Volume 48, Number 2, Fall 2007

VANDERBILT ENGINEERING

Junior Dynamos

The National Science Foundation recognizes VUSE's junior faculty as among the best in the nation—to the tune of millions in research grants.

The National Science Foundation has bestowed prestigious Faculty Early Career Development (CAREER) Program awards to four Vanderbilt School of Engineering junior faculty members so far in 2007. That news caps a seven-year run that has averaged two CAREER grant awards per year—positioning the engineering school among the NSF's top award recipients nationally.

"Compared to similar schools, we've done quite well," says George Cook, associate dean for research and graduate studies and professor of electrical engineering, emeritus. "Of our 85 faculty, only 10 to 15 are eligible to receive CAREER awards in any one year."

The NSF CAREER Program offers significant cash awards in support of the early career-development activities of those teacher-scholars who most effectively integrate research and education within the context of their organization's mission. The NSF receives about 2,500 applications each year for the 400 CAREER grants it ultimately awards. The grants are typically doled out over a five-year period.

"Competition is stiff," says Cook. "The NSF is looking for two things: innovation in research, and the presence of an educational component that integrates graduate and undergraduate students into the work."

Building a Research Legacy

CAREER Program award recipients typically are at the beginning of their research lives, says Cook. "They have published, but they have not established national reputations. Therefore, one of the objectives of the award program is to identify the next generation of leading researcher-educators."

For Mark Does, assistant professor of biomedical engineering and assistant professor of radiology and radiological sciences, the CAREER award he received in 2005 has been invaluable in deepening his research on MRI techniques at cellular, subvoxel levels. "It's allowed me to broaden the scope of my research and explore ideas that have been difficult to get funded without preliminary data," says Does. "I have been able to augment my research program with some new studies, which, in turn, I anticipate will strengthen the pending renewal of my main NIH-funded project."

Learning in the Lab

"One objective of the CAREER award is to give both graduate and undergraduate students a taste of what teaching and researching are all about," explains Cook. "Graduate students are typically just a few years [in their careers] behind the faculty proposer. They know they want to follow in those footsteps, and they're looking for people with whom they can work and the opportunity to do work that interests them. CAREER awards can facilitate that."

For undergraduates, working with a CAREER award recipient provides hands-on experience and a window into the working world of academia. "It gives them the opportunity to see what a career in this area would be like by exposing them to the many aspects of a research program," says Florence Sanchez, assistant professor of civil and environmental engineering, who received a CAREER award in 2006. "Both undergraduate and graduate students bring a new perspective and energy to the work."

Such experiences can motivate students to pursue advanced degrees and the career of a researcher-teacher, says Cook. Additional funds are available to cover the cost of including undergraduates in the research process.

2007 Award Recipients

Four VUSE faculty members are recipients of an NSF CAREER Program award in 2007.

Julie A. Adams, assistant professor of computer science and computer engineering, is developing technology that will help remote robot operators in dangerous situations. Her objective is to supply technology that enables operators to better understand the situation unmanned vehicles and remote robots are in while also improving interaction systems. *Amount awarded to date: $306,166*

Yi Cui, assistant professor of computer science and computer engineering, is working to develop software that can help prevent Internet traffic jams by using peer-to-peer technology that transforms end-user computers into participants rather than passive recipients of data. *Amount awarded to date: $78,848*

Deyu Li, assistant professor of mechanical engineering, is studying the dynamics of fluids at the nanoscale level while harnessing nano eccentricities to zero in on DNA and other molecules. Using a sensing technique he developed, it will alert researchers when a single molecule enters the sensing channel. The objective is to enable reading of a DNA molecule as it passes through the channel. *Amount awarded to date: $400,000*

Harold S. Park, assistant professor of civil and environmental engineering, is researching efficient design of nanoscale photonics components—specifically, the challenge of controllable light emission from silicon-based nanostructures such as nanowires. *Amount awarded to date: $400,250*

—Mardy Fones

In addition to those awarded this year, the following VUSE faculty members have received National Science Foundation CAREER Program awards since 2000. The amounts listed are the funds awarded to date for each recipient.

2006, **Florence Sanchez**, civil and environmental engineering: integrated research and education program in long-term durability of nano-structured cement-based materials during environmental weathering; $413,325

2005, **Mark D. Does**, biomedical engineering: contrast-enhanced MRI tissue characterization; $400,000

2005, **T. John Koo**, computer engineering: computation platform for design of hybrid systems; $240,000

2004, **Xenofon D. Koutsoukos**, computer science and computer engineering: computational methods for the analysis and design of stochastic hybrid systems; $400,000

2003, **Robert E. Bodenheimer Jr.**, computer science: teachable agents in educational computer animation; $428,558

2002, **Kenneth D. Frampton**, mechanical engineering: scalable intelligent systems for vibration reduction; $381,617

2001, **Bridget R. Rogers**, chemical engineering: ultra-high-vacuum chemical vapor deposition of Al203/ZrO2 alloys; $374,985

2000, **Frank Bowman**, chemical engineering: modeling secondary organic compounds in atmosphere; $224,382

2000, **Timothy Fisher**, mechanical engineering: microscale direct energy conversion by field emission and microscale technology in thermofluids engineering education; $256,540

2000, **Eugene J. LeBoeuf**, civil and environmental engineering: groundwater contamination by organic compounds; $310,000

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Yi Cui


Deyu Li


Harold Park

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Phillip B. Tucker, Interim Editor
615/322-3989
editor.engineeringnewsletter@vanderbilt.edu

Vivian F. Cooper, Information Officer
615/343-6314
vivian.f.cooper@vanderbilt.edu

Keith A. Wood, Designer

Donna Pritchett, Art Director

Mardy Fones, Contributing Writer

Emily Borders · Neil Brake · Vivian F. Cooper · Daniel Dubois · Steve Green · Nancy C. Hirst · Stacy S. Klein · David F. Salisbury · Jennifer Zehnder, Additional Contributors

Kenneth F. Galloway, Dean

K. Arthur Overholser, Senior Associate Dean

Michael D. Moll, Associate Dean for Administration

Dean's Office: 615/322-2762

David M. Bass, Associate Dean for Development and Alumni Relations
615/343-8872
david.m.bass@vanderbilt.edu

George E. Cook, Associate Dean for Research and Graduate Studies
615/343-5032
george.e.cook@vanderbilt.edu

Stacy S. Klein, Associate Dean for Outreach
615/322-6085
stacy.klein@vanderbilt.edu

Burgess Mitchell, Assistant Dean for Student Services
615/322-2567
burgess.mitchell@vanderbilt.edu

John R. Veillette, Associate Dean for Preparatory Academics
615/322-7827
john.veillette@vanderbilt.edu

Visit the School of Engineering on the Web:
www.vuse.vanderbilt.edu

Visit Vanderbilt's alumni publications on the Web: *www.vanderbilt.edu/alumni/pubs.htm*

Please send news items and changes of address to the editor at: VU Station B #357703, 2301 Vanderbilt Place, Nashville, TN 37235-7703.

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A Call to Action: K–12 Education and the Future of Engineering

The report "Rising Above the Gathering Storm," prepared by a panel of experts convened by the National Academies, the nation's leading science advisory group, provides many calls to action. Among these is the need to recruit, educate and retain excellent K–12 teachers who fundamentally understand biology, chemistry, physics, engineering and mathematics.

The *Trends in International Math and Science Study* (1995) and others simultaneously report poor math and science scores for our children, particularly at the high school level. The Business and Higher Education Forum (2005) reports that the number of students graduating with degrees in science and engineering is falling at a time when job growth is taking place in these areas.

Such calls to action have served to increase Vanderbilt School of Engineering's K–12 school outreach efforts, and Dean Kenneth F. Galloway recently appointed me associate dean for outreach to oversee them. Here I'd like to share just three examples of the work we're doing.

RET: For the Teacher

For the past four summers, VUSE has hosted the Vanderbilt University Bioengineering Research Experiences for Teachers (RET) program, for which I serve as principal investigator. This six-week-long program serves 11 to 16 high school teachers each summer from Middle Tennessee. It seeks to give teachers a broad overview of bioengineering, engage the teachers in meaningful research experiences, and help them take their research experiences back to their high-school science classrooms.

Professors from across VUSE and Vanderbilt University Medical Center participate in the program by hosting the teachers in their labs for 23 days, providing them with a research project to complete during that time, along with the support and guidance to do so. This past summer 10 professors served as mentors for projects ranging from assessing the effects of the heat shock protein 70 (HSP70) on wound healing to photosystem I extraction from spinach leaves and its use in providing electrical power. Many of the teachers end up with bioengineering research results that are published with their professor mentors in peer-reviewed engineering journals.

VIBES: For the Classroom

VUSE is also proud to be home of the Vanderbilt Instruction in Biomedical Engineering for Secondary Sciences (VIBES) program [see **www.vanth.org/vibes**], which seeks to develop curricula for teaching basic bioengineering principles in standard secondary science classrooms, ultimately motivating students' interest and achievement in science. The curriculum is challenge-based, interdisciplinary, and anchored in biomedical engineering. The National Science Foundation-funded VaNTH Engineering Research Center for Bioengineering Educational Technologies at Vanderbilt has funded VIBES for the past eight years.

VIBES is recognized by the National Science Teachers Association (NSTA) as an exemplary high-school science program in meeting the National Science Education Standards. The program is featured as a chapter in the book *Exemplary Science in Grades 9–12: Standards Based Success Stories* (NSTA, 2005), having been recognized among the 15 best science curricula in the country.

PAVE: For the Student

Finally, the School of Engineering coordinates Pre-College PAVE, a six-week course of study on the Vanderbilt campus each summer that is designed to strengthen the academic skills of high-school juniors and seniors who are planning to enter a college engineering, premedical, science or technology degree program. Founded more than 15 years ago, PAVE introduces around 175 high school students to campus life each summer and helps them decide if a technology-based career is right for them.

PAVE participants have the opportunity to improve their problem-solving skills, technical writing skills, computer application skills and laboratory skills by performing experiments in the sciences, premed and engineering disciplines. John R. Veillette, associate dean for preparatory academics in the School of Engineering and associate professor of the practice of civil engineering, founded and has directed the PAVE program since its inception.

Would you like to get involved with these initiatives? Please do! If you live in the Nashville area, we would love to include you in outreach efforts to area schools. No matter where you live, your company could sponsor local teachers to attend a VIBES workshop. Please contact me if you are interested by e-mailing stacy.klein@vanderbilt.edu.

—Stacy S. Klein

Passion for Compassion

With a world in need, Nathan Rajalingam isn't taking life for granted.

The more you give, the more you receive. For Nathan Rajalingam, BE'01, it's an approach to life that's led the 28-year-old Twin Cities native to stretch beyond himself to help others, particularly children.

"In the Congo, there's a huge need," says Rajalingam. "So last year a group from my church joined with Heal Africa to work there." He spent two weeks in the central African nation, where war, socioeconomic devastation, and communities crippled by wholesale rape, mayhem and murder have left the people and their economy in shambles.

"The average age of the population is 18. One child had had an eye gouged out. Another, because he didn't have access to medication, had an arm and a leg amputated. When I think of Africa, I think of those children.

"We made flyers with photos and bios of 65 kids and distributed them at our church to get sponsors," says Rajalingam, who is a systems engineer for medical device manufacturer Medtronic. "While we were doing that, another 500 kids watched from outside. There's tons left to be done." Rajalingam won his employer's Mission in Motion Award recognizing employee volunteerism.

The Africa trip was life changing for Rajalingam, who was raised in Minnesota and is the son of Sri Lankan immigrants. "I visited homes where three people lived in a space the size of my cubical. Yet, they were happy and cared for each other."

Rajalingam's passion for giving reaches beyond last year's Congo trip and a similar one this year to India. He's a big brother to an 11-year-old, works with mentally and physically handicapped kids, and volunteers with a Medtronic program that assembles and supplies furniture to people in need.

Through his family's foundation, he is involved in funding construction of schools and libraries in Sri Lanka. At Vanderbilt he participated in Alternative Spring Break, serving food to homeless people and helping children from disadvantaged homes, and was a member of Vanderbilt Student Volunteers for Science.

"When my parents immigrated, my dad first worked as a bank teller and a janitor. Eventually, he owned his own financial services company," says Rajalingam. "He couldn't have done that if it hadn't been for the help he got."

In his own life, Rajalingam says volunteering gives him a regular dose of grounding reality. "We tend to take everything for granted—new cars, a nice place to live, financial and personal security. I keep realizing that it's not necessarily the norm to grow up like I did, with a family and two loving parents and a good education and job," he says. "I always used to wait for better timing to do something. Now I realize it's about appreciating what you have and being involved right *now*."

—Mardy Fones

Alumnus Nathan Rajalingam worked two weeks in the Congo last year helping to provide physical, mental and spiritual health care to villages there.

Life in the Real World

There's no substitute for experience. That's the philosophy behind the School of Engineering's two-semester capstone Senior Design courses, which culminate in the annual Senior Design Day event. Through the experience, senior engineering students take on design challenges from actual corporations, or agencies such as NASA, with real design needs.

"It's one thing to study a formula. It's another to work with a team to find a solution," says Art Overholser, senior associate dean and professor of biomedical and chemical engineering. "Through SDD, we emulate work in a true engineering practice with multidisciplinary student teams who work together as they would in the real world."

Senior Design Day 2007 was held April 24, featuring some 65 design projects by seniors in biomedical engineering, civil engineering, electrical engineering, computer science, engineering management and mechanical engineering. The projects, many of which required cross-disciplinary cooperation by the students, included a point-of-care bedside bar-code system for hospitals, fluorescent X-rays for noninvasive biopsies, a magnetic levitation track, a concrete canoe, a robotic arm, and a training algorithm for operating an unmanned aerial reconnaissance vehicle.

Vanderbilt's capstone course is of particular benefit to the engineering student because it presents him or her with real engineering challenges from corporations like Nissan, Proctor & Gamble, Lexmark, Pharmasys and Toshiba, as well as from the medical community, including Vanderbilt Medical Center.

"The work done in SDD is the intellectual property of the participating companies. That allows us to work collaboratively with them without getting tangled in legal negotiations," says Overholser. "We forego money that might be made with an SDD solution because it's more than repaid by the experience our students get. We believe preparing students for the real world is our core business."

DANIEL DUBOIS

Colin Roper and his team's six-legged crawling rescue robot

A Bite of Reality

Usually, students get to work on a project they prefer. "Occasionally, some get drafted," says Joel Barnett, associate professor of the practice of mechanical engineering. "If they end up working on something they don't like at first or are unfamiliar with, well, we say, 'Welcome to the real world of work.' Often these projects turn out to be some of the best, since the team is working in areas that are new and challenging to them."

The teams meet with their clients to refine and define the challenge ahead, create a strategy, build a timeline, divvy up responsibilities, set deadlines and manage customer relations. On the last day of the spring semester, the students present their solutions in the Design Day event.

"The projects combine technical, teamwork and communication skills," says Barnett. "It's the overall experience that matters." Senior Design Day gives the design teams the opportunity to demonstrate their total engineering effort.

This combination of technical, teamwork and communication skills was particularly well demonstrated this year by a team sponsored by Nissan North America to solve a challenge on the company's auto-assembly floor. "Programs like SDD are a definite win-win for students and for the company," says Bill Krueger, senior vice president, manufacturing, purchasing and supply chain management for the Americas at Nissan North America Inc., which is based in Nashville. Beyond the students' solution, which Nissan is considering implementing, is collaboration and access.

"SDD helps us develop relationships, so when we recruit engineers or need academic research, we have resources in our own community," says Krueger. "It makes sense for local industries and universities to work together to compete in a global marketplace."

Communication Is Key

For J. Rachel Avril, BE'05, who is now a mechanical design engineer for Boeing in Seattle, working on the P8-A plane for the U.S. Navy, SDD positioned her to hit the ground running at her first engineering job. "SDD introduced me to skills that I apply in my job today, and communication is the biggest one," she says. "The hardest part of SDD wasn't the research or the intellectual challenge; it was scheduling, setting goals and sticking with them.

"Then there's the working relationships you build with customers, showing the product in a meaningful way, working on a multidisciplinary team, thinking creatively and pursuing a solution without a safety net. Everything about SDD mirrors the working world.

"Communication is important for teamwork, for funding and for customer satisfaction. You can have the best design in the world, but if you can't communicate it to others, it will never become reality," says Avril. "SDD taught us how to present our designs and communicate them in a productive way."

—Mardy Fones

DANIEL DUBOIS

Max Franklin, Alexander Indest, Alex Lee and Andrew Beese with their engine pallet assembly project for the manufacture of Nissan Altima automobiles

Senior Design Day 2007

A sampling of this year's design projects:

Client: Standard Candy Co. (Nashville)
Challenge: Improve productivity on the production line.
Result: Students developed a system that modified the movement of candy on the line from a continuous stream to an incremental flow pattern, making it easier for workers to process the product in a more efficient manner.

Client: Vanderbilt Center for Intelligent Mechatronics
Challenge: Develop the locomotion control algorithm for a six-legged robot.
Result: Incorporating hardware and software design, engineering students created the leg structure and a control algorithm for a robot that could be used for reconnaissance and for surface and underground rescue.

Client: MAX Mobility LLC (Nashville)
Challenge: Modify existing equipment to enable people with disabilities to water ski with greater comfort, safety and control.
Result: Students designed a shock-absorbing system that fits between the ski's seat and the ski to provide necessary stability and comfort.

Client: Netcordia Inc. (Annapolis, Md.)
Challenge: Design a residential energy management system.
Result: The students developed a networkable and programmable thermostat that consumers could log in to from the Internet to check the health and status of an HVAC system as well as energy usage. They also developed an integrated system for monitoring and operating home appliances, fixtures and lights using existing house wiring.

Client: U.S. Army Aviation and Missile Command (Huntsville, Ala.)
Challenge: Develop a control system for unguided rockets used on Apache helicopters.
Result: Students created an avionics module that could be affixed between the warhead and rocket motor, using the rocket's existing fins to provide guidance, enabling military personnel to set the device to strike a specific position.

DANIEL DUBOIS

Corey Toomey and his team's "smart home" device, which can remotely control a home's lights, appliances, and heating and air conditioning via the Internet or a cell phone

The **2008 Senior Design Seminar** is looking for companies willing to provide engineering students with opportunities to create innovative solutions to real design and engineering challenges. If you or your employer is interested in participating, please contact:

Paul King (biomedical engineering): 615/322-2201 or *paul.h.king@vanderbilt.edu*

Joel Barnett (mechanical engineering): 615/343-4780 or *robert.j.barnett@vanderbilt.edu*

Andy Dozier (electrical engineering and computer science): 615/322-2962 or *andrew.w.dozier@vanderbilt.edu*

Computer Science, Health Care and Finance Converge

Drug discovery. International currency exchange systems. New energy technologies.

These and hundreds of similarly varied innovations share one thing in common: reliance on advanced computing to make them happen. Whether the enabling computers are huge high-power systems or smaller computers working in concert through secure distributed networks, they must give the right answers at the right time.

Computer scientists are the designers, integrators and programmers of this technology, and computer science is increasingly an excellent major for launching careers in health care and finance.

Vanderbilt School of Engineering is now offering two new computer science curriculum tracks to help students capitalize on these opportunities. One helps prepare computer science majors for medical school, while the other enables the computer science major to obtain a master's degree in financial engineering within one year of obtaining the bachelor's degree in computer science.

The **Premedical Track in Computer Science** provides an excellent background for future medical studies, allowing students to prepare for medical school while earning a degree in computer science. The program is designed to be completed in four years by taking a normal course load. This track incorporates all the chemistry and biology courses needed for the Medical College Admission Test, with an information technology/computer science core and a strong liberal arts component.

The **Financial Engineering Track in Computer Science** is a joint effort between the School of Engineering and Vanderbilt's Owen Graduate School of Management. It enables students to obtain a bachelor's degree in computer science during a typical four-year program and then a master's degree in finance during a fifth year. The bachelor's curriculum includes a minor in engineering management, two C++ programming courses, economics, and the statistics background needed to prepare for graduate study in finance and a career in business.

Graduate study in computer science opens up a broad range of career options to students. With advanced degrees, particularly a doctorate, computer scientists can work in computer design and engineering, artificial intelligence, computer architecture, software engineering, computer theory, information technology, operating systems and distributed networks.

—Vivian F. Cooper

Student Outreach Program Benefits Middle Schools

Pressure in public school classrooms to prepare students for academic achievement tests can limit the time devoted to hands-on math and science. That's especially true for middle schoolers whose teachers may be uncomfortable with those subjects or teach in schools that simply lack the resources necessary to delve more deeply into them.

Working in concert with the Metropolitan Nashville-Davidson County Public School System's curriculum, students from Vanderbilt Student Volunteers for Science (VSVS) are helping to bridge that gap. Of the program's 600-plus volunteers last year, more than 25 percent were from the School of Engineering.

"Most engineering students have some background in math and science," says Janey Smith, a third-year doctoral student in environmental engineering and a VSVS volunteer. "Helping middle school students develop stronger skills in these areas can only lead to better engineers in the future."

Created in 1994, VSVS is Vanderbilt's largest student volunteer organization. Its members represent the four undergraduate schools and three graduate programs, says VSVS Coordinator Patricia Tellinghuisen. "Students choose VSVS because we're well organized and have structured activities. Each team goes into the same middle school classroom four times per semester, and we have training sessions to prepare them for those classroom experiences."

Traditionally, VSVS has served only fifth and sixth graders, but the program expanded to seventh- and eighth-grade classrooms during the 2006–07 academic year. The program currently serves 129 classrooms in 15 Nashville schools, reaching 3,900 children each semester. Often the program's outreach extends to special groups of students, such as patients at Vanderbilt Children's Hospital and home-schoolers who meet together at Nashville's Adventure Science Center.

VSVS teaching materials for each team of four students include a manual outlining each lesson, instructions on how to use it, and the materials needed to teach it. Lesson topics vary from the principles of electricity to the properties of solids, liquids and gases. Other lessons use familiar objects such as Beanie Babies to teach about microscopes. Another focuses on how scientific techniques are used to catch counterfeiters.

During the fall 2006 semester, 105 different teams of Vanderbilt students taught in middle school classrooms through VSVS. Tellinghuisen says the response from middle school students and teachers is rewarding. "The students are excited about what our volunteers do, and the teachers welcome us back, especially because we tailor the experiments to fit with their curriculum."

The program's lesson plans were developed by VSVS faculty, staff, undergraduates, and Metro Nashville Schools teachers, as well as graduate students in the National Science Foundation Graduate Teaching Fellowship program. Funding is provided by Vanderbilt, the National Science Foundation, and the Tennessee Space Consortium.

—Mardy Fones

Tom Harris Steps Down as BME Department Chair

As a new faculty member in chemical engineering at Vanderbilt in 1964, Tom Harris' interest in fluids led to collaborations with Vanderbilt Medical School researchers. Those initial forays into the intersections of engineering and the human body led him to earn a medical degree at Vanderbilt Medical School in 1974 and to spearhead the formation of the biomedical engineering department.

DANIEL DUBOIS

Chair of the department since 1987, Harris, 70, has stepped down from that role. Todd Giorgio, professor of biomedical engineering and chemical engineering, has been named interim head of the biomedical engineering department while a new chair is sought.

Thomas R. Harris, the Orrin Henry Ingram Distinguished Professor of Engineering, has instilled in hundreds of engineers a passion for working collaboratively with the medical community. Just one of his many legacies is his work as director of the Vanderbilt-Northwestern-Texas-Harvard/MIT (VaNTH) Engineering Research Center for Bioengineering Educational Technologies. Funded by the National Science Foundation, the program partners with Peabody College's Learning Technology Center to support the development of innovative bioengineering educational technologies.

"To be competitive we must increase the capacity of our students to innovate," says Harris. "Challenge-based instruction restates engineering problems in a way students can relate to. It's about achieving a balance of instruction and challenging students to come up with new solutions."

In addition to continuing work on his research interests—and finding more time for his passion for fishing—Harris will be traveling extensively abroad on behalf of the School of Engineering, exploring educational liaisons with engineering schools in Asia.

—Mardy Fones

High Hopes for Cancer Detection System

A Vanderbilt engineering research team's plan to use nanotechnology to produce a new type of cancer detector took third place at the Nano Nexus 2007 conference in April at Oak Ridge National Laboratory in Oak Ridge, Tenn.

The detector has been under development for two years by Chinmay Soman, Vanderbilt doctoral student in materials science, working under the supervision of Todd Giorgio, professor of biomedical engineering. They have demonstrated that the simple and inexpensive system, which can be built from off-the-shelf components, can rapidly detect the presence of cancer biomarkers—telltale proteins in bodily fluids that can signal the presence of malignant tumors—at very low levels.

The Nano Nexus Idea-to-Product competition, which took place April 3–4, was based not only on the technical merit of the proposed devices but also on the plan the researchers advanced for turning them into commercial products. Soman, along with biomedical and electrical engineering doctoral student Ashwath Jayagopal (BE'03, MS'05), presented their technology and associated business plan, winning third place and an award of $2,500.

The Vanderbilt team's Quantum Dot Enabled Multiplexed Antigen Profiling (QuaD-MAP) system is based on the ability of nanoparticles to self-assemble—to form structures without external prodding. The system starts with nanoscale fluorescent beads called quantum dots, which come in a range of colors and are used to tag specific biological structures.

Another key component is antibodies—proteins produced by the body's immune system that recognize and bind to foreign substances. The researchers chemically attach antibodies onto the surface of the quantum dots that bind to a particular biomarker. When mixed in liquid containing the biomarkers, the proteins act as bridges between the quantum dots, forming microscale "snowballs" from the nanoscale "snowflakes." Within a matter of minutes, the fluorescent snowballs grow large enough to be detected easily by a flow cytometer, a standard hospital instrument used for counting and measuring blood cells. If the targeted biomarkers are not present, the quantum dots do not agglomerate and remain undetectable by the cytometer.

Vanderbilt has applied for a patent on the use of controlled nanoparticle agglomeration combined with characterization by flow cytometry as a novel method of protein detection.

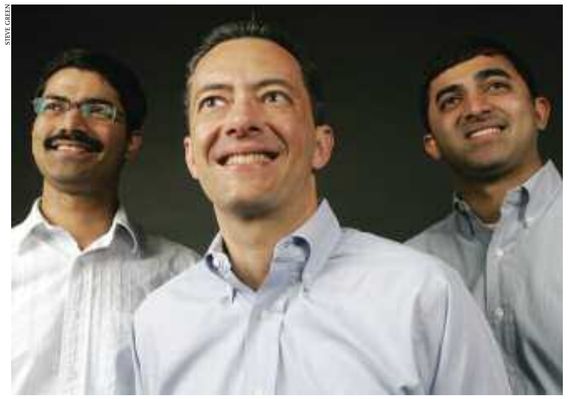
"Biomarker research has been going on for some time and is just reaching the point where we are reasonably confident that biomarkers can be used for cancer detection," says Giorgio. "However, current methods for detecting biomarkers are complicated and expensive, particularly since it appears that it will take the simultaneous identification of several biomarkers to determine the presence of cancer unambiguously."

That is one of the strengths of the QuaD-MAP approach: It can detect the presence of a number of different biomarkers simultaneously by attaching the antibodies to each biomarker to different-colored quantum dots.

"With this technology, a future scenario might be that you go to the doctor every year for a checkup; he draws about 10 milliliters of your blood and runs it through our machine," says Soman. "The machine is equipped to detect the biomarkers for all common types of cancer. Half an hour later it produces a list of the biomarkers it has found. Then the list is examined to determine whether you have any cancers that need treating."

The researchers are focusing on lung cancer as an initial application because no adequate way to detect it at an early stage currently exists. They are looking for a small business that is interested in partnering with them to apply for a federal small business innovative research grant.

—Vivian F. Cooper



STEVE GREEN

Professor Todd Giorgio is flanked by graduate students Chinmay Soman, left, and Ashwath Jayagopal. The team of researchers is using nanotechnology to develop a new type of cancer detector that eventually could lead millions of people to an earlier cancer diagnosis.

Breaking the Sound Barrier

Vanderbilt engineers are working to increase the accuracy of ear surgery while decreasing the risks.

Ear surgery is delicate and demanding work, requiring the surgical team to maneuver in a location crisscrossed by the facial nerve, carotid artery, brain and other fragile tissues. While surgeons know generally the location of these structures, ear surgery demands submillimeter precision.

Michael Goldfarb, professor of mechanical engineering, and Kevin Fite, research associate in mechanical engineering, are collaborating with Dr. Robert Labadie, associate professor of otolaryngology in the Vanderbilt School of Medicine, on a robotic system to dramatically increase the accuracy of ear surgery. Using computed tomography (CT)—along with a system of markers that correlates both to the tissues being operated upon and the tissues to be avoided—they hope to increase accuracy while decreasing the risks.

The delicate nature of ear surgery has made a robotic approach unfeasible in the past, says Goldfarb. "If you look at the speed of response from the eye to the hand, a person's coordination is 10 times slower than a robot's. That makes us more likely to violate the surgical boundaries [that could result in injury to the patient]. Humans may be smarter than robots, but if you tell a robot not to move past a boundary, it won't."

In the operating room, the surgeon would do the preparatory work of separating the skin and muscle from the site, and then draw for the robot a perimeter around the bone to be removed.

As the robot grinds away bone, the physician monitors the work via the CT's three-dimensional image and makes adjustments offline. "The process has much in common with Photoshop," says Goldfarb, referring to the popular image editing software. "The physician tells the robot what to do; the robot doesn't make judgments."

The National Institutes of Health-funded work is still in the early stages. The ultimate goal is not to replace the surgeon but to develop a tool that will result in a better outcome for the patient, says Goldfarb.

Hearing Solutions

For people with damage to the part of the ear containing nerves that make hearing possible, cochlear implants have reintroduced the world of sound. But cochlear implant surgery is complex and tedious, and carries a risk of damage to nerves and other delicate structures.

J. Michael Fitzpatrick—who is professor of computer science, computer engineering, radiology and radiological sciences, neurological surgery, and electrical engineering—and Benoit Dawant—who is professor of electrical engineering and radiology and radiological sciences—have created algorithms that exactly and safely determine the path to the cochlea and facilitate the implant of the electrodes that make hearing possible.

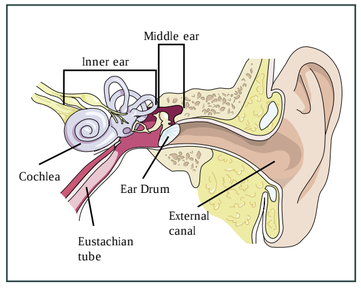
Using a three-legged platform custom designed for each patient based on data from CT scans, a drill can be inserted at the center of the platform at exactly the angle necessary, as determined by their algorithms. The tiny incision enables surgeons to connect the implant immediately rather than waiting weeks for the swelling that accompanies the standard, more invasive technique to abate.

Because of the pinpoint accuracy of the new technique and the speed with which it can be done, it's possible in the future, says Fitzpatrick, that cochlear implant surgery could be an outpatient procedure.

In October, with the support of a $2.9 million, four-year grant from the NIH, and with Labadie serving as principal investigator, testing of the technology will begin with 120 patients. The University of North Carolina, Case Western Reserve University, and the University of Texas Southwestern are participating in this phase, along with Vanderbilt. With the first 60 patients, the standard protocol will be used, but the minimally invasive technique also will be employed with a sham drill with surgical ink on the tip to mark the target location. A camera will then be inserted to check the accuracy. By 2009 it's hoped the technique will be used to do cochlear implant surgery on the remaining 60 patients.

"Currently, the error rate for this surgery is less than 1 percent," says Fitzpatrick. "But the difficulty of the surgery means it isn't readily available. If it can be done on an outpatient basis, it could become as common as Lasik surgery."

—Mardy Fones



In Search of Communication: Robots and Autism

One in 150 children in the United States will be diagnosed with an autism spectrum disorder (ASD). ASD is a complex neuro-developmental condition whose cause isn't completely understood. The degree to which a child with ASD is affected varies widely. What is clear, says Nilanjan Sarkar, associate professor of mechanical engineering and computing engineering, is that those with autism have difficulty communicating.

"More than 70 percent of human communication is nonverbal, and 55 percent of emotional meaning is communicated nonverbally," says Sarkar. These nonverbal signals can be explicit, such as a yawn or a grimace, or implicit, such as muscle tension or perspiration. These signals could provide important information about the mental state of a person with autism.

"People with ASD don't express themselves clearly. If we can understand their nonverbal cues, we can develop better interventional strategies," says Sarkar, who became interested in autism after a cousin's son was diagnosed with it. "The overarching goal of my work is to develop a robotic system that understands you and can respond to your needs."

Emotion-Sensing Basketball

Sarkar's earlier work with a robotic system that senses and responds to physiological cues that are related to emotion, such as heart rate, grimacing and perspiration, is at the heart of his new work. Sarkar collaborated with Wendy Stone, an investigator in the Vanderbilt Kennedy Center for Research on Human Development and director of the center's Treatment and Research Institute for Autism Spectrum Disorders, to explore the project's potential and application.

Through a grant from the Marino Autism Research Institute, Sarkar and his team developed a robot-based basketball game. The game includes a robotic arm that adjusts the difficulty of the game by moving the hoop based on the mental state of children with ASD through assessment of nonverbal signals obtained from wearable physiological sensors.

"In this research, the robot is endowed with intelligence to decipher nonverbal communication and the ability to progressively engage and challenge a child," says Sarkar, who presented his work in August at the IEEE International Symposium on Robot and Human Interactive Communication in Korea.

A robot can present a task in an engaging way that kids like. Using a child's physiological responses to gauge how well he likes the task, the robot can subtly moderate the task to a level the child progressively enjoys, he explains.

The next step, says Sarkar, is to develop an intelligent virtual reality system. The virtual reality characters will engage the child in social interactions and use the child's physiological feedback to build communication skills incrementally. Sarkar has been awarded a $120,000 biomedical research grant from Autism Speaks for this phase.

The goal, he says, is to create an interactive technology that challenges children with autism to communicate better in a measurable way. "The technology allows us to change the interaction incrementally, to start the kids in a position of comfort and slowly scaffold their skills so they improve."

—Mardy Fones

DANIEL DUBOIS

Using interactive technology, professor Nilanjan Sarkar hopes to help children with autism learn to communicate more effectively.

One Giant Leap

Nick Roberts, graduate student in mechanical engineering, explains rocket design and payload issues to seniors in the Aerospace Propulsion course, followed by a demonstration of a low-altitude rocket launch.

The demonstration was in preparation of the Vanderbilt Rocket Club's first-year entry into the NASA-sponsored University Student Launch Initiative—a competition intended to groom a new generation of engineers to work on planned manned flights to Mars. Eight teams from seven Southeastern universities participated in the competition, which was held in May at Marshall Space Flight Center in Huntsville, Ala. The seven-member Vanderbilt team placed third. "A rocketeer needs a grasp of concepts and a passion for the noise," says Robin Midgett, electronics technician in the mechanical engineering department. "We live for the launch and recovery." This year a name change—Vanderbilt Aerospace Club—is expected to attract more students interested in aeronautics and space exploration.

NASA's University Student Launch Initiative encourages college students to tap their science, technology, engineering and mathematics knowledge to design and build their own rockets, complete with science payload. Rockets were required to reach an altitude of one mile during flight and be reusable. NASA engineers and scientists evaluated each rocket design, including propulsion systems, materials used for construction, payload and safety features.

Galloway Wins IEEE Award in Nuclear and Plasma Science

Kenneth F. Galloway, dean of the Vanderbilt School of Engineering, has won the prestigious Richard F. Shea Distinguished Member Award from the IEEE Nuclear and Plasma Sciences Society (NPSS).

The annual award recognizes outstanding contributions through leadership and service to the NPSS and to the fields of nuclear and plasma sciences. Peter S. Winokur, chair of the NPSS Awards Committee, says that Galloway's award citation will read: "For leadership, technical and educational contributions to the field of radiation effects on microelectronics."

"Dean Galloway is truly one of the leaders in radiation effects," says Winokur. "The program he has helped build at Vanderbilt is world-class, and his efforts to foster international cooperation through the Radiation Effects on Components and Systems (RADECS) association are truly noteworthy." RADECS is the premier European radiation effects conference, and Galloway was one of the first American researchers to be involved in the technical organization of the conference.

Galloway is an expert on radiation effects in power devices and mobility degradation in metal-oxide-semiconductor transistors, and is a fellow of the IEEE. He helped found the School of Engineering's Radiation Effects and Reliability Group, the largest program of its kind in the United States and the only academic program actively involved in the support of the U.S. Department of Defense in radiation effects for strategic applications.

In 2003 Galloway also helped establish the Institute for Space and Defense Electronics (ISDE), which serves government and commercial customers in developing predictive, radiation-aware simulation tools in support of space and defense systems design.

—Vivian F. Cooper

DANIEL DUBOIS

Dean Kenneth F. Galloway

Designer of Dreams

Hibbett Neel is rebuilding communities and leaving his mark across the Southeast.

Hibbett Neel, BE'63, president and CEO of Neel-Schaffer Inc., has built Mississippi's largest and most diverse engineering firm despite the fact he believes himself to be the "black sheep" of the family.

"All my family were writers—literary people. I was surrounded by fascinating writers my whole life. My aunt, Frances Neel Cheney, was a professor of library science at Peabody College and was involved with Vanderbilt's famous Fugitives—people like John Crowe Ransom and Robert Penn Warren. Allen Tate, Andrew Lytle and Eudora Welty were friends. Flannery O'Connor and my Uncle Lon [Cheney] were great friends.

"But I didn't like to read," he chuckles, admitting to difficulty in learning how as a boy. "So I was the black sheep of my family."

During high school in Murfreesboro, Tenn., Neel had his first experience with inspirational serendipity. "I discovered what I wanted to do with my life quite by accident," he says. "I was in sophomore Latin class, and we were learning all about the Romans building aqueducts and coliseums and all their other great engineering feats. It was fascinating to me, and that's what got me interested in civil engineering."

Having discovered that his brain was better wired for math and science than for literary pursuits, Neel went on to Vanderbilt, which was a family tradition. As an undergraduate in the School of Engineering, he first got involved in the military, joining the Army ROTC. From Vandy he went on to get his graduate degree from Georgia Tech.

At a time when military service was a given for young men in America, Neel was able to use his ROTC training to secure a posting to Germany for several years' military service. There serendipity struck again—twice. First, he met his wife, Susan, whose father was the installation commander and to whom he has been married for 38 years. Second, he met Jack Hatton.

"I was company commander, and Jack was my first sergeant," says Neel. "He was from Sumrall, Miss."

The two kept in touch. Back in the States, Neel went to work for an engineering firm in New Orleans, where the company was doing a traffic study, and eventually hired Hatton. In 1974 Hatton convinced the firm to move him and Neel to Jackson, Miss., to open an office there.

A "Tragic Opportunity"

In 1983 Neel's firm was sold to a Canadian business, but Neel and Gorman Schaffer, who was operations manager, wanted to stay in Jackson. "We basically bought out the operations and formed our own company with about 25 employees, and we started growing from that."

Today, Neel-Schaffer Inc. is still in Jackson, but has nearly 400 employees in 25 offices throughout the Southeast. They employ civil, environmental, structural and geo-technical engineers working on everything from foundations to landfills to transportation planning and design.

The enormous engineering challenges presented by Hurricane Katrina are Neel-Schaffer's latest concern, and Neel has become a designer of dreams. "I describe the situation as a 'tragic opportunity,'" says Neel. "With all the pain and suffering is also massive urban renewal. We are heavily involved in debris monitoring. We're virtually rebuilding Bay St. Louis. We have about 240 part-time employees on the Katrina work alone."

Neel is active in numerous business, civic and charitable organizations, and he maintains strong ties to his family in Tennessee and to Vanderbilt, where he serves on the School of Engineering Alumni Council.

Optimistic, industrious, and with a whimsical sense of humor, Neel is firmly planted in Mississippi. "This is home," he says. "My wife, Susan, never had hometown ties, being from a military family, and we moved a lot ourselves at first. When we moved to Jackson, she said, 'If you move again, it'll be without me.' I've honored that commitment."

—Nancy Cotten Hirst

AMY BRAID

Hibbett Neel has built Mississippi's largest and most diverse engineering firm.

VUSE Team to Develop Pollution Sensors

Vanderbilt engineers have won an award from Microsoft Corp. to develop a real-time, online, detailed and accurate picture of air quality in large metropolitan areas like Nashville. The mobile system will make it possible to monitor air quality more accurately than the current system, which makes use of fixed stations performing low-resolution sampling, by utilizing car-mounted sensors that measure, process and report emission levels.

Engineers in the Vanderbilt Institute for Software Integrated Systems will adapt Microsoft SensorMap technology for this purpose. SensorMap is a software platform designed to integrate and publish various types of sensor data in real time on the Internet.

"The ability to search for and analyze information within the context of location is a field with great potential," says Sailesh Chutani, director of external research and programs, the arm of Microsoft Research that works closely with academic institutions.

According to principal investigator Akos Ledeczi, the system being built with the $70,000 grant will include five prototype sensors that can be mounted on vehicles. "We will develop the sensors as well as the necessary infrastructure to measure the pollutants; to gather, process and visualize the data; and to deploy the system in the Nashville area to provide a continuous live data feed," he says.

Ledeczi, research assistant professor of electrical engineering, explains that when the sensor-carrying car is in motion, the sensor will sample the pollutants every few seconds, noting time and location of each sample. When the car comes into contact with a WiFi hotspot, the system will upload the data to the SensorMap portal, where a detailed picture of the air quality in the area will be displayed.

Xenofon Koutsoukos, assistant professor of computer science, and Peter Volgyesi, research scientist engineer, serve as co-principal investigators on the project.

—Vivian F. Cooper and David F. Salisbury

Faculty Notes

A.V. Anilkumar, research associate professor of mechanical engineering, was presented the School of Engineering Award for Excellence in Teaching by Dean Kenneth Galloway in May. "Anil is an outstanding teacher, combining curricular innovations with a passionate and personable style that students resonate with," said Galloway.

George E. Cook, associate dean for research and graduate studies and professor of electrical engineering, emeritus, was presented the Edward J. White Engineering Faculty Award for Excellence in Service by Dean Galloway in May. Galloway cited Cook's numerous contributions during his 44 years of service to the school.

Dan Fleetwood, chair of the Department of Electrical Engineering and Computer Science, has been honored as a 2007 distinguished alumnus of the Purdue University College of Science. In announcing Fleetwood's selection, Purdue noted his electronics inventions and influential research.

Clare McCabe, assistant professor of chemical engineering, received the prestigious Jacob Wallenberg Foundation Award in July in recognition of her research on computer simulations of molecular activity. The award, which was established by the Royal Swedish Academy of Engineering Sciences, honors and supports research in materials science.

McCabe

Robert J. Roselli, professor of biomedical and chemical engineering, has received the American Society for Engineering Education's 2007 William Elgin Wickenden Award. Sponsored by the *Journal of Engineering Education,* the award is given to the authors of the best paper appearing in the journal during the previous January-to-October publishing cycle.

Greg Walker, assistant professor of mechanical and electrical engineering, was named in the spring a recipient of a Young Faculty Award from the Defense Advanced Research Projects Agency (DARPA), the primary research and development agency for the U.S. Department of Defense.

DANIEL DUBOIS

An engineer is your best bet in a desperate situation, says professor Kane Jennings.

Engineer to the Rescue

You're stuck on a deserted island with four people and a one-person escape raft. The situation is desperate. Which person do you trust to take the raft alone, on the deep ocean, to search for help? A musician, a political scientist, a teacher or an engineer?

An engineer, obviously, says G. Kane Jennings, associate professor of chemical engineering. Armed with his insights, props, persuasive arguments, and jokes loaned from previous engineering faculty winners, Jennings was declared the 2007 winner of Vanderbilt's annual Raft Debate.

Launched in the late 1960s and modeled after a similar debate at Oxford University, each year the Raft Debate pits the wit and strategies of faculty members from Vanderbilt's four undergraduate schools against one another. Each competitor gets 10 minutes to convince a panel of judges and a raucous audience of their peers and students that his or her expertise would save the day.

Best Laid Plans

"I spent a month putting together a killer PowerPoint presentation," says Jennings. "It had everything: It was funny, it made good points, the timing was perfect." But then, much as happens to people stranded on islands, his hopes were dashed, rekindled and then dashed again. "They said I couldn't use it. Then, three days before the debate, they said I could. Then, the day of the debate, they said the Sarratt Center couldn't accommodate it."

Known for his lively lectures that combine planned material with spontaneous discussions, plus demonstrations and active problem solving that mimics the working world, Jennings was undeterred by the shift. Armed with a rotary phone, a cassette player, a dictionary, and other technology that was once cutting edge, he argued that the myriad engineering-driven advances that displaced his props signals the fact that an engineer is the only logical choice in the raft.

"Joel Barnett gave me one of my best punch lines: 'NASA employs five engineers for every scientist, so it's not really rocket *science*, but rocket *engineering*,'" says Jennings. (Barnett is associate professor of the practice of mechanical engineering.) "He used that four years ago when he won. I figured it was OK to use it again. It was a fresh audience." When the debate was over, Jennings was the winner, based on applause from fellow faculty and students and the decision of the judges.

Everyone in the Boat

All kidding aside, Jennings is quick to acknowledge that an engineer isn't an island unto himself, even when he wins the Raft Debate. "Ultimately, many of the biggest advances come through collaboration. We need everyone—teachers, writers, musicians, scientists and engineers working together to come up with the best solutions."

Jennings is already preparing for the 2008 Raft Debate, where he will have the task of introducing the competitors. He readily concedes that the other debaters this year were good humored about the whole event and that, while they may have been more polished and clever in arguing their points, he won because of his engineer's knack for problem solving and ability to turn an obstacle into a solution. "Basically, I won by applying the Law of Relative Ability," Jennings explains. "Just ask yourself: What would you rather have, a poem written by an engineer or a bridge built by a poet?"

—Mardy Fones

A LOOK BACK

In this 1957 file photo from *The Tennessean* newspaper, H. Roy Slaymaker, BE'50 (left), and Wilbur F. Creighton III, BE'53, review plans to remodel the old Belmont Theatre in Nashville. Many alumni are familiar with the Belcourt Theatre in Hillsboro Village, which still exists, but fewer remember the Belmont, which sat on the opposite side of the same block, at the corner of what is now 21st Avenue South and Blakemore/Wedgewood. The lavish, 1,350-seat, Spanish-style Belmont opened in 1925 to show silent films, accompanied by a 15-piece orchestra. Slaymaker and Creighton contributed to its 1958 "art theater" conversion, but it closed in 1961, two months before being demolished. Slaymaker and Creighton, both Vanderbilt civil engineering graduates and members of Chi Sigma fraternity as students, live in Nashville and have maintained close ties to the engineering school through its alumni activities. Slaymaker received the 1996 Distinguished Alumnus Award from the School of Engineering.

JACK CORN /FILE PHOTO/THE TENNESSEAN

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"Through my contributions of time and money to the School of Engineering, I have had the privilege of staying in touch with advances in education and the people making them happen. It is very gratifying to know that Vanderbilt and I both benefit."

—Bailey Robinson, BE'66 (left), with Hibbett Neel, BE'63

"Madeline and I met at Vanderbilt, and attending Vanderbilt has been a long tradition in both our families. We believe we have a responsibility to prepare the way for future students who wish to receive the excellent education Vanderbilt offers."

—Howell Adams Jr., BE'53 (second from left), with Madeline Adams, BA'56; Nancy Wilson, BA'58; Larry Wilson, BE'57; and Katie Hutchison

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Henry B. Cain (BE'64)*
Carolyn B. and William W. (BE'64) Featheringill
James P. Kelley (BE'64, PhD'67)*
James N. Stansell Jr. (BE'64)*
Theresa M. and Claude A. (BE'64) Thomas*

Class of 1965
Nancye G. and James H. (BE'65) Clayton
Edward P. deZevallos (BA'65)
Joseph A. Drago (BE'65)
Logan H. Hickerson (BE'65)*
K. Arthur Overholser (BE'65)*
Shirley Bethshares Stansell (BA'65)*
Gary C. Thompson (BE'65)
Francis M. Wells (BE'65, MS'67, PhD'70)
Jack L. Wood (BE'65, MS'70)*

Class of 1966
Anthony S. Johnston (BE'66, MS'69)*
Garland P. Rose Jr. (BE'66)*
Irby C. Simpkins Jr. (BE'66)*

Class of 1967
Ronald E. Crutcher (BE'67)*
Pamela Hathcock deZevallos ('67)
Ann Kimball Johnson (BA'67)
John W. Johnson (BE'67)

Class of 1968
Stephen C. Betts (BE'68, MS'71)*
Elizabeth and Warren (BE'68) Bicknell III
R. Sidney Ransom Jr. (BE'68)*

Class of 1969
Malcolm E. Baird (BE'69, PhD'99)
Estelle and David L. (BE'69) Condra
Andrew W. Dozier (BE'69, MS'71, PhD'74)*
Zo P. and James A. (BA'69) Harper*
W. Marlin Keel (BE'69, MS'71)*
Elizabeth Lee Kern (BA'69)*
W. Michael Kern (BE'69)*
Peter D. Kinnear (BE'69)
Susan B. and Eugene (BA'69) Shanks Jr.
Alva Terry Staples (BE'69)

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Joyce M. Crutcher (BS'70)*
Robert J. Fairbank (BE'70)
John P.K. Featheringill (BE'70)
Charles Higgins Jr. (BE'70, MS'78)
Philip J. Olsson (BA'70, MMgmt'72)
Kenneth W. Thomas Jr. (BE'70)*
Susan Upshaw Thomas (BA'70)*

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George C. deZevallos (BE'71)*
Joel S. Janco (BE'71, MS'73)*
Jo Nelle S. and James H. (BE'71) Kepper III*
James D. Riddell (BE'71)
Charles F. Smith Jr. (BE'71)
J. Michael Sullivan (BE'71)*
Gregory N. Tragitt (BE'71)*
Russell B. Truell (BE'71)*

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George C. Garden (BE'72, MS'93)*
Nancy McCauslin Garden (BA'72)*
R. Scott Heflinger (BE'72, MS'82)*
Stephen M. Heuser (BE'72)*
Scott B. Hinckley (BE'72)*
Peter D. Leonard (BE'72)
Jack W. Morris (BE'72, PhD'77)
G. Gayle Cryer Olsson (BE'72)
John W. Pettit (BE'72)
Robert E. Stammer Jr. (BE'72)
Stephen K. Vernon (BE'72)

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Steve M. Hays (BE'73)
Craig Anne Roberts Heflinger (BA'73, MA'75, PhD'89)
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Betty D. and Thomas A. (BE'73) Pirtle III*

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Laurie Breakbill Aldredge (BA'74)
Mark C. Aldredge (BE'74)
M. Jeffrey Bachman (BE'74)*
J. Robin Barrick (BE'74, EMBA'83)*
William J.D. Bond (BE'74)*
Gregory S. Collins (BE'74)*
Kenneth G. Diehl Jr. (BS'74)*
John W. Fowler Jr. (BS'74)
Thomas R. Harris (MD'74)*
Stephen P. Lainhart (BE'74)*
J. Kenneth Tate (BE'74)*
Stephen A. Townes (BE'74)

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Class of 1976
Jean Popp Collins (BS'76)*
Richard G. Rathe (BE'76)*
Thomas R. Walters (BE'76)*

"The School of Engineering has opened so many doors for me. I'm proud to do my small part to ensure those same opportunities are available to future students as well."

—Stephen McGuire, BE'05, MS'05

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Danny G. Johnson (BE'77)*
Win Jui (PhD'77)
Andrea Lykins Lainhart (BS'77)*
David M. Lockman (BE'77)*
Henry R. Nichols (BE'77)
Nancy I. Pierce (BE'77)
Jeffrey Rothschild (BA'77, MS'79)

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Daniel B. Barge III (BE'78)*
Thomas G. Calhoun (BE'78)
Glen E. Johnson (PhD'78)*
Laura Riedl Kyle (BS'78)*
Richard N. Kyle (BS'78)*
Stephen C. Lane (BE'78, ME'91)*
Spence S. Monroe (BS'78)

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Mary Jane Boswell (BE'79)*
Daniel T. Crane (BE'79)
Laurie E. and John T. (BE'79) Davis*
Elizabeth Hovda Ey (BA'79)
John W. Ey (BE'79)
Katherine Powell Hill (BE'79)
Leonard B. Hyde (BE'79)
Jennifer Gorog Nichols (BA'79)
Thomas C. Schaeffer (BE'79)
James C. Taylor (BS'79)*
R. Victor Varney (BE'79)*

Class of 1980
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Donald Q. Cochran (BA'80, JD'92)*
Sandra Brophy Cochran (BE'80)*
Regina Cates Featheringill (MSN'80)
Edith Keith Graves (BS'80)*
Janice Miller Greenberg (BS'80)*
Susan Nesbit Heath (BE'80)
William F. Henagan (BE'80)*
Helen Hardcastle Lane (BA'80)*
William L. Moench Jr. (MS'80)
E. Bert W. Smith III (BE'80)

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C. Peter Bolvig III (BE'81)
Randall S. Brown (BE'81)*
Jeffrey C. Carlton (BE'81, MD'85)*
Paul Breckinridge Jones (BS'81)
Joseph A. Kessler III (BE'81)*
Michael S. McCarthy (BS'81)*
Tom Williams (BE'81)

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Anderson L. Baldy III (BE'82)*
Lynne Flowers Carlton (BS'82)*
Elizabeth Alberts Cheney (BE'82)*
Peter J. Conway (BE'82)*
Marti Winfrey Rimbault (BE'82)
Paul R. Van Hook (BS'82)*
Deborah Stanford Watson (BE'82)*
Robert W. Yosaitis (BS'82)*

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Nancy Begel Phillips (BE'83)*

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James L. Johnson Jr. (BS'84)*
Robert W. Koch (BE'84)*
Cheri McMillan McKechnie (BA'84)*
Timothy N. McKechnie (BE'84, MS'85)*
Thomas W. Sheedy Jr. (BE'84)*
Nancy Griggs Sullivan (BE'84)*

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Michael A. Morris (BS'85)*

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Douglas B. Chope (BS'86, MBA'88)
Lyn Drennen Cosby (BE'86)
Randall R. Cosby (BE'86)
Mark L. Reuss (BE'86)*

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Ashley W. and William H. (BE'87) Dawson Jr.*
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Mark E. Platt (BE'87)
Scott D. Yates (BE'87)*

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Scarlet Weakley Martin (BA'88, MBA'92)
Andrew C. Schlosser (BE'88)

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Fronda Throckmorton Alley (BA'89)*
Christopher P. Kelley (BE'89, MBA'97)
Robert S. Langdon (BE'89)*
James C. Seabury III (BE'89)*

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Erik T. Sundell (BA'90, MD'95)*

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Mary McDonald Collins (BS'91)*
Robert K. Collins IV (BE'91)*
Noah J. Fitzpatrick IV (BE'91)*
Paul L. Lavergne (BE'91)*
Kenneth R. Martin (BE'91)
Jennifer Young Sundell (BA'91, MEd'94)*

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William P. Hamilton (BE'92, BS'90, PhD'99)
Andrew J. Hurter III (BE'92)
Janis Rose Hurter (BE'92, MS'94)

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Robert J. Barnett (PhD'93)
Ronald A. Lewis II (BE'93)*

Class of 1994
Tina S. Patel (BS'94)
G. William Sadler III (BE'94)*
Tricia Doak Thomas (BE'94)

Class of 1995
Brian J. Thomas (BE'95)

Class of 1996
Elizabeth Cox Duke (BE'96)
Christopher G. Goodman (BE'96)*
Jed E. Hunter (BE'96)*
Meghan Baird Hunter (BE'96)*
Philip J. Salem (BE'96)*

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Richard C. Holton Jr. (BS'97)
Allison Valuch Sadler (BE'97)*
Dugan H. Schwalm (BE'97, MS'00)*
C. Wesley Williams III (BS'97)*

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Anthony A. Divino (BE'98)
Bryan K. Hinckley (BS'98)
Andrew J. Wagner (BS'98)

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Erika Brown Wagner (BE'00)
Louise Busch Wilson (BE'00) and Michael A. Wilson

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Thomas P. Convery (BE'02, MS'02)

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Mark P. DiPaola (BE'03)
Eduardo J. Fernandez (BS'03)*
Kevin A. Harnsberry (BE'03)

Class of 2005
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Christopher B. Nash (BE'05, MS'06)*

Class of 2007
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Clay G. Prickett (BE'07)*

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Anita and Larry C. Boyd
Lydie S. Brown
Meredith S. Bullington
Terrell and Joseph W. Clark
Gail N. and James R. Dawson
Grace O. and Walter C. Edwards
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Jean Marie and Charles F. Haugh
Laura J. and W. Winston Hoy Jr.
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Celia M. and Frederic H. Jenkins
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Patricia E. and Harold K. Matthes
J. Mark Myers
Joseph Xu

While the School of Engineering Development and Alumni Relations Office has made every effort to ensure the accuracy of this list, we want to hear from you to correct any omissions or errors. Please notify us by e-mailing AlumniEngineering@vanderbilt.edu.

* Denotes members who have made a five-year pledge

Alumni Honored in Atlanta

The School of Engineering is making its way around the country, bringing a piece of Vanderbilt to you—our parents, alumni and friends. Our 2007 stop was in Atlanta on May 22. Dean Kenneth F. Galloway and other engineering staff made their way south to induct **Douglas C. Davis**, BE'65, and **Samuel McCleskey**, BE'51, into the School of Engineering Academy of Distinguished Alumni. (Look for a full report on Doug, Sam, and other members of the Academy in the Spring 2008 issue of *Engineering Vanderbilt.*) Nearly 100 Vanderbilt faithful turned out to show their support for our honorees and learn about the exciting things happening at the School of Engineering. We look forward to connecting with more of you as our travels continue in 2008!

Doug Davis, BE'65 (left), and Sam McCleskey, BE'51 (right), shown here with Dean Kenneth Galloway, were inducted into the School of Engineering Academy of Distinguished Alumni in Atlanta in May.

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