. "It rarely occurs to me that I'm the age of some of our engineers' parents," Rothschild says. "We look for engineers who have an added dimension—run their own Web sites, pursued their own research, have skills beyond what's taught. People who show initiative."

## Technical Yet Social

Rothschild recently spoke to VUSE students on campus. In a standing-room-only session, he discussed the technology issues in managing a rapidly expanding network of connections and applications for millions of users. Students, staff and faculty alike hung on his every word.

Rothschild understands both the technology behind the site and the organization's appeal. "Everyone who joins has what I call 'a Facebook moment,'" he says. Such moments are individual, but typified by long-lost friends searching for each other and reuniting on the Facebook site or when distant relatives first see baby pictures of a new family member posted there. "The [site's growth] is one of the small pleasures of my job that comes from creating value for people," Rothschild says. "Social networking is something everyone wants in their life, even if they don't know it."

—Mardy Fones

## Faculty Notes

**Peter T. Cummings**, John R. Hall Professor of Chemical Engineering, was invited to give a supersession talk during the American Institute of Chemical Engineers annual meeting and centennial celebration in November. His presentation was on the achievements, progress and future of thermodynamics, a core area of chemical engineering.



Peter T. Cummings

**Daniel M. Fleetwood**, professor of electrical engineering and chair of the Department of Electrical Engineering and Computer Science, has received the 2009 IEEE Nuclear and Plasma Sciences Society's Merit Award in

recognition of outstanding technical contributions to the fields of nuclear and plasma sciences.

**Kenneth F. Galloway**, professor of electrical engineering and dean of the School of Engineering, is chair-elect of the Engineering Deans Council of the American Society of Engineering Education (ASEE).

**Sanjiv Gokhale**, professor of the practice of civil and environmental engineering, has been elected a fellow of the ASCE. The ASCE fellow grade is the highest membership grade for the organization, America's oldest international engineering society. Less than 5 percent of ASCE members are elected fellows.

**John Gore**, director of the Institute of Imaging Science and Chancellor's University Professor of Biomedical Engineering, is the principal investigator



John Gore

for a new \$7.5 million grant to Vanderbilt University Institute of Imaging Science and the Vanderbilt-Ingram Cancer Center. The grant from the National Cancer Institute will be used to establish a new imaging program.

**Clare McCabe**, associate professor of chemical engineering, has been elected to a three-year term as a trustee for national nonprofit CACHE (Computer Aids for Chemical Engineering).

**William H. Robinson III**, assistant professor of electrical engineering and assistant professor of computer engineering, received a Modern-Day

Technology Leaders Award during the 2009 Black Engineer of the Year conference. Honorees demonstrate outstanding performance and are expected to shape the future course of engineering, science and technology.

**Jamey Young**, assistant professor of chemical and biomolecular engineering, has been appointed an American Institute of Chemical Engineers representative to the Emerging Leaders Alliance, an interdisciplinary community of learning for engineering and scientific professionals.



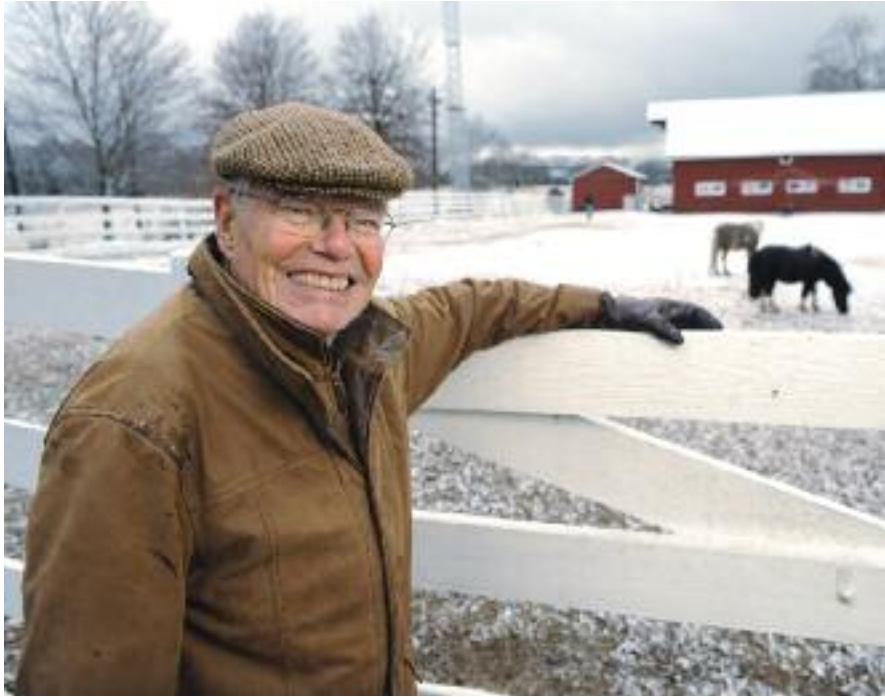
Jamey Young





## Still Doing What He Likes to Do

Near-octogenarian embraces life with gusto.



Wilbur Sensing, BE'51

**W**ilbur C. Sensing Jr., BE'51, celebrated his 65th birthday shooting whitewater rapids down the Colorado River through the Grand Canyon. The next year, he hauled a 40-pound backpack across icy glaciers while climbing Washington's 14,410-foot Mt. Rainier.

Today you might find the 79-year-old flying his twin-engine Beechcraft to the world's busiest airport in Atlanta; snowboarding down a groomed moun-

tain slope in Snowmass, Colo.; or delivering calves in near zero-degree weather in Tennessee. Sensing embraces life with gusto—and always has.

The Nashville native graduated from Vanderbilt School of Engineering in 1951 with a degree in civil engineering and joined a local distributing firm. In 1964, he and his father, Wilbur Carson Sensing Sr., BE'23, formed Enco Materials. Under their direction, Enco soon became a leader in the commercial con-

struction materials market. As CEO, Sensing Jr. presided over eight facilities and more than 250 employees in three Southeastern states. He stepped down as CEO in 2000, but continued as chairman of the board until 2007, when he and his sons, Carson and Ben, JD'98, sold the company to Gerda Ameristeel.

"I farm and manage some real estate investments now," he says. An avid horseman who took up polo at 65, Sensing raises horses and Black Angus cattle on his Middle Tennessee property, Windy Hill Farm.

### Wind Power at Windy Hill

Sensing recently constructed a 75-foot-high windmill to generate electricity at Windy Hill Farm. Built from a salvaged crane and using a base of Sensing's own design, the windmill is capable of generating more than 250 kilowatt-hours of electricity a month. Sensing sells the power to Nashville Electric Service and receives a credit on his bill each month. He estimates that his \$11,000–\$12,000 investment has generated about \$20 in savings since it started up in the spring of 2008.

"I tell people I've gotten \$20 worth of electricity from it and \$20,000 of publicity," he says, chuckling. He's also gotten the satisfaction of investing in green energy that could benefit future generations.

Sensing and his wife, Lucy Tritschler

Sensing, BS'59 (Peabody), reared their two sons and two daughters at Windy Hill, their home for the past 35 years. The two-story, red brick Federalist house built in 1830 is on the National Register of Historic Places. A wooden swing hanging from an oak tree in the front yard hints at the Sensings' devotion to their 13 grandchildren. So does the miniature pony kicking up his heels in the paddock.

After a granddaughter was diagnosed with cystic fibrosis about 12 years ago, Sensing began raising funds for research into the genetic respiratory disease. He is also a strong supporter of the Nashville Rescue Mission, which ministers to homeless men, women and children.

Such interests and activities contribute the richness of the active, adven-

**"I tell people I've gotten \$20 worth of electricity from it and \$20,000 of publicity."**

turous life Sensing began years ago. Ever since the day he climbed into the cockpit of his first airplane, took the controls and flew off by himself at the age of 16, he has relished life and opportunity. "I've always done what I wanted to," he says with a smile.

—Joanne Lamphere Beckham

## Three Engineering Alumni Enter Athletics Hall of Fame

**T**hree School of Engineering alumni have been inducted into Vanderbilt's new Athletics Hall of Fame, established to recognize and honor outstanding achievement and to celebrate the university's sports heritage.

John Hall, BE'55, Perry Wallace, BE'70, and Peggy Harmon Brady, BE'72, were among the first honorees for the new hall.



John Hall, BE'55

They were nominated by Vanderbilt alumni, fans and friends and selected from hundreds of nominations by the senior athletic administration team.

"These three individuals effectively showcase the qualities that make both engineers and athletes successful," says

Kenneth F. Galloway, dean of the School of Engineering. "The same traits that made them outstanding athletes contributed to their ability to succeed as engineering majors: They excelled at time management, organization and problem solving, and were dedicated to learning and excellence."

The three former athletes were recognized during Vanderbilt's special Hall of Fame weekend Sept. 12–13.

### John Hall, BE'55

Hall, the university's first academic All-American, was a defensive lineman and co-captain for Vanderbilt's football team. He graduated magna cum laude with a degree in chemical engineering. Hall joined Ashland Oil in 1957 and was named a vice president of the corporation less than 10 years later. He served as president, executive vice president, vice chairman of the board, chief operations officer, and eventually, chairman of the board and chief executive officer of Ashland Inc. Hall was elected to the School of Engineering's Academy of Distinguished Alumni in 1983. He has been a member of the Vanderbilt Board of Trust since 1987, and served as its president from 1995–1999.

### Perry Wallace, BE'70

Wallace was Vanderbilt's first African American varsity athlete and the first

African American to play basketball in the Southeastern Conference (SEC). In his senior year, Wallace was captain of the Vanderbilt varsity squad and was named All-SEC. That same year, he won the SEC Sportsmanship Trophy, determined by league player vote. Almost 40 years later, Wallace remains one of Vanderbilt's best rebounders and highest scorers. His jersey is one of only three ever retired by the university. Wallace graduated with a degree in electrical engineering and engineering mathematics. He received his law degree from



Perry Wallace, BE'70

Columbia University's School of Law in 1975. After working for the U.S. Justice Department and teaching at the University of Baltimore, he became a law professor at the American University in Washington, D.C.

### Peggy Harmon Brady, BE'72

A leading amateur golfer who won the USGA Girl's Junior Championship, Brady enrolled at Vanderbilt at a time when the university didn't have women's varsity athletics. In her sophomore year, she was asked to represent Vanderbilt at the National Intercollegiate event. A one-woman team, she placed third. The next year, she was a medalist in the Intercollegiate for Vanderbilt. Brady was a two-time All-American in 1970–1971. Graduating with a bachelor's degree in computer science, she continued to play on an amateur basis, including in three U.S. Women's Opens and six U.S. Women's Amateurs. Her daughter, professional golfer Chris Brady, BE'07, followed her to Vanderbilt and the School of Engineering. They have the distinction of being the only mother-daughter All-Americans in school history.



Peggy Harmon Brady, BE'72

—Nancy Wise



# ENGINEERING

VANDERBILT

## Vanderbilt University School of Engineering

### Wings, Research and Running on Johnson's Flight Path

**A**s an Army aviator, Julie Johnson routinely strapped herself into the pilot's seat to test fly just-repaired five-ton helicopters. If repairs to the more than \$4.7 million UH-1 "Hueys" weren't done right, she'd be the first to know.

Johnson, PhD'03, now a researcher, lecturer and engineer at Vanderbilt's School of Engineering, says she got into Army aviation for the thrill of it. She spent five years as a helicopter test pilot with the U.S. Army's 101st Airborne (Air Assault) paratroopers. As one of the famed Screaming Eagles, Johnson tested helicopter repairs and modifications, managing a team of engineers, mechanics and sheet-metal workers at the U.S. Army base in Clarksville, Tenn. Today she holds the rank of captain in the ready reserve, meaning she could be called to active duty if needed.

"Aviation is a wonderful branch. It's small and was a good fit for me," says Johnson, the daughter of a Navy pilot. Johnson was an ROTC student at Dickinson College in Carlisle, Penn., when she had the opportunity to go to jump school and a one-month flight program. "I had motion sickness the whole time I was there," the Philadelphia native says with a laugh. "I didn't realize that if you go and you don't kill yourself, you're branched to aviation to become a pilot. So I just stumbled into it by accident."

Johnson says she sometimes felt isolated as one of only 10 women in her 250-soldier unit. "The army is a hard life in general. There was none of this glass ceiling or sexual harassment stuff, but it was a little lonely being surrounded by men all the time," she acknowledges. "However, I met some great men and women who helped and encouraged me."

#### From Army Aviation to Academia

After release from active duty, Johnson earned her master's degree in computer science engineering from Auburn University in 1997 and her doctorate at Vanderbilt in 2003. The same year, she joined the School of Engineering faculty as a lecturer in the electrical engineering and computer science department. In 2007, she became a staff engineer with Vanderbilt's Institute for Software Integrated Systems, which conducts basic and applied research in systems and information science and engineering.

In addition to teaching undergraduate classes in computer ethics and discrete math, Johnson develops online courses about cybersecurity and terrorism for the U.S. Department of Homeland Security.

"It's really exciting," she says of her institute work. "The interesting part, which is really new to me, is that we have to figure out how people learn online. We have to know the technology, but we also have to understand what's going to engage students, how they're going to retain the knowledge." She and her colleagues also use their research to create interactive homework assignments for Vanderbilt engineering students.

When she's not teaching, researching, working on cyberissues or spending time with her family, Johnson, 45, is on the run. Literally. She's a champion long-distance runner training for the 2009 Music City Marathon and, possibly, the Boston Marathon. Last year, she won the Grand Prix Championship in the master's division of the Tennessee State Parks Running Tour, a unique fall and winter series of races across the state.

— Joanne Lamphere Beckham



Julie Johnson, PhD'03



COURTESY OF VANDERBILT UNIVERSITY SPECIAL COLLECTIONS AND UNIVERSITY ARCHIVES

#### Landmark with a Legacy

The sundial on Rand Terrace was designed by engineering students in the 1950s to mark the spot where Barnard Observatory once stood on campus. The old observatory had been named after one of the university's most famous alumni, Edward Emerson Barnard, who discovered Jupiter's fifth moon and became the first astronomer to photograph the Milky Way. The observatory was razed in 1952 to make room for the construction of Rand Hall. John C. Adamson, BE'56 (left), and James H. Patton III, BE'55, used materials from Barnard Observatory to construct the sundial under the direction of Professor of Mechanical Engineering Dillard Jacobs, BE'32. "The idea for the sundial was his," Adamson says. "Jim and I did the design drawings and he completed the project after we graduated. Dillard Jacobs was a loyal Vanderbilt supporter and a nurturing professor. I had great admiration for him." Jacobs photographed Patton and Adamson viewing the sundial during a Reunion visit in 1974. Today the sundial is surrounded by brickwork added in a subsequent renovation.

A LOOK BACK



# VANDERBILT SCHOOL OF ENGINEERING

## A Reason to Celebrate

Nearly 300 alumni, parents and friends turned out for the 2008 Engineering Celebration Dinner. Alumni in attendance covered a span of more than seven decades (from 1938 to 2008), represented 12 classes reuniting during Reunion Weekend, and traveled from 22 states and three countries.

The dinner was hosted by Dean Kenneth F. Galloway and the Engineering Alumni Council. It celebrated engineering alumni, Lewis Society members, and members of the Vanderbilt School of Engineering Academy of Distinguished Alumni, and commemorated the lifelong impact of a Vanderbilt engineering education.

Highlighting the evening was the induction of three accomplished alumni into the School of Engineering Academy of Distinguished Alumni. Donald C. Orr, BE'56; Maryly VanLeer Peck, BE'51; and William H. Rowan Jr., BE'55, professor of computer science, emeritus, were honored with the Distinguished Alumnus Award; earlier in the year, Sandra Brophy Cochran, BE'80, was also inducted into the academy at an event in Birmingham, Ala.

The October celebration was sponsored by Carl Adams Jr., BE'65, MS'66; Structural Design Group; HCA Information Technology and Services Inc. and Bell Capital Management Inc.



Sophomore Sarah Moredock (left) talks with Joseph Flowers, BE'88, and Lori Manix Flowers, BA'88 (Arts and Science). Sarah is the recipient of the Joseph and Lori Flowers Scholarship in the School of Engineering.



Dean Kenneth F. Galloway (left) greets Jason Chambers, BS'00, MBA'01.

## Outstanding Alumni Inducted into Academy

*The Vanderbilt School of Engineering Academy of Distinguished Alumni inducted four distinguished new members in 2008, two of whom became the first female members of the academy. Academy members represent the School of Engineering's most accomplished graduates. The honor recognizes distinguished achievement, significant service, excellent character and a reputation that reflects well on the engineering school. Selections are made by a committee composed of representatives from the Engineering Alumni Council, faculty, and the dean of the school of engineering. To date, 43 alumni have been inducted as members of the academy since it was established in the 1970s.*

### Sandra Brophy Cochran, BE'80

Sandra Brophy Cochran was born in Fort Benning, Ga., and grew up on U.S. Army posts in the United States and Germany. After graduating from high school in 1976 with an Army ROTC scholarship, she enrolled at Lafayette College in Pennsylvania. In 1978, she transferred to Vanderbilt, graduating in 1980 with a bachelor's degree in chemical engineering.

She was commissioned in the Army upon graduation and attended the Ordnance Officer Basic Course, where she was the honor graduate in 1981. Cochran also qualified as a paratrooper and advanced from second lieutenant to captain. She served in the 9th Infantry Division, first as a missile maintenance officer in the 1st Battalion, 4th Air Defense Artillery, and then on the division staff. During that time, she also earned an MBA at Pacific Lutheran University. In 1983 she left the 9th Division for assignment to the Computer Systems Command at Fort Belvoir, Va.

Her Army awards and decorations include the Meritorious Service Medal, the Army Commendation Medal with

oak leaf cluster, Army Parachute Wings and several service ribbons.

Leaving the Army in 1985, Cochran worked at the Trust Company Bank in Atlanta. When Trust Company merged with Sun Banks, forming SunTrust Banks, she advanced to vice president, corporate finance.

While at SunTrust, Cochran met and worked with Charles Anderson and his son Clyde Anderson. Charles, whose father founded the retail business that became Books-A-Million, was at that time chairman of the Books-A-Million board and Clyde was president of the company. In 1992, they recruited her to join the organization as vice president of finance. Later that year, Books-A-Million went public. Cochran advanced to become chief financial officer in 1993, executive vice president in 1996, president in 1999, and chief executive officer in 2004. Today, Books-A-Million is the third largest bookstore chain in the United States, with 208 stores in 26 states and the District of Columbia.

In 1996, in addition to their work at Books-A-Million, Clyde Anderson and Cochran formed Anderson Growth Partners. Cochran is the president and managing partner of AGP.

Cochran is married to her Vanderbilt classmate Donald Cochran, BA'80, JD'92. He is a tenured law professor at the Cumberland Law School of Samford University. The Cochrans live in Birmingham, Ala., and have two children, Katherine, 14, and Quin, 11.

### Donald C. Orr, BE'56

Donald Cooper Orr is a native of Miami, Fla. and came to Vanderbilt's School of Engineering with the assistance of an athletic scholarship. The stellar high school athlete had played four varsity sports and earned All-City and All-State honors in football.

Juggling engineering classes, football practice and games, ROTC drills, Scabbard and Blade Society meetings, and Sigma Chi fraternity activities, Orr thrived at Vanderbilt. He was named the most valuable player in Vanderbilt's victory over Auburn (25-13) in the 1955 Gator Bowl, elected co-captain of the Vanderbilt team in 1956, and later was named co-captain of the south squad in the North-South College All Star Game.

Upon graduating in 1956, Orr married Eve Loser, '58, and immediately reported to Fort Bliss, Texas, as a second lieutenant artillery officer.

After completing their military commitment, the Orrs returned to Nashville, where Orr began his career with Nashville Machine Company Inc. He became president in 1970 and eventually obtained majority ownership. Under his leadership, Nashville Machine Company grew to become what *Engineering News Record* considers one of the top 75 mechanical contractors in the country. Orr remains on the board of directors as chairman, but has turned daily operations over to his son, Donald B. Orr, BE'84, EMBA'87.

For more than two decades, Orr served as the mechanical contractors' representative on the State of Tennessee Contractors Licensing Board. Until 2000, he negotiated wages and working conditions as chair of the contractors' Labor and Management Committee.

Orr is actively involved in Vanderbilt activities as a member of the Lewis Society and a strong supporter of the National Commodore Club. He has

1951, she was one of the first women to earn a chemical engineering degree from the school.

Peck then went on to become the first woman to receive an engineering degree from the University of Florida, earning an M.S.E. in 1955 and a Ph.D. in 1963.

As an engineer she conducted basic research for the Naval Research Laboratory and Medical Field Research Laboratory at Camp LeJeune, N.C. She worked on solid fuels for the Rocketdyne division of North American Aviation (now Pratt & Whitney Rocketdyne), where rocket engines were developed. The engines and solid fuel developed by Peck are still used in the space program today.

While working in the space industry, Peck was featured in *Life* magazine's September 14, 1962, special report, "The Take Over Generation: One Hundred of the Most Important Young Men and Women in the United States."

In the educational field, she served 20 years in college and university administration, including presidencies at Cochise College and Polk Community College. When Peck was named president of Polk Community College in 1982, she became the first woman to lead one of Florida's community colleges.

In 1993, she received the Society of Women Engineers award for advancement and awareness of engineering as a profession for women. A longtime member of that organization and its first life member of record, Peck has served on its national board of directors and as national vice president.

Peck has long been active in community affairs, including involvement with Rotary International and the United Way. She has been recognized for her accomplishments with a variety of honors, including the Woman of Distinction Award from the Girl Scouts, U.S.A.; George Jenkins' "She Knows Where She's Going Award" from Girls Inc.; Winter Haven Junior League Community Service Award; Gulf Ridge District of the Boy Scouts Lake Region Citizen of the Year honor; and National Community Service Award from the National Society of the Daughters of the American Revolution. She was inducted into the Florida Women's Hall of Fame in March 2007.

Peck has four children—including Vanderbilt graduates Jordan, BS'75, and James, BE'80—three stepdaughters and 12 grandchildren.



From left, Walt Casson, BE'56, and Howell Adams Jr., BE'53, congratulate Don Orr, BE'56, on his induction.

served on both the engineering school Committee of Visitors and the Athletic Board, in addition to acting as fundraising chair and Class of 1956 reunion chair.

Football officiating was a second vocation for Orr. He worked with the Southeastern Conference for 10 years and with the National Football League for 25 years. He retired from the NFL in 1996 after officiating numerous play-off games and three Super Bowls.

The Orrs have two sons, Donald and Jefferson, as well as six grandchildren. They split their time between Nashville, North Carolina and Naples, Fla.

### Maryly VanLeer Peck, BE'51

Washington, D.C., native Maryly VanLeer Peck has spent more than 45 years as an engineer, educator and pioneer. When she graduated from Vanderbilt University's School of Engineering in



From left, Sandra Cochran; Betty Tucker Thackston, BA'62 (Peabody); Professor Emeritus Edward L. Thackston, BE'61, PhD'66; and Maryly Peck.



**William H. Rowan Jr., BE'55**

Bill Rowan Jr. followed his father, Vanderbilt University School of Engineering professor William H. Rowan Sr., into civil engineering before becoming a pioneer in the field of computer science. A Nashville native, Rowan Jr. graduated magna cum laude from the school of engineering in 1955.

From 1955 to 1957, he worked with The Boeing Co. in Seattle, Wash. While there Rowan was introduced to digital electronic computation using the concept of the stored program as well as a new research area called finite element analysis. He also fulfilled a childhood ambition and earned his private pilot's license.

Rowan then served two years in the U.S. Army Corps of Engineers as a second lieutenant.

Returning to Nashville, he worked as an electronics engineer with the Tennessee Highway Department and as an instructor of mechanics at Vanderbilt School of Engineering.

ber of the Phi Kappa Phi honor society.

Rowan received a National Science Foundation (NSF) Initiation Grant in 1967 to study matrix, finite element and computer methods of structural analysis. He was also appointed staff consultant to AVCO's aerospace division and named director of Vanderbilt's new Information Engineering program. That same year, he and other professors developed courses to teach finite element and computer methods of structural analysis and design to practicing engineers. In 1969 the group was awarded an NSF grant to teach this material to faculty from other universities.

Rowan founded On-Line Computing Inc., a computer software and consulting services company, in 1969. In 1971 he proposed that the Vanderbilt graduate school offer master of science and doctorate degrees in information engineering. The proposal was approved and the program became known as systems and information science.

In 1977 Rowan became a full-time faculty member of the systems and information department (which eventually became the Department of Electrical Engineering and Computer Science). He also began working with relational databases, which became his area of research and teaching until his retirement and appointment as professor of computer science, emeritus, in 1995.

He is married to Sarah Conley Rowan, BS'51, MA'59 (Peabody). They have two children and five grandchildren. Residents of Nashville, the Rowans winter in Ft. Myers, Fla.

Nominations for the 2009 class of Distinguished Alumni are now being accepted. To nominate someone, go to <http://www.vanderbilt.edu/alumni/engineering-nominations/>.



Members of the Academy of Distinguished Alumni gathered at the 2008 Engineering Celebration Dinner. Pictured from left, front row: John Hall, Don Orr, Maryly VanLeer Peck, Bill Rowan Jr., Bob Smith and Howell Adams. Back row: Jim Johnson, Johnny Johnson, George Trabue, Fred Cassetty, Hall Hardaway, Bob Clay, Sandy Cochran and Ed Thackston.

**THE ACADEMY OF DISTINGUISHED ALUMNI**

Howell E. Adams Jr., BE'53	2003	Gerry G. Hull, BE'64	2004
William B. Akers, BE'47	2006	James A. Johnson, BE'63, PhD'72	2006
William H. Armistead, BE'37, MS'38, PhD'41†	2006	John W. Johnson, BE'68	2007
Daniel B. Barge Jr., BE'43†	1981	Vaughn Mansfield, BE'33, ME'45†	1969
Robert L. Bibb Jr., BE'43†	1989	H. Eugene McBrayer, BE'54	1987
Dennis C. Bottorff, BE'66	1999	Samuel W. McCleskey, BE'51	2007
H. Lee Buchanan III, BE'71, MS'72	1998	Donald C. Orr, BE'56	2008
Monroe J. Carell Jr., BE'59†	2001	Frank K. Pittman, BE'36, MS'37†	1979
Fred J. Cassetty Jr., BE'60	2006	Eugene E. Pentecost, BE'50	1985
Jere S. Cave Jr., BE'36†	1984	Bailey P. Robinson, III, BE'66	1995
W. Robert Clay, BE'54	2007	William H. Rowan Jr., BE'55	2008
Sandra Brophy Cochran, BE'80	2008	H. Roy Slaymaker, BE'50	1996
Wilbur F. Creighton Jr., BE'29†	1980	Lester H. Smith Jr., BE'54	1991
Douglas S. Davis, BE'65	2007	Robert E. Smith Jr., BE'51	1992
John H. DeWitt Jr., BE'28†	1974	Edward L. Thackston, BE'61, PhD'66	2007
David F. Dyer, BE'71	2005	George O. Trabue Jr., BE'55	1993
William W. Featheringill, BE'64	2000	Maryly VanLeer Peck, BE'51	2008
H. Fort Flowers, BE'12, ME'15†	1975	John A. Warren, BE'48	1990
John R. Hall, BE'55	1983	J. Lawrence Wilson, BE'58	1988
L. Hall Hardaway Jr., BE'57	2002	Lawrence A. Wilson, BE'57	1994
George W. Hardigg, BE'43†	1982	Thomas L. Yount Jr., BE'52	1986
Bruce D. Henderson, BE'37†	1978	† Deceased	



Rowan Scholar Kim Lesnick (center), a junior in chemical engineering, talks with Sarah Conley Rowan, BS'51, MA'59 (Peabody), and Bill Rowan, BE'55.

In 1964 Rowan joined the Vanderbilt faculty as an assistant professor of civil engineering and engineering math. The following year, he received his Ph.D. from North Carolina State University where he was a Ford Foundation Fellow and mem-

**“My degree from the Vanderbilt School of Engineering opened many doors for me. I’m giving back to help create similar opportunities for other engineering students.”**

**-Cloyce Darnell, BE'67**

**T**alk to Cloyce Darnell for a few minutes and chances are you'll hear the words create and opportunity several times; he uses them often when talking about Vanderbilt.

“Vanderbilt gave me a football scholarship, and with it an opportunity to get the best education possible,” Cloyce says. “As a defensive back I got knocked down occasionally, but I learned to get right back up and keep going. That’s why I’ve accepted as an opportunity every challenge I’ve been faced with in my civil engineering career.”

Cloyce and his wife, Sharilyn, recently established a **charitable remainder trust** that created a mutually beneficial opportunity for them and the school. Their gift is **tax-deductible** and provides them with **yearly income**. Later, the funds will support civil engineering at Vanderbilt.

“People I never met gave money to Vanderbilt that provided for my scholarship,” Cloyce says. “I hope this gift engenders similar opportunities in the School of Engineering.”

If you'd like to join Cloyce in supporting the School of Engineering, please contact Katie Jackson in Vanderbilt's Office of Planned Giving at 615/343-3858 or 888/758-1999 or [katie.jackson@vanderbilt.edu](mailto:katie.jackson@vanderbilt.edu).

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