Taking a Byte Out of Crime
One of the things I most enjoy about being dean is the opportunity it gives me to meet with alumni from around the country. I’ve been very impressed by the many different paths they’ve taken since graduating from the Engineering School.

As you might expect, I’ve met many engineers, but I’ve also encountered venture capitalists, high school math teachers, members of the military, attorneys, executives of large corporations and physicians. But whatever their profession, they have told me that the things they learned here — the ability to frame a problem, the quantitative tools needed to solve it, the ability to work together with others — have been critical to their success.

At the same time, their experiences highlight the different motivations that people bring to the Engineering School. Some students know from the start that they want to be engineers. Others come here because they see engineering as an ideal foundation for another career path. Still others are keeping their options open; they aren’t yet sure what they want to do when they graduate.

At the Engineering School, we recognize these diverse motivations, and we’ve responded by broadening the range of experiences that are available to our students. We’ve instituted programs such as our Science and Technology Policy Internship, which gives students a taste of how engineers can influence the policy debates about critical national issues. We support our chapter of Engineers Without Borders, which has motivated students to take on public service projects in Central America and South Africa. And, most notably, we have created an engineering business minor in partnership with the McIntire School of Commerce.

The 18-credit program includes three required courses — Making Business Work; Principles of Economics: Microeconomics; and Technology and Product Development Life Cycle — and three electives chosen among courses in economics, accounting, commercial law, finance, marketing, strategic management, business ethics and entrepreneurship.

The minor, now in its second year, has been embraced by our students. Between 10 percent and 15 percent are currently enrolled in it, and the McIntire School has created additional sections to accommodate them. In fact, it’s been so successful that we are considering expanding the program to include entrepreneurship and developing a parallel program in law.

Everyone benefits from programs such as these. They offer students a chance to explore alternatives, and they provide a head start for students entering other professions. Equally important, these options give students who intend to become engineers the broad perspectives they need to practice effectively.

I welcome your thoughts on these initiatives designed to broaden the student experience. Our goal is to give students the ability to use their engineering education to serve society in the way that suits them best.

JAMES H. AYLOR
Louis T. Rader Professor of Electrical Engineering
Dean of the School of Engineering and Applied Science
U.Va. Engineer is published by the University of Virginia School of Engineering and Applied Science using private funds. An online version of the magazine is available at www.seas.virginia.edu/uvef/publications/spring07.

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Imagine yourself as a fourth-year U.Va. systems engineering student. As you begin work on your capstone project, you find yourself developing an incredible computer program that will work in tandem with record management systems (RMS) used in police stations across the country. Your program will help law enforcement officials analyze incident data, identify and predict crime trends and better understand the dynamics of crimes in certain jurisdictions. Ultimately, this successful product becomes licensed by one of the premier software providers for public safety organizations, such as law enforcement agencies, fire and rescue services, and even jails.

Although this may sound like a plot to a movie, it’s not — at least not yet. It’s real, and it’s happening here at the U.Va. School of Engineering and Applied Science (SEAS).

Based on a decade of information infrastructure for crime analysis research conducted by Donald E. Brown, professor and chair of the Systems and Information Engineering (SIE) Department at SEAS, the Web-based Crime Analysis Toolkit, or WebCAT, was developed and is continually being refined as part of undergraduate student capstone projects. The WebCAT program has been funded since 2001 by the Virginia Department of Criminal Justice Services and is currently led by James H. Conklin, research scientist in the SIE Department and program director of the department’s newly chartered Predictive Technology Laboratory.

As participants in these capstone projects, students are helping to solve a statewide communication challenge: information flow between jurisdictions.

Currently, each jurisdiction in Virginia reports crime data to the state police on a monthly basis. This information is collected and reported to the Federal Bureau of Investigation. A one-way flow of data, however, doesn’t allow local law enforcement agencies to share information or conduct crucial regional, historical, categorical or geospatial data analyses. When a police officer writes a report, the “criminal incident” is entered into an RMS to fulfill the reporting obligation. But “calls for service” such as those to 9-1-1, which are equally important to track, are not categorized as criminal incidents and thus are not logged into the system.

U.Va. systems engineering researchers set out to develop a product that not only addressed data analysis and sharing issues but also was user-friendly. WebCAT, with its Web-based format, provides crime analysts and police officers easy access to historical crime data and a suite of tools to analyze such data. The system also enables the sharing of data among jurisdictions and law enforcement agencies.

Users log in to WebCAT and are able to run queries to search and identify crimes by characteristics such as location or use of a weapon. The system then generates graphs, reports and maps of crime data based on the queries. WebCAT can detect such trends as when and where particular crimes are more likely to occur — information that Conklin says could aid law enforcement in more effectively deploying its resources.

WebCAT is much more than a sophisticated computer program that can help police stations run more efficiently. Its real complexity is in the research conducted before the program was even built. Department faculty,
Researchers and doctoral students used fundamental systems engineering principles to develop intricate mathematical models that would make these WebCAT analyses work.

“It is just like the mathematical models you would come up with to explain and predict a flow process or a chemical process,” Brown says. “After the research has been completed, a mathematical model can be developed to comprehensively understand — and perhaps improve — the process, and from that point the software can be built.”

Building the software was no easy task. Last summer, students Jeff Bordogna (SE ’07) and Mark Mitchell (SE ’07), among others, worked with Conklin to rebuild, recode and redesign WebCAT to expand its functionality. This academic year, they have further refined the toolkit so that it can analyze text incident data and the narrative description of criminal action that appears on a police officer’s report. These upgrades also can enable WebCAT to identify crime trends over the long term and assist police in better understanding the dynamics of crime in their jurisdiction.

With technology like WebCAT becoming available, several industry leaders have taken an early interest in research conducted in this arena. For example, DaProSystems, which provides software for public-safety agencies, immediately saw the value in providing its customers with ways to do more than just track incident data. It licensed WebCAT in July 2006 from the Engineering School’s SIE Department — thus making it available to all Virginia law enforcement agencies — with the understanding that the team would continue to expand the toolkit’s capabilities.

“It is really amazing to see years of research become the backbone for a series of student projects to produce a product that is in demand. The students working on this project had the opportunity to see a true technology transfer from the university to the marketplace,” Brown says.

Plans for expanding WebCAT’s capabilities include the ability to store and categorize additional data types (including calls for service, warrants, arrests, and names and characteristics of people) and the development of advanced analysis tools that could help predict the location of future crimes and automatically detect changes in crime patterns.

Additionally, within the next two years, the team hopes to add crime-association functionality to the program, whereby text-dense reports are automatically read and categorized by related features so that similarities between incidences can be quickly identified. As a result of Conklin’s ongoing conversations with local law enforcement agencies, WebCAT will evolve to comprehensively meet the needs of the end user.

James H. Aylor, dean of the U.Va. Engineering School, says projects such as these get at “the core of engineering” by improving processes to make our world a better place. “My hat is off to the great students, research scientists and professors who remained on the leading edge of technology and the demands of the marketplace to develop WebCAT,” Aylor says. “It is an invaluable product that is meeting a significant need in our society.”
The engineering students who will gather in Darden Court this spring to celebrate their graduation have a wide variety of interests, are committed to contributing to society and have an insatiable curiosity.

Among them will be three outstanding students who are emblematic of the engineers of tomorrow: technically proficient and well-prepared to meet the needs of a rapidly changing world. Their passionate interests and wide-ranging life experiences have enhanced their professional training and education, and they are eager to go forth and make the world a better place.

We applaud these students and their peers.

Daniel J. Glanz Jr. (Aero ’07)

Daniel Glanz doesn’t view earning his Bachelor of Science in aerospace engineering this spring as anything exceptional. But those who know him are inspired by his latest accomplishment in an already eventful life.

An Alexandria, Va., native, Glanz earned a B.A. in foreign affairs from U.Va. in 1993 and worked as a paralegal. Always fascinated by flight, he took up skydiving, coached others and has performed more than 1,400 jumps.

Glanz also became a soldier. After serving in the ROTC while earning his first degree, he was commissioned as an officer in the U.S. Army Reserves. Upon attaining the rank of captain, he became a battalion logistics officer in Maryland.

Glanz returned to U.Va. to enter the Engineering School, but his studies were interrupted. “After September 11, I knew I would be going on active duty, and I was proud to do so,” he recalls.

He put his degree on hold to serve as a civil affairs officer during two combat tours in Afghanistan. While traveling from a meeting in June 2005, Glanz and his unit passed a suicide bomber, who detonated a bomb as the soldiers passed by. Glanz lost his right arm below the elbow. He returned to the U.S. bearing two Bronze Stars, a Purple Heart and the General Douglas MacArthur Leadership Award; and with encouragement from Mechanical and Aerospace Engineering Associate Professor Robert Ribando, he resumed his studies while still undergoing physical therapy and rehabilitation.

Now married and retired from the military, Glanz is a full-time student in the Engineering School, where his thesis focuses on improved data acquisition capabilities in the Supersonic Combustion Wind Tunnel. After graduation, he plans to join rocket manufacturer Aerojet and work on solid-fuel rockets.

Glanz is grateful for the support he received from engineering faculty and staff. “They were always there to lift my spirits and keep me in the game.”
Erika M. Chin (CS ’07)

Erika Chin, who will earn her Bachelor of Science in computer science from the Engineering School this spring, chose her major because she enjoys finding innovative solutions to real-world problems.

“I’m interested in security in computers, and there is a lot of opportunity for improvement in that area,” says the Burke, Va., native.

Chin, a Rodman Scholar, was selected by the Committee on the Status of Women in Computing Research to participate in its Distributed Mentor Program, which matches female students with engineering research professors across the country. She co-authored a paper with University of Washington Professor Maya Gupta on the study of inverse color management in printers, which has been submitted for publication.

Chin also has been recognized for academic excellence. The winner of the Engineering School Class of 1986 Scholarship, Chin was a finalist for the prestigious Anita Borg Scholarship, awarded by Google to women seeking a future in computing and technology. She also received the Marshall Green Education Program Award for proficiency in Japanese, a language she has been studying for eight years.

Chin, who plans to pursue a doctorate in computer science, has another passion that is decidedly non-academic. A skilled dancer, she is vice-president of U.Va.’s Ballroom Dance Club and has placed well in several regional dance competitions.

“As a child, I was always dancing around the house on tiptoe,” she says. “The costumes make me feel like I’m dancing at a ball, in another place and time.”

Michelle D. Kofron (BME ’07)

Michelle Kofron, who earns her doctorate in biomedical engineering this spring, did not originally plan to come to U.Va. The Montclair, N.J., native was working on her doctorate at Drexel University when her mentor there, Dr. Cato Laurencin, moved to U.Va. to chair the University’s Department of Orthopaedic Surgery sports medicine division. Kofron followed, and she’s glad she did.

“It’s a great school, and since it’s larger than Drexel, it’s easier to conduct research because many core centers are right here and available to me,” she says.

Kofron, who earned a biology degree from Bucknell University, is using tissue engineering, including ex vivo gene therapy, to accelerate bone healing. When there is trauma to bone tissue, it will not heal unaided. Laurencin’s lab uses a biodegradable material to construct a scaffold that fills the bone defect and provides a surface on which new bone can grow. Other researchers have investigated adding cells to the scaffold prior to implantation. Kofron adds an active gene that encodes bone morphogenetic protein-2 to these cells. This gene causes them to secrete a protein that induces bone regeneration.

This discovery has exciting implications for future treatment of bone tissue trauma. It has also garnered Kofron the U.Va. Excellence in Science and Engineering Award, the Outstanding Biomedical Engineering Graduate Student Award and the Jill E. Hungerford Outstanding Graduate Student Award, as well as several fellowships and opportunities to present her work.

Kofron is looking forward to launching her career. “I’m torn between academe and industry,” she admits, “but I believe I could handle either because of all I’ve learned from Dr. Laurencin. He is a terrific mentor whose enthusiasm for his work is contagious and incites me always to do my best.”
For their final project in a second-year engineering course in statics, students were given a novel assignment: produce a six-minute podcast discussing a major, real-world engineering project and its impact. The result surprised even the professor, Edward J. Berger.

It’s not that Berger, an associate professor in the Mechanical and Aerospace Engineering Department, doubted that students might be more engaged by creating a podcast than by writing a paper. The most satisfying result was that the exercise also achieved his goal of getting the students engaged in big-picture engineering questions. As student Ryan Kelly (CE ’09) explained: “The podcasting assignment helped me to see the world as an engineer, not just as a student studying engineering.” That comment was music to Berger’s ears.

The class project divided the students into four-member teams to produce podcasts that discussed such projects as Hoover Dam; sustainable building practices encouraged by the Leadership in Energy and Environmental Design (LEED) standard; the new Guggenheim museum in Bilbao, Spain; and the Three Gorges Dam on China’s Yangtze River. The podcasts also addressed how such projects impacted (or might impact) the economy, the environment, tourism or the local community.

After spending an hour learning Apple’s GarageBand software, one student said she felt “liberated” to express herself creatively, and the podcast project was widely described by the students as “much more fun,” “interesting” and “creative” than writing a paper on the same topic.

Part of Berger’s reasoning for the assignment was that “things are always getting in the way of kids saying what they want to.” Podcasts, he thought, would let students use the spoken word, pictures and diagrams (use of video footage was prohibited, because working with it is much more time-intensive). And, unlike a traditional group presentation in class, students didn’t have to suppress public-speaking anxieties, because they could record and rerecord the narration until they got it just right.

One class member, Cassie Jordan (CE ’09), said that conveying her thoughts in a podcast was easier than doing so in a paper because of the advantages of the spoken word over the written word for her, especially the ability to use intonation and humor. Berger concluded that the podcasts allowed students to express their passion and knowledge of engineering far beyond what was evident from the traditional assessments on weekly problem sets and tests.

Statics is the first engineering course for many structural disciplines, and it’s profoundly important that students really understand the material, Berger said. Along with the barrage of equations, diagrams and problem sets, students need opportunities to see just how exciting real-world engineering projects can be. Producing podcasts proved to be an easily accessible way to achieve this objective. This semester Berger is teaching the same students their next level statics class and is looking forward to seeing the podcasts they produce.
Sound Engines
By Charlie Feigenoff

Stand on a busy runway, and you can be overwhelmed by the roar and vibration of powerful jet engines. This sound, startling as it is, represents in part a compromise between power and stability, between energy produced by combustion and the acoustic field within the engine.

“Combustion amplifies resonance acoustic phenomena within an engine that are determined in part by the physical characteristics of the system,” says Associate Professor of Mechanical and Aerospace Engineering Harsha K. Chelliah. “These adverse thermoacoustic phenomena lessen combustion efficiency in engines of all kinds and, if not checked, can even produce a catastrophic failure.” Such acoustic effects are particularly pronounced when a lean fuel mixture designed to reduce pollution and lower energy costs is used.

The acoustic effects produced by single fuels are well studied. Chelliah specializes in modeling and simulation of reaction flows for propulsion and power generation systems. He is particularly interested in mixed fuels such as syngas and different combinations of hydrogen, carbon monoxide and natural gas. In each case, he wants to characterize the thermoacoustic effects under different conditions and evaluate different mitigation strategies, such as adding a secondary fuel source, that allow high efficiency operation.

In the laboratory, Chelliah uses a simplified flow geometry that contains all the important features of an actual gas-turbine engine and which allows for accurate numerical resolution of the flow field. He is currently setting up a micro gas turbine in the former nuclear reactor building to confirm the results of his laboratory tests. He also sees the turbine as a potential prototype for energy cogeneration. “We could use the turbine to generate electricity and pass the waste gases through a heat exchanger to warm the building,” he says.

Chelliah also is tackling the issues of efficiency from another perspective. In a turbine engine, the droplets produced by the injectors must be very fine. In order for turbines to be adapted for biodiesel, engineers must understand its characteristic spray pattern. “We need to create injection conditions that are similar to those produced with diesel fuel,” he notes. “Our challenge is not simply to develop new renewable fuels, but also to modify systems so that we use those fuels efficiently.”

CORPORATE ENGAGEMENT
Engineering School Opens Its Doors to Industry

The Engineering School welcomed corporations, researchers and executives from industry in its first Industry Open House on Friday, Feb. 23, 2007. This all-day event featured exhibits, networking opportunities and lab tours of research facilities and drew nearly 50 representatives from a wide range of businesses and agencies to Thornton Hall.

Attendees included representatives from Lockheed Martin Corporation, the National Technology Alliance, nanoTITAN Inc., General Electric, Sunset Learning Institute, the Virginia Economic Development Partnership, Liberty Ventures International LLC, the National Geospatial Intelligence Agency and the U.Va. Patent Foundation, among others.

The event featured a presentation by William A. Wulf, president of the National Academy of Engineering, University Professor and AT&T Professor of Computer Science at U.Va. Wulf spoke about “Engineering Education in the 21st Century.”

Participants visited labs in the Engineering School’s four applied research areas — bioengineering, nanotechnology, information science and technology, and energy and the environment — and enjoyed a tour of labs in the state-of-the-art materials science and nanotechnology research facility, Wilsdorf Hall.

This was the first of a series of industry days planned with the intent of strengthening the link between the Engineering School’s applied research and local, regional and national industries.
“Want to go to Africa?”
It may not seem like a common question, but it’s one that Jason Manto (BME '06) and Brooke Yamakoshi (CE '06, SE '07) have been asking a lot lately. Two of seven students who traveled to Tourou, Cameroon, in the spring of 2006 to design and implement a sustainable water filtration system, Manto and Yamakoshi have organized multiple return trips to the province. Their most recent trip occurred over winter break and included a new face, Ezekiel Fugate (CE, Mathematics '07), for whom those five little words prompted a unique journey.

From November 2006 to February 2007, the students visited Tourou and worked to enhance the water purification system they had developed there the previous spring. As a part of the original system, the students had created several filters using a clay and flour mixture that they cooked in pit fires. Ideally, when fired, the flour throughout the mixture combusts, leaving little pores big enough for the water — but not for most impurities — to pass through. The students, however, were not satisfied with their initial filter results. “We knew they just weren’t working,” says Yamakoshi of the pit fires. “We decided that the best way to fire the filters would be in a kiln, which is why we went back to build one.”

And so, Manto visited a Maroua market, where he found two brick makers willing to help the students. The students made 3,000 bricks, the first ever fired in Tourou, where most homes are built of either mud or concrete. The group then transported the bricks to the city market, or Tourou-Centre, where they built the kiln and ultimately fired several quality filters.

After constructing the kiln, the students focused on their second priority in Tourou: performing rigorous water testing in each of the local wells — more than 50 in all — they had mapped using a GPS system on their previous trip. They performed membrane filtration tests, courtesy of James A. Smith, professor of civil engineering at U.Va., to look for fecal coliforms and other impurities in the well water. “In performing these rigorous tests,” Fugate explains, “we hoped to find a correlation between water quality and wellness in the area.”

This summer, the students plan to return yet again to Tourou to educate the community about the new water filtration technology. “Making pottery is a dry-season-only activity,” says Yamakoshi, “so we can use the rainy season to distribute the inventory of filters and focus on water filtration education. We want to teach people why there’s a need for water filtration and provide a connection between water quality and health.”

—Brooke Yamakoshi (CE '06, SE '07)

“‘The biggest health risks in Tourou are malaria, malnutrition, diarrhea and lung infections. Hopefully, by focusing on water purification, we will help improve community health.’”

—Brooke Yamakoshi (CE '06, SE '07)
Erica Taylor Uses Engineering and Medicine to Heal Young Bones

By Josie Loyd

Erica D. Taylor (Engr Sci ’02), a resident physician in the academic orthopaedic surgery training program at the U.Va. Health System, delights in the interconnections in her life.

A resident of Reston, Va., Taylor is the daughter of National Football League Hall-of-Fame wide-receiver Charley Taylor, who played for the Washington Redskins from 1964 to 1975 and in 1977. “I’ve been interested in the process of damage and healing in ligaments and bones since high school,” she says. “And with a family as involved in sports as mine was, it seemed like there was always some kind of injury around to study.”

Her path after graduation from the Thomas Jefferson High School for Science and Technology led her to the Engineering School, where she was a student of the U.Va Engineering Bridge program — a program designed to assist incoming first-year minority students in the transition from high school to college through an intensive six-week summer program before their first semester.

After graduating from U.Va., she went directly to Duke University for her medical degree and returned to U.Va. in the fall of 2006 to complete her residency in orthopaedic surgery.

Taylor is just where she wants to be. “U.Va. was my first choice for residency, and a large part of the reason for that is Dr. Cato Laurencin,” she says. She first met Laurencin, who is a University Professor, professor of biomedical engineering and chemical engineering, and a professor in and the chair of the U.Va. Department of Orthopaedic Surgery, while she was conducting research on the orthopaedic complications of pediatric obesity at the National Institutes of Health in Bethesda, Md. Laurencin, who serves on the executive committee of the J. Robert Gladden Society, later encouraged Taylor to apply for a Gladden Society grant to attend the May 2005 Third International Conference on Children’s Bone Health in Sorrento, Italy. In 2006, during her senior year of medical school, Taylor worked with Laurencin again during a visiting rotation in orthopaedics at U.Va., which confirmed her commitment to apply for residency here.

“This is one of the most diverse orthopaedic residency classes in the country, in many different ways,” Taylor reports. “We recently attended a conference where people remarked that they had already heard that the U.Va. Orthopaedics incoming residents were unique. Such diversity and the general supportive, friendly atmosphere among residents and faculty make U.Va. a great place to train.”

Next year she will work with Laurencin and Dr. A. Bobby Chhabra to investigate biomechanical properties of tissue-engineered tendons and ligaments, with the long-term goal of specializing in the injuries common to young athletes.

“My dad is a great example of how to work hard and to always strive for your best. My mom, who is a middle school English teacher and just about the most wonderful person in the world, is also a great role model. And I found a second home here at U.Va., both as an Engineering School student and now as a physician,” Taylor says. “After all the hard work it took to achieve my goals, I can honestly say I look forward to going to work every day.”

There’s more to the story …

Check out the Engineering School’s research publication, IMPACT, at www.seas.virginia.edu/impact

- Sign up for E-News and get monthly e-mails from the dean at www.seas.virginia.edu/enews
- Others are taking notice! See how we’re making the news at www.seas.virginia.edu/news
Throughout its rich 171-year history, the University of Virginia School of Engineering and Applied Science has educated generations of engineering leaders. The School does not limit its reach to university students, however. In fact, many Engineering School programs are specifically geared toward kindergarten through 12th-grade (K–12) students throughout the region. Read on to learn more about some of the School’s involvement with the engineers of tomorrow — and the next day.

**Engineering Teaching Kits**

Through innovative Engineering Teaching Kits, the School is exposing local youth to the field and properties of engineering well before they set foot on a college campus. Founded in 2002 by Associate Professor of Mechanical and Aerospace Engineering Larry G. Richards through the Virginia Middle School Engineering Education Initiative, the Engineering Teaching Kits program enables undergraduate students to design customized lesson plans, or teaching kits, for middle and high school students. The kits cover a variety of engineering topics, such as solar cars, bridges, catapults, hovercrafts, submarines, planes and rockets, vehicle crash testing, sustainable house design, artificial arms, water filtration devices, heart pumps and brain surgery. The students take the plans to local schools, where they field-test the kits by leading the students through the engineering discovery exercises. Each kit includes an engineering design challenge. The pre-college students then demonstrate their understanding by designing and building a working device or system.

Over the past five years, the Engineering Teaching Kits have proven very successful. “Our students,” Richards says, “have done a great job of representing the School, serving as role models, and both teaching the students and getting them excited about engineering.”

The kits are being used by middle school science and math teachers throughout Central Virginia and in summer programs for both middle and high school students. This program is supported by the Payne Family Foundation and the National Science Foundation.

**GEMS: Girls Excited about Math and Science**

Through “GEMS,” or Girls Excited about Math and Science, U.Va. Engineering School students are helping to close the gap between males and females when it comes to engineering and the sciences. Dedicated to boosting middle school girls’ self-esteem and guiding them toward futures in these disciplines, GEMS participants serve as mentors to sixth- through eighth-grade girls in local schools and lead them in hands-on experiments and activities. For example, past GEMS activities have included making paper airplanes, making Gak™, solving logic puzzles and even learning about liquid nitrogen.

**Center for Diversity in Engineering Outreach Programs**

The Center for Diversity in Engineering (CDE) sponsors a number of statewide outreach initiatives for middle and high school students who may not otherwise learn about engineering. CDE volunteers and faculty throughout each of the Engineering School’s nine departments participate in these outreach programs, including “Introduction to Engineering,” a one-week summer residential program; Juntos Podemos, an overnight program for high school students organized by the Society of Professional Hispanic Engineers; the Science, Engineering, Communication and Mathematics Enrichment program, which helps historically underrepresented and differently-abled students enter and complete post-secondary studies in science; and a tutoring program with Charlottesville High School. In addition, the National Society for Black Engineers often volunteers with local Charlottesville, Va., organization Computers4Kids; and the Society for Women Engineers (SWE) organizes the High School Visitation program, in which local female junior and senior high school students explore majors and careers in engineering, and also offers local Brownies or Girl Scouts a special
“What can engineers do?”

Ask Ambassador Alton G. Keel Jr. (Aero ’66, Engr. Physics ’70), and his answer would be “just about anything.”

Keel’s illustrious career is a case in point. It includes service as U.S. Ambassador to NATO in Brussels; principal deputy national security adviser to the President; chairman of the board of Land-5 Corp.; CEO of InoStor Corp.; chief executive officer and founding partner of Carlyle International; deputy chairman of the Riggs National Bank of Washington, D.C.; executive director of the Presidential Commission on the Space Shuttle Challenger Accident; associate director of the U.S. Office of Management and Budget; and assistant secretary of research and development in the U.S. Air Force.

Keel is currently the president and managing director of Atlantic Partners LLC, a private investment-banking group. He is recognized in Who’s Who in America, Who’s Who in the World and Who’s Who in Science and Engineering—testaments to his extraordinary contributions to public service and to the investment banking and computing industries.

And he credits it all to the fact that first and foremost, he is a U.Va. engineer.

“At significant junctures in my career, the fact that I was a guy who was comfortable with and understood numbers was absolutely key to my success,” Keel said during his presentation at the December 2006 Engineering School graduation ceremony. “I learned how to think analytically as an engineering student at U.Va., and I carried that knowledge forward throughout my career in ways that I never expected when I began my professional life as a research scientist at a Naval aerospace lab.”

In addition to his studies at U.Va., Keel was a postdoctoral student at the University of California, Berkeley. He is an American Institute of Aeronautics and Astronautics Fellow; was recognized as a U.S. Distinguished Alumnus; received the NASA Group Achievement Award; and was named a Congressional Science Fellow. He serves on the U.Va. SEAS Trustees and is an enthusiastic supporter of the founding principles of the Engineering School: the education of leaders in engineering and technology who go forward to make the world a better place.

Keel concluded his remarks to the graduates with this message: “Being at an engineering school at a number-one public university has enabled you to become not only highly skilled engineers but also well-adapted citizens and future leaders. You have become Jeffersonian Engineers.”
Gregory J. Redmann (EE ’07), fourth-year electrical engineering undergraduate

SEAS is unlike any other engineering program in the country. Becoming a U.Va. engineer requires us to not only become excellent engineers, but also to become accomplished writers and orators. The SEAS curriculum is designed to help students develop new ideas and effectively present these ideas to a group. This portion of our education serves to create proficient communicators with the vital skills necessary to succeed in any industry — a true distinction that sets U.Va. engineers apart from others throughout the country.

Keith W. Moored (Physics, Aero ’04, MAE ’08), graduate student in mechanical and aerospace engineering

The most unique aspect of a SEAS education is the emphasis on leadership — both within the curricula and by the faculty. SEAS students gain a broad conceptual background that allows them to understand all facets of a project, preparing them for professional roles as project managers, business executives, top researchers and leaders in a variety of industries. Moreover, SEAS undergraduate and graduate students are exposed to multiple cutting-edge research projects that prepare them to be influential in emerging engineering fields.

Deborah G. Johnson, Anne Shirley Carter Olsson Professor and chair, Department of Science, Technology and Society

I think that the most unique aspect of a SEAS education is the set of courses that students are required to take in the Science, Technology and Society Department. All American engineering schools require students to take courses in the liberal arts; they all provide an education designed to meet ABET requirements. SEAS, however, is unique insofar as it requires students to take a set of liberal arts courses specifically designed for engineering students. These courses, including the senior thesis, ensure that U.Va. engineers are not only strong technically, but also understand the social, ethical, political and cultural dimensions of engineering.

Raya L. Papp (SE ’96), vice president, Operations and Strategy, Corporate Services Group, Thomson Financial

Systems optimization. Although I’m not a practicing engineer, my systems education provides me an excellent basis for solving business problems. I map the system that is responsible for solving a problem, and then I seek to optimize it. In the information industry, systems are typically people, technology or a combination of both. Visualizing the connections and understanding the relationships between each component — social, political and physical — is critical to getting things done and creating efficient processes to drive our business.
Engineering School professors make an impact on their students each and every day. Sometimes the experiences are unforgettable, as was one alumna’s experience with Edmund P. Russell III, an associate professor in the Science, Technology and Society Department and coordinator of the Science and Technology Policy Internship Program.

Of the many courses I took as an engineering student, I truly enjoyed my humanities classes. In fact, I find that the skills I’ve used consistently throughout my 10 years as a professional have been those core communications skills you develop in the humanities. Why? You can have the greatest ideas in the world, but if you are unable to present those ideas in a way that is clear and compelling to your audience, you’ll never see those ideas become a reality. I spend 80 percent of my time communicating to executives in my company via presentations, proposals and meetings. Every time I deliver a presentation, I can hear Professor Russell in the background reminding me to always make eye contact!

In addition, being in the financial services business and given the current slide in ethics we’ve seen in corporate America lately, it’s encouraging to know that the Engineering School still teaches the basics of ethics. We must all strive to factor the fundamentals of ethics into more and more of our decisions. Our knowledge that U.Va Engineering students have that incorporated into their curriculum makes them even more appealing as candidates when we recruit on Grounds for jobs.

I know that as students, we rarely took the time to say thanks to our professors for all of their hard work and dedication. As adults, however, we have more time to reflect on the things that have made us successful. Many thanks to Professor Russell and the other professors in his department for giving me the tools I needed to be successful.

Shavonne Gordon (SE ’95)
Senior Operations Manager, Capital One

“...”

―Shavonne Gordon
(SE ’95)

Who was your favorite professor? Send comments to vef-info@virginia.edu.

We Want to Hear From You!


Submit your news items, personal milestones or an obituary of a loved one to: the University of Virginia Engineering Foundation, P.O. Box 400256, University of Virginia, Charlottesville, VA 22904-4256, or submit them online at hoosonline.virginia.edu.

And/or send responses to articles you’ve read in this magazine to vef-info@virginia.edu.
1980s

**Thomas H. Marshburn** (Engr Physics '84) is a flight surgeon and astronaut at NASA’s Johnson Space Center. Awards he has received include the NASA Superior Achievement Award, the Space and Life Sciences Division Special Space Flight Achievement Award and the Lyndon B. Johnson Space Center Superior Achievement Award.

**James P. Pennell** (CS ‘88) was named vice president of interactive platforms for Cygnus Business Media, a leading diversified business-to-business media company.

**Steven J. Signorelli** (Aero ‘88) was promoted to vice president of Mars & Co., a management consulting firm specializing in business strategy.

**Kevin S. LeFew** (ME ’89) has been named vice president of technology and operations for Gannett Digital, a leading international news and information company that publishes 90 daily newspapers in the United States.

1990s

**Douglas A. Hyslop** (EE ’91), of Vienna, Va., is the director of next-generation technologies at Sprint Nextel. He and his wife, Paula, welcomed their second son, Douglas Glenn, in September. Douglas joins older brother Logan, 3.

**Lori Ann Dorsey Buckler** (ChE ’94) and her husband, Bart, had their third child, Sydney Claire, in July. Claire joins older brothers Zachary, 4, and Ryan, 2.

**L. Roger Mason Jr.** (Nuc ’92, ’94) and Colleen McLaughlin Mason (Nursing ’94) announced the birth of their third child and first daughter, Caroline Elizabeth, in August.

**Albert J. Williams Jr.** (CE ’92, MSE ’95) is the assistant director in the City of Newport News, Va., Department of Public Utilities. He and his wife, M. Vanessa Phillips-Williams (Architecture ’97), had their second child and son, Reis Phillip Williams, in October.

**Kenneth Yagen** (SE ’94) has been appointed vice president of engineering at Compasssoft Corporation.

**Stephen W. Smithson** (CE ’90, ChE ’96) joined law firm Riker Danzig Scherer Hyland & Perretti LLP as counsel for the firm’s environmental group.

1990s

1980s

**Edward B. Blanchard** (ChE ’61) recently received a Lifetime Achievement Award from the Association for Behavioral and Cognitive Therapies. He retired from the University at Albany, State University of New York, in September 2004 as a distinguished professor of psychology.

**William C. Putman** (CE ’66) was named civil engineering department head in the Woodbridge, Va., office of Burgess & Niple Inc.

**Philip M. Chen** (ME ’68) has joined UBS Investment Bank in New York as a senior energy banker and executive director.

2000s

**Allan J. (Jamey) Thompson** (SE ’00) and Puja Seam (Col ’00) married in October. Members of the wedding party included **Brian Hudak** (CS ’00).

**Carl A. Morris III** (CS ’01), an account executive for Sophos, married Hope Force in August. The wedding party included **Michael J. Marino** (CS ’01, Darden ’08) and **Rob Rex** (CS ’01).

**Jeffrey P. Marcello** (ME ’02) and Christina M. Johnson were married in September. Groomsman included **David Rauschberg** (ME ’02).

**Nilanjan Ray** (EE ’03) co-wrote a book, titled *Biomedical Image Analysis: Tracking Synthetic Lectures on Image, Video and Multimedia Processing*, with Alan C. Bovik and Scott T. Acton, professor of electrical and computer engineering and biomedical engineering.

**Dale R. Beermann** (CS ’04) and his brother, Brian, created MyOutdoors.net, a powerful, map-based journaling site where users can post descriptions and images of their outdoor experiences. The site also employs Google Earth technology to generate maps of users’ activities.

**Ladan Pazhouhandeh** (SE ’04) received a Volunteer Excellence Recognition Award from Bpeace in recognition for her contributions to the organization and to the Afghan and Rwandan people. She resides in Washington, D.C., and is a financial analyst for XM Satellite Radio.

**Steven L. Huffman** (CS ’05) sold the business he founded with Alexis Ohanian and Aaron Swartz to Wired Digital, the Web home of *Wired*, a Conde Nast publication.
Alumni Credit U.Va. Engineering School Experience with Success in Elite U.S. Air Force Test Pilot School

Michael E. Welser (EE ’03) and Sean A. D. Celi (EE ’97) are U.S. Air Force officers stationed at Edwards Air Force Base in California at the Air Force Test Pilot School (TPS).

TPS is the world’s premiere test pilot school — the place where test pilots, flight test navigators and flight test engineers are educated in the theory and techniques necessary to test any new Air Force aircraft or system on an Air Force aircraft.

During the course of the one-year program, Welser and Celi will get the opportunity to fly up to 30 different types of aircraft — everything from American F-16s to Russian MiGs to unpowered gliders.

“The education we received at U.Va. Engineering School serves us well in the flight test world,” Welser says. “The systems that the aircraft employ — weapons, radar, communications, surveillance, tracking, etc. — are all based on electrical engineering concepts that we both first learned at U.Va.”

“The degree I earned at U.Va. made attending the Test Pilot School possible,” Celi says. “Whether it be a technical journal entry or presentation in front of a committee of some sort, knowing how to communicate effectively has been very useful.”

Following graduation, Celi will work as a flight test navigator in charge of conducting tests on any modifications made to the B-52 or other bombers like the B-1 or B-2. Welser will be a flight test engineer working on a wide variety of aircraft.

For information on the U.S. Air Force Test Pilot School, visit www.edwards.af.mil.

Creating His Own Path

SEAS alumni continue to prove that nothing is off limits. Take Dallam G. Ferneyhough (EE ’63), for example. His professional life has included titles such as engineer, English teacher for the People’s Republic of China and Anglican priest. Ferneyhough has quite the résumé, and he attributes its unique nature to the education he received at SEAS.

“The problem-solving techniques I learned at U.Va. have been invaluable in all that I have done and continue to do,” Ferneyhough says. “I have also benefited greatly from the Engineering School’s humanities curriculum components. My ability to speak and write coherently and effectively set me apart from my compatriots in all of my varied professional positions.”

Ferneyhough began his professional career developing guidance and navigation techniques for the on-board computer of the Gemini spacecraft. That started him on a 31-year career path that turned out to be quite a bit different than he expected.

“Nothing that I have done since I graduated from U.Va. has been anything like anything I anticipated, but the skills I acquired at Mr. Jefferson’s Academical Village continue to serve me well,” Ferneyhough says. “Thanks for preparing me for what has been a wonderful working life.”
In Memoriam

The University of Virginia Engineering School mourns the passing of our alumni and friends.

1930s

William B. Shippen (ME ’40) of Sykesville, Md., died in August.

Greenhow Johnston Jr. (Engr ’42) of Palm City, Fla., died in November.

Thomas Dabney Kern (CE ’49) of Charlottesville, died in December. He served in the U.S. Army Air Forces during World War II. At U.Va., he was president of his class, a member of the Honor Committee, Omicron Delta Kappa and Trigon Engineering Society. He spent his career as a civil engineer with the Illinois Central Railroad.

1940s
Steward W. O’Rear (ChE ’40) of Aiken, S.C., died in December. A member of engineering honor society Tau Beta Pi, he was a lieutenant in Naval Intelligence in Washington, D.C.

John E. Holford (EE ’52) of Fredericksburg, Va., died in January 2006.

Michael D. Slaymaker (Engr ’74) of Dayton, Ohio, died in August.

1950s
Harold G. Breeden (ChE ’50) of New Castle, Del., died in November. He served in the U.S. Army during World War II and worked for 32 years for the DuPont Company as a chemical engineer and senior process engineer. He received the William Ralston Memorial Award from the American Chemical Society for excellence in scientific writing.

Michael Condit Fox Sr. (CE ’50) of Woodbridge, Va., died in October. First working as a surveyor and engineer, he joined his family’s business, Fox Realty, in 1954, retiring as president.

Andrew Charles Holup (EE ’50) of Stanardsville, Va., died in December. He was a U.S. Navy veteran of World War II and Pearl Harbor survivor.

1960s
Thomas Marshall Fawley II (EE ’65) of Saltville, Va., died in October.

1970s
James M. Rinaca (Nuc ’73, Law ’76) of Richmond, Va., died in December. He was a partner and attorney in the regulated industries and government relations field with Hunton & Williams. At U.Va., he was a DuPont Scholar, member of both the Seven Society and the IMP Society. He was a member and former president of the Virginia Engineering Foundation.

Michael D. Slaymaker (Engr ’74) of Dayton, Ohio, died in August.

Stephen Paris Sarver (Nuc ’78) of Richmond, Va., died in November.

1980s
David C. Albrecht (CS ’79, ’83) of San Jose, Calif., died in June. He worked as a computer software developer for 25 years.

2000s
Scott Matthew Hayes (CS ’04) of Annapolis, Md., died in March 2006. At U.Va., he was a member of the U.Va. Pep Band and was its director during his fourth year. He was also a member of the Orthodox Christian Fellowship. After graduating with distinction, he worked as a software engineer for Northrop Grumman.

Faculty & Friends
Professor Emeritus George B. Matthews of Charlottesville, Va., died in February. In his long career at the Engineering School, he served as professor of aerospace engineering, department chair, assistant dean and student adviser. He also served as program coordinator and lecturer for the Continuing Education Department of Conferences and Institutes and as dean of admissions for the University of Virginia. Recognized and treasured for his service, he received the Mac C. Wade Award, the Ralph R. Teetor Award, the Z Society Award for outstanding faculty member and AIAA awards for distinguished educator and outstanding faculty adviser.

Gifts in his honor may be sent to the University of Virginia Engineering Foundation, P.O. Box 400256, Charlottesville, VA 22904-4256.

Professor Emeritus James L. Meem Jr. of Charlottesville, Va., died in May 2006. He joined the faculty in 1957 as a professor, and then chair, of the Nuclear Engineering Department. He was director of the nuclear reactor facility for 20 years, overseeing the startup of the U.Va. reactor in 1960. In 1981, he retired as professor emeritus. Prior to his work at the University, he was a chemist for the National Advisory Committee for Aeronautics, director of the bulk shielding reactor at Oak Ridge National Laboratory and director of Oak Ridge’s nuclear operation and testing. He was the author of a textbook, Two Group Reactor Theory, and a member of several professional societies.
Electricity is one of the most critical infrastructure components of our country's economy. The American Society of Civil Engineers (ASCE) gave energy the grade of “D” (down from a “D+” in 2003) in its 2005 Report Card for America’s Infrastructure, and that fact should give each of us cause for concern. Why should we be concerned? Because that “D” means that the investment in the electric grid has not kept up with demand: not enough assets have been built, and the aging fleet of equipment that is currently installed has not been upgraded to meet growth demands. The resulting shortfall in reasonably priced and reliable electricity will jeopardize the nation’s prosperity and adversely affect our quality of life.

The electric utility infrastructure has three components: generation, transmission and distribution. Generation consists of the power plants where electricity is produced. The transmission system consists of the large towers, wires and associated equipment that move the electricity from the power plants to the population centers. The distribution system consists of smaller wires and associated equipment that move power from the transmission system to the actual end user — our homes, businesses, hospitals and other consumers.

The U.S. fleet of more than 900,000 megawatts (MW) of generation is aging rapidly; many are more than 30 years old (the original design life). With an average size of 250–500 MW for new generating units, replacing 200,000 MW or existing generation systems would mean the construction of 400 to 800 new generating units. Most major transmission lines were built in association with the power plants, so they are dated as well. Both the physical components (power plants and wires) and the technological components are antiquated. The most recent significant advance for the transmission system occurred in the 1970s when 765-kilovolt lines were introduced. Likewise, the most recent significant advance for conventional large central station power plants also occurred in the 1970s. There have been advances in materials and electronics, but essentially we are powering a component critical to our society’s infrastructure — the entire spectrum of electric utility operation — with 30- to 40-year-old technology. The forces of NIMBYism (not in my back yard) — and her sisters, BANANA (build absolutely nothing anywhere near anyone), NOPE (not on planet Earth) and NIMTOO (not in my term of office) — further complicate the situation by making the construction of power plants as well as of transmission and distribution lines increasingly difficult. Yet, as the economy continues to grow, the demand for electricity nationwide continues to increase at a rate of just under 2 percent per year.

I hope that we will find our way and fix our electric utility system before the ASCE gives it an “F.” Only through significant investments in the generation and transmission systems (including conservation, energy efficiency and renewable energy) will we have enough power in our future.
Come Home to U.Va. Engineering
Reunions 2007

May 31 to June 3


Join your fellow U.Va. Engineering alumni at the following Engineering School events:

SEAS Reunion Cocktail Reception
Friday, June 1, 2007
Thornton Hall
5 p.m. to 7 p.m.

SEAS Reunion Celebration Lunch
Saturday, June 2, 2007
Darden Court, Thornton Hall
12 p.m. to 2 p.m.

See a detailed schedule of events, register and find out ‘Hoos coming at www.alumni.virginia.edu/reunions.

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