Fortune-telling
Big data at Virginia Tech

Sensors Within
Goodwin Hall knows where you are

Monument Man
Alumnus shapes D.C. sites

VIRGINIA TECH magazine

winter 2014-15

Sowing the Future

Part Two

Future Directions

by TIMOTHY D. SANDS

On Oct. 17, I had the pleasure of being formally "installed" as Virginia Tech's president. Of course, I have occupied this role since June, but the ceremony afforded me the opportunity to share some ideas about future directions.

Fortunately for us, few universities in the nation have such a balanced array of programs perfectly suited to the needs of today's world. We have strengths across the board in the science, technology, engineering, and mathematics (STEM) disciplines, accompanied by outstanding programs in in the arts, humanities, and social sciences. If Justin Morrill, the creator of 1862 Land-Grant Act, were around today, I believe he would design a school just like Virginia Tech.

This balanced approach leads to beneficial interdisciplinary collaboration. That's a mouthful of a phrase, but simply put, our program leaders work with each other to build teaching and research programs that mimic the real world. We create programs outside traditional disciplinary silos that address pressing world issues. Where else can one get a "water: resources, policy, and management" degree? Indeed, some contend that water concerns will drive geopolitics in the 21st century. In similar fashion, our large-scale research institutes traverse many departmental or disciplinary boundaries.

One important foundational strength is the Virginia Tech residential campus experience. Long a strong point, on-campus living is one that should be nurtured, not replaced. I doubt that the water in Blacksburg causes our strong alumni loyalty, but certainly the bonding you all experienced here contributes to the great retention and graduation rates, the high starting salaries, and the low loan-default rates of Hokie alumni.

I suspect that bonding is linked to the university's motto—*Ut Prosim* (That I May Serve). One quickly learns it is more than a stuffy motto; it is a way of life. This community truly defines itself by its commitment to service. I have personally heard our students speak to their reasons for coming to Virginia Tech. Normally, they highlight the reputation of academic programs, our sense of community, and our commitment to service. On what other campus today would one hear young people identify such lofty attributes?

Looking to the future—a horizon I set at 2022, the year of our 150th anniversary—we should build on existing trajectories and set new goals.

Virginia Tech must continue to move up in the ranks of U.S. research universities. Goals and metrics are important in their own right. But in this context, I see rankings as proxy for impact on society—our ability to make Ut Prosim real. We should continue our quest for top-30 status.

We live now in a world of wide horizons and international landscapes, so we should also commit ourselves to becoming recognized as a top-100 global research institution. The best talent knows no boundaries. Maintaining impactful, curiosity-driven scholarship requires the best minds on the planet.

For our students, it almost goes without saying that we should offer high-value degrees with a strong return on investment. Satisfaction surveys and rankings indicate that we do a pretty good job there. However, decades of social science research on well-being shows there is more to thriving as an adult than financial success.

The recent Gallup-Purdue Index report, which surveyed 30,000 graduates of U.S. institutions, is making feasible a focus on what truly matters to our students: Are they thriving in life and engaged in their work? And what experiences do students most strongly associate with thriving and engagement in later life?

Although we are just beginning to understand these data, early analysis clearly points to the importance of inspiring faculty, mentorship, and deep experiential learning. Thus, I believe that every Virginia Tech undergraduate should have the opportunity to participate in either an internship in a field related to his or her studies or a meaningful undergraduate research experience—or both. We have ample data to show that these opportunities open doors and raise ceilings.

JIM STROUP

Forward: At the installation ceremony on Oct. 17, 2014, President Timothy Sands outlined his vision for Virginia Tech.

Every student should have access to a personal mentor, whether that mentor is a Hokie alum, a faculty member, or a staff member. We have a tremendous opportunity here for you, our devoted alumni, to engage with our current students.

Every undergraduate who wishes to participate in study abroad should have the opportunity to do so without delaying progress toward degree goals and without financial hardship.

Every student, faculty member, and staff member at all of our campuses and facilities should have a culturally rich experience, with opportunities to live, work, and study with people whose life experiences are very different from their own. For this to happen, we must have a wide diversity of life experiences among our people. We will lead intentionally, with inclusion as a pathway to excellence.

These experiences will reinforce our parallel and intertwined efforts to structure our curricula to ensure that our graduates have both depth in their disciplines and the skills necessary to compete. Our students should also leave Virginia Tech with the entrepreneurial skills needed to turn their vision for a better world into reality.

While Virginia Tech has strategically plotted its course toward the future, the reality is that the ground underneath us is shifting again. The public-good model for funding public universities has eroded for three decades. At Virginia Tech, state support per Virginia undergraduate is only half what it was in real dollars in 2000. We must rebuild the strong support we have had and reverse this trend of declining state funding to ensure the affordability of a Virginia Tech education.

Similarly, the funding of research is increasingly unreliable in the current climate of state and federal government. If the funding model does not change, we will be relying to a greater degree on limited gifts and foundation funds to propel our research in partnership with government and corporate sponsors.

The demographics of our future students from Virginia, the U.S., and around the world are shifting markedly, becoming more diverse in every dimension. We need to be ready. We need to anticipate. We need to be intentional and proactive in taking advantage of this diversity.

In short, we cannot rely on the government for funding. We must focus on resource-building. I am challenging the university community to at least double our current $800 million endowment.

This is Virginia Tech's century. I am humbled to have been chosen to serve as your president at this extraordinary time. And I look forward to working with you on our journey together as we continue to build upon the spirit of *Ut Prosim*.

The full story:

The full transcript of President Sands' speech, excerpted here, can be found at www.president.vt.edu, along with videos and photo galleries of the ceremony and other events during the three-day celebration. Also, visit www.president.vt.edu/installation/ for additional stories.

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The Sensors Within: Goodwin Hall knows where you are

Virginia Tech's new engineering building, Goodwin Hall, is rigged with more than 240 highly sensitive accelerometers that can detect the movement of people within its walls, earthquakes, and cannon fire from Lane Stadium. As intriguing as the sensors are now, the future of the project holds incredible promise.

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Fortune-telling and other uses of big data at Virginia Tech

From the Discovery Analytics Center predicting events in Latin America and the Middle East to the Virginia Bioinformatics Institute modeling the response to a nuclear detonation in the nation's capital, Virginia Tech leads the way in the big data movement.

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Sowing the Future

In the second of a two-part series, the university's international efforts to meet rising demand for food and water are examined. Across the globe, Virginia Tech is building capacity in developing nations, helping farmers boost soil productivity and crop yields, developing more resilient crops, overhauling curriculum, and researching ways to use more of the world's water.

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MICHAEL KIERNAN

On the cover: Sekouna Diatta, a master's degree student in the Department of Crop and Soil Environmental Sciences, holds rice, an integral part of the Senegalese diet. Diatta is one of more than a dozen Senegalese students at Virginia Tech. To read more, see page 22. Photo by Logan Wallace.

At right: When President Timothy Sands was formally installed in October 2014, he exchanged the academic regalia from his alma mater, the University of California, Berkeley, for new Virginia Tech regalia (at top). Other installation activities, meanwhile, were less formal. Photos by Logan Wallace.

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letters to the editor

Have something to say? Send us a letter at **vtmag@vt.edu.**

Food, water, and population growth

Developing new technologies and methodologies to help feed a growing human population is a noble and worthwhile cause. However, as any biologist, including this one, will tell you, providing a seemingly endless supply of food only serves to increase any species' population, perpetuating a spiraling problem.

The largest part of the solution should be to slow down and reduce the world population. The Earth's ecological carrying capacity has been exceeded. It's time for us to recognize that a finite planet cannot support, feed, and provide clean water for an infinite number of people.

Smaller families (two or fewer children), having children later in life, and education all play major roles in achieving this ecological balance. It should be a personal, conscious choice, not one forced upon us by governments or other entities.

Not yet, anyway.

Do we truly need two, three, or four billion more people?

Craig and Mary Strautin (communication '78) Morrisville, North Carolina

First touchdown in Lane Stadium

[In a fall edition letter to the editor], Bill Bodie '58 indicates having a "distinct" memory of Virginia Tech's first varsity touchdown in Lane Stadium. Based on numerous records of the game and personal experiences, we beg to differ. (He might be confusing the '65 game with the '78 William & Mary game in which Tech's Ron Zollicoffer made a game-winning reception at the goal line with no time left.)

As Virginia Tech players in that W&M game in 1965, we were down 7-0 in the fourth quarter when Tech kicked a field goal of 34 yards with 4:31 remaining. Our onside kick was recovered by W&M, but our defense forced them to punt. Tech then had the ball on the 20-yard line with 2:33 left, trailing 3-7. In an eight-play drive lasting 1:56, Tech scored the winning touchdown with quarterback Bobby Owens running into the end zone on a 13-yard option sweep. Instead of the robbery Bodie remembered, Virginia Tech showed what 110 percent for four quarters could do.

The first Lane Stadium teammates in 1965: Mike Saunders (civil engineering '67, M.S. '69), Atlanta; Ken Barefoot (health and physical education '68), Virginia Beach, Virginia; Bill Edwards (civil engineering '67, M.S. '68), Atlanta; Gene Fisher (civil engineering '69), Winchester, Virginia; Jim Richards (civil engineering '69, M.S. sanitary engineering '73), Virginia Beach, Virginia; and Tom Stafford (business administration '68), Christiansburg, Virginia; in remembrance of our late teammate, Bobby Owens (civil engineering '66).

East Carolina fans greeted warmly

I wanted to let you know how much my husband, friends, and I enjoyed our trip to Virginia Tech [in September]. Tech fans greeted us with a warm welcome and handshake prior to the game and even sincere congratulations after the game. Folks were very cordial and respectful, even though we were "the enemy," and we appreciate that. Wally Nelson and his large

tailgate crew absorbed us into their party and even played "Purple Haze" and "Purple Rain" for us. We don't get that everywhere we go, that's for sure!

I've been to ECU football games at various venues in 11 states, and I have never been treated better by the opposing team's fans than I have in Blacksburg. In fact, my husband and I have been to Blacksburg before and experienced the congeniality of your fans, so I know this is not an anomaly. You people at Virginia Tech do it right and set the standard for how it should be done on every campus on every game day!

Donna Raynor
Ayden, North Carolina

Economic engagement

I want to compliment Dr. Sands on his very insightful and encouraging message, "Unleashing the Innovation Ecosystem," in the recent Virginia Tech Magazine. Having recently retired from the General Electric Co.'s major appliance division, I appreciate very much his views about engaging in commercialization and entrepreneurship at the university level. Dr. Sands' vision for Virginia Tech's role in promoting sound cooperation between academia and industry is very exciting, and I applaud this approach as he leads our university.

John Nininger (electrical engineering '63)
Louisville, Kentucky

Orange ink

There is probably some valuable information in the recent magazine from Tech, but the poor, weak orange-on-white and white-on-orange print makes it very hard to read. Try plain old black and white. Many of us old-timers have weakening eyes and need all the help we can get.

Ralph Griffith (business administration '56)
West Chester, Ohio

I, like most Americans who suffer from macular degeneration and similar eye diseases, have trouble reading Virginia Tech Magazine. I cannot read the orange print, so some of the content is lost and makes for difficult reading. Is it possible for your team to use a dark maroon color or other color scheme in your captions and content in future publications?

Mark Tokay (marketing management '84)
Swannanoa, North Carolina

Editor's note: Thank you for sharing your concerns. We're working on a solution for the spring edition.

Corrections from the fall edition

A Class Notes entry misstated Wolfgang F. Preiser's (M.Arch. '69) role with "Enhancing Building Performance"; he was co-editor.

A Book Notes entry on Jim Mize's (forestry '75, M.S. agricultural economics '77) book on fishing humor, "A Creek Trickles Through It," misspelled his last name.

In the story on the Duck Pond, the reference to the book "Remarkable Trees of Virginia" should have included Professor Emeritus Jeff Kirwan's contributions as one of the authors.

The Garnes-Waddle wedding photo on page 56 should have been credited to Laura's Focus Photography.

Transportation institute awarded federal contracts

This spring, the Virginia Tech Transportation Institute captured two federal contracts from the Federal Motor Carrier Safety Administration and the National Highway Traffic Safety Administration worth a combined potential $55 million. Collectively the largest of their kind awarded to the institute in its 25-year history, both contracts aim to mitigate fatalities and injuries on our nation's roads.

For the Federal Motor Carrier Safety Administration, Richard Hanowski, director of the institute's Center for Truck and Bus Safety, will oversee new research into commercial truck driver performance, such as fatigue and distraction, and other characteristics that influence driver behavior, such as vehicle handling and braking. Expected to span several years, this research will incorporate the use of a naturalistic driving video-capture technique that places multiple cameras inside and outside a vehicle to record the driver as he or she interacts with the vehicle and the road.

Myra Blanco, who heads the institute's new Center for Automated Vehicle Systems, will oversee the contract from the National Highway Traffic Safety Administration. Breaking new ground in the burgeoning field of automated vehicles, the research will focus on automated-vehicle technology, including safety protocols, that is expected to flood the automotive market in the next decade and beyond. Blanco will study vehicle electronic systems, seek reinforcements to block potential hacking of vehicles, and identify potential safety issues, including fail-safe systems.

COURTESY OF STANDUPPLANET.ORG

"Stand Up Planet" stands out
Variously described as a documentary TV show, transmedia series, and digital campaign, "Stand Up Planet"—shown on campus in early September 2014—brings social issues into focus by storytelling and stand-up comedy. In the series, American comic and host Hasan Minhaj (center, with South African comedian Mpho Popps at left and Indian comedian Aditi Mittal) searches out comics whose stand-up routines help raise awareness of hardships worldwide.

Because comedy has proven to be an effective vehicle for reaching millennials—the generation born between the early 1980s and early 2000s—who may be desensitized to the onslaught of messages in the media, the project's approach is "a creative new way to tell the story about global poverty," said Caty Borum Chattoo (communication '96), the project's transmedia executive producer.

Chattoo, professor of public communication and executive in residence in American University's School of Communication, visited Virginia Tech for a screening and Q&A in the Moss Arts Center. Find a full account of the evening, along with the film's trailer, at www.vtmag.vt.edu.

Richard Hanowski

Myra Blanco

Robert Walters

Vice president for research to retire

Virginia Tech Vice President for Research Robert W. Walters will retire Sept. 1.

During Walters' eight years in the role, Virginia Tech has remained the commonwealth's only institution in the top 50 of the National Science Foundation (NSF) research expenditure rankings, reaching No. 40 in the most current national standings. In addition, NSF-reported research expenditures at the university grew by approximately $175 million—from $321.7 million in 2006 to $496.2 million in 2013.

From 1985 to 1997, Walters was a faculty member in the College of Engineering's Department of Aerospace and Ocean Engineering. In 1988, he founded AeroSoft Inc., which specializes in computational fluid dynamics software development and applications to develop solutions for the aerospace and defense industries. After selling the company to employees a decade later, Walters continued with the aerospace and ocean engineering department and was named its chair in 2002.

"Dr. Walters' leadership further established Virginia Tech as the Commonwealth of Virginia's leading driver of innovation and invention," said President Timothy Sands. "He brought a singular understanding of federal agencies, industry, and entrepreneurship to the position and built a strong platform for growth of Department of Defense-sponsored research. Because of his efforts, Virginia Tech is positioned to continue its progress to become an elite research university."

Engineering a new archive

When W. Cully Hession (agricultural engineering '84, M.S. '88), professor in the Department of Biological Systems Engineering, chanced upon thousands of photographs and documents deep within Seitz Hall—some dating back to 1915—he knew he'd found the mother lode of Virginia Tech's agricultural engineering history.

The materials—since compiled in a digital collection titled "Project No. 10," the name of the entity that originally funded Tech's agricultural engineering department, today's Department of Biological Systems Engineering—have already proven valuable to researchers and historians alike, Hession said.

Learn more about the collection—available in Discovery Commons, the university's online research repository—at www.vtmag.vt.edu.

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Female cadets stand in formation in front of Lane Hall.

Firsts in Virginia Tech history: Coed residence halls

Virginia Tech's groundbreaking 1973 decision to admit women into the Corps of Cadets not only predated the U.S. service academies by a year, but also led to another first for the university in 1981—a first that can also be considered a "last."

Living in a separate residence hall from the males, female cadets in corps leadership roles found it increasingly difficult to fulfill their supervisory responsibilities. In response, the Board of Visitors backed off its hard-line policy of separating the sexes and allowed Brodie Hall to house both men and women.

Tech, however, was well behind the curve in this area. Said then-Vice President for Student Affairs James Dean, "We are the last university in the state and perhaps the last in the East that doesn't have some form of coeducational living."

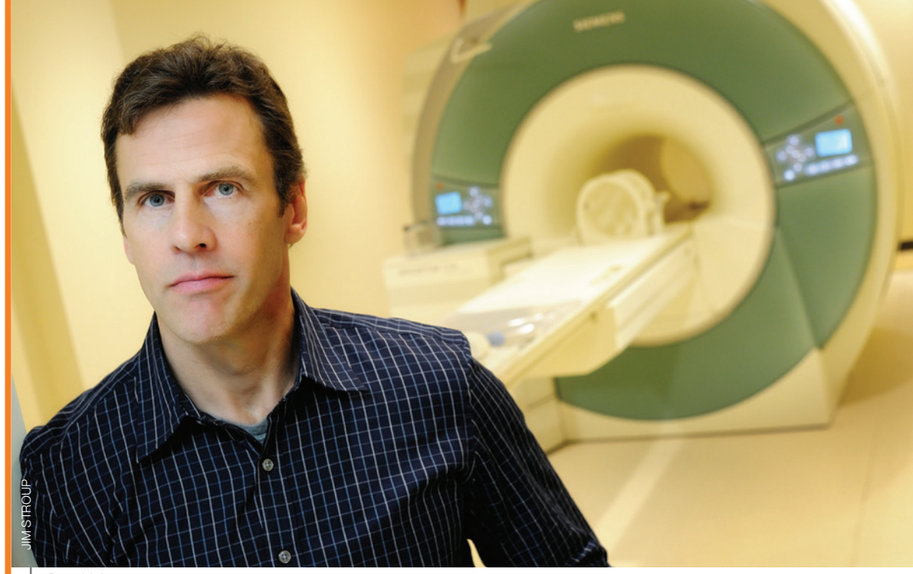
But the die had been cast, and the commingling of genders soon spread to the civilian student body. In fall 1983, East Ambler Johnston became Virginia Tech's first non-cadet residence hall to go coed.

Researchers discover potential markers for breast cancer

With one in eight women likely to develop breast cancer in their lifetimes, finding better predictive markers remains critical. In a study published in Breast Cancer Research and Treatment, Virginia Tech researchers in the Medical Informatics and Systems Division at the Virginia Bioinformatics Institute pinpoint diagnostic markers that may aid clinicians in better forecasting and preventing the disease.

Using breast cancer germline (blood) samples from The Cancer Genome Atlas Project and comparing them with samples from cancer-free individuals whose genomes are found in the 1000 Genomes Project, the research team identified several novel markers that not only may reveal risks for breast cancer, but also may yield therapeutic benefits.

"There is still a lot we can learn from looking at the human genome and how it can be affected in ways that may be associated with disease," said Natalie Fonville, a geneticist on the research team. "This study is the first of many in which we are engaged that identify subtle genomic changes that together may add up to cancer risk."



JIM STROUP

Read Montague

In stock market game, brain patterns of high earners predict bubbles and crashes

In a study published in July in the Proceedings of the National Academy of Sciences, scientists at the Virginia Tech Carilion Research Institute and the California Institute of Technology discovered that when they simulated market conditions for groups of investors, economic bubbles invariably formed. More remarkably, a correlation between specific brain activity patterns and sensitivity to those bubbles was found.

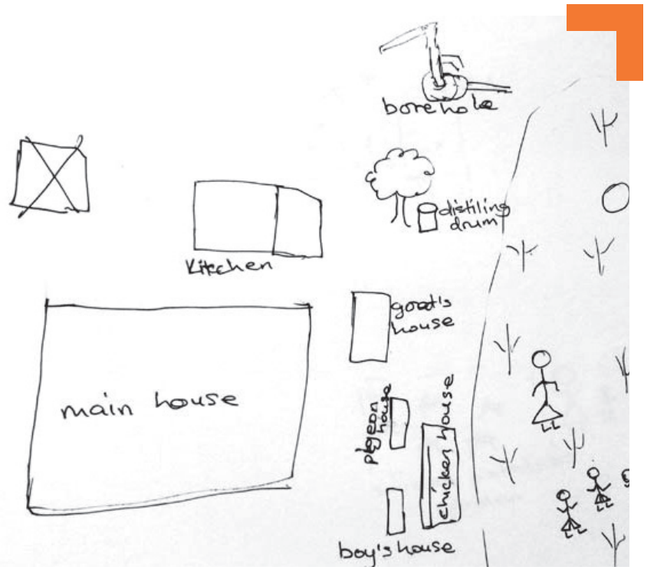
"Stock market bubbles form when people collectively overvalue something, creating what economist Alan Greenspan once famously called 'irrational exuberance,'" said Read Montague, director of the Human Neuroimaging Laboratory at the research institute and one of the study's senior authors. "Our experiments showed how the collective behavior of market participants created price bubbles, suggesting that neural activity might offer biomarkers for the evolution of such bubbles."

Montague and colleagues enrolled 320 subjects in a market-trading simulation game. Up to two dozen participants played in each of 16 market sessions, with two or three participants simultaneously having their brains scanned using functional magnetic resonance imaging, or fMRI, a noninvasive technique that allows scientists to use microscopic blood-flow measurements as a proxy for brain activity.

At some point during the 50 trading periods of each session, a price bubble would invariably form and crash. Although the scientists had suspected that crowd cognition would result in some bubble formation, they had not expected it to happen every time. Surprising the scientists even more were the distinctive brain activity patterns that emerged among the low earners and high earners.

The model may also shed light on other contexts in which groups or individuals overvalue something, Montague said. "This neurobehavioral metric could be used to help quantify situations in which people place excessive value on poor choices, such as drug addiction, compulsive gambling, or overeating," he said.

Montague, who uses computational models to understand neuropsychiatric conditions, noted that the study could not have been conducted without two relatively new additions to the neuroscientist's toolbox: fMRI and hyperscanning, a cloud-based platform that enables multiple subjects in different brain scanners to interact in real time—whether across rooms or across continents—and allows scientists to study live human interactions. Montague likens the technique, which he and his team developed just over a decade ago, to being able to eavesdrop on an entire cocktail party conversation, rather than the monologue fMRI enables.



"Can you draw me a map?"

A gender research associate in the Office of International Research, Education, and Development, Mary Harman Parks (M.S. geography '13) was trained to make maps—by hand.

In her fieldwork, Parks has approached some 100 international farmers—many of whom had never held a marker before—and asked them to draw maps. "In international development," Parks explains, "mapmaking can be a great way to learn about local people, their environment, and their way of doing things. Some people refer to these maps as mental maps or community maps, but most people in this field refer to them as participatory maps."

The maps, which depict the farmers' everyday lives, show crops, animals, homes and buildings, machinery, and even other people. A map of a woman's work environment in Uganda includes a kitchen, a chicken house, a bore hole, and the distilling drum, where beer is made, tucked under a tree.

To see examples of the participatory maps and to learn more about Parks' research, go to www.vtmag.vt.edu. Image courtesy of Mary Harman Parks.

Healing wounds twice as fast

While examining how electricity moves through cardiac muscle, Robert Gourdie's research team developed a peptide that, as expected, enhanced the flow. Because other research had discovered similar proteins that supported healing, the scientists then scratched a single layer of skin cells lying on a Petri dish, applied their peptide, and waited. The cells began mending.

"We had this fundamental question: How does electricity flow through the heart? We had no idea the answer would lead to a treatment for healing skin wounds," said Gourdie, director of the newly expanded Center for Heart and Regenerative Medicine Research at the Virginia Tech Carilion Research Institute.

While early clinical trials using the peptide on diabetic foot ulcers have been promising, with the potential for wounds to heal in half the time, the treatment must progress through additional trials before it can be made available for wider use.

Nicole Abaid

Engineer among Popular Science's 2014 Brilliant 10

Nicole Abaid, an assistant professor with the Department of Biomedical Engineering and Mechanics in the College of Engineering, was named one of Popular Science magazine's 2014 Brilliant 10 in its October issue. At Virginia Tech since 2012, Abaid studies how animals—most prominently bats—swarm, research that aims to improve the control of multi-agent systems, such as underwater robotic vehicle teams that rely on sonar.

The ability of bats to fly in a swarm without the danger of collision is seen as key to building underwater vehicles and other robotics systems that operate similarly. Abaid is working on an algorithm of this behavior, with plans to build a team of robotic ground vehicles that can mimic the ultrasound of a bat swarm and avoid both collisions and jamming.

Abaid is the fourth Tech faculty member to receive the Brilliant 10 designation from Popular Science since 2008.

Virginia Tech Daily

Want your Hokie news more often? Visit www.vtnews.vt.edu, where you can sign up for the Virginia Tech Daily email.

Tooth buried in bone indicates prehistoric interactions

The tooth of a phytosaur, a reptile, lodged about two inches deep in the thigh bone of a rauisuchid, a land-bound carnivore, has led researchers to question the long-held belief that these two dominant predators didn't interact some 210 million years ago.

In a paper published online in September 2014 in the German journal Naturwissenschaften, Stephanie Drumheller of the University of Tennessee and Michelle Stocker and Sterling Nesbitt, vertebrate paleontologists with Virginia Tech's Department of Geosciences, presented evidence that the two creatures not only interacted, but did so on purpose.

The researchers discovered the bone by chance at the University of California Museum of Paleontology in Berkeley. "Finding teeth embedded directly in fossil bone is very, very rare," Drumheller said. "This is the first time it's been identified among phytosaurs, and it gives us a smoking gun for interpreting this set of bite marks."

Added Stocker: "This research will call for us to go back and look at some of the assumptions we've had in regard to the Late Triassic ecosystems. … Aquatic and terrestrial distinctions were oversimplified, and I think we've made a case that the two spheres were intimately connected."

Pictured below are teeth from phytosaurs, a reptile from the Triassic Period about 210 million years ago in what is now the western United States. The blue tooth on the left is a 3-D printed replica of a tooth embedded in the thigh bone of a rauisuchid, another Triassic Period carnivore. The details of the tooth were digitally extracted using CT scans. Photo courtesy of the Department of Geosciences, College of Science.

Because we're happy

The Town of Blacksburg was ranked fourth on the "10 Happiest Small Places in America" list compiled by the national real estate blog Movoto.com. The rankings are based on seven criteria: stress factors (unemployment, commutes, and cost of living); personal safety (violent crimes per 100,000 people); percent of residents making greater than $25,000 annually; percent of married residents; home ownership; percent of residents with a bachelor's degree or higher; and walkability.

To those in the know, Blacksburg's quality of life is seldom far from praise—a happy circumstance that boosts Virginia Tech's ability to recruit and retain high-caliber faculty and staff.

Not only was Blacksburg ranked the "Best Place in the U.S. to Raise Kids" on a 2012 list in Bloomberg's Businessweek, Forbes.com named the Blacksburg-Christiansburg-Radford Metropolitan Statistical Area one of the best small areas to find employment, based on statistical data from the Bureau of Labor Statistics.

And to nary a Hokie's surprise, in 2011, Southern Living included Blacksburg among the "Best College Towns in the South."

In similar fashion, Virginia Tech's efforts to ensure the well-being of both town and gown continue to attract their own accolades.

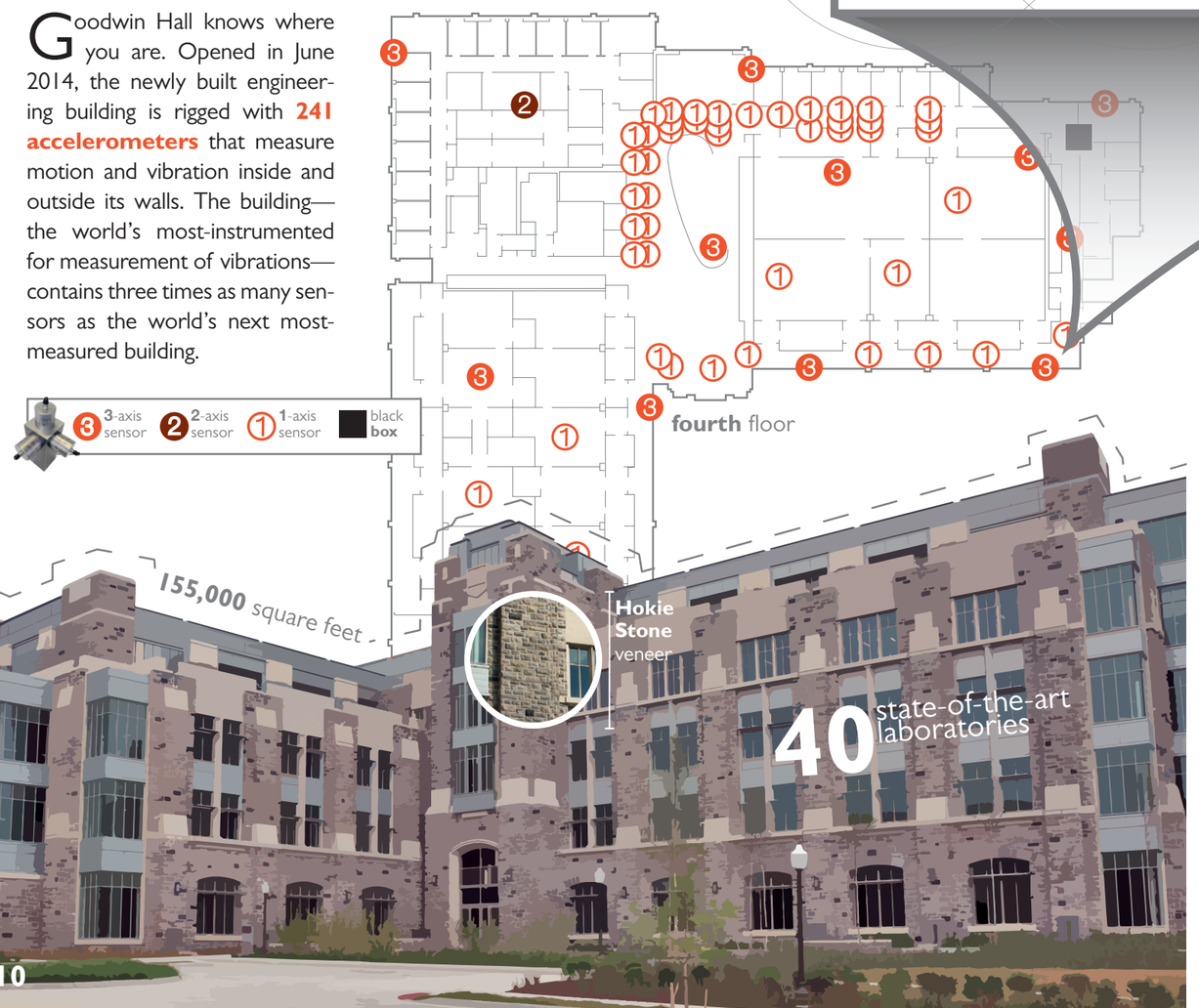
For the fifth consecutive year, the university received a gold award for its commuter program from Best Workplaces for Commuters, which encourages sustainable transportation. Last year, Virginia Tech landed the No. 1 spot on The Active Times' list of the "50 Fittest Colleges in America." And the year prior, the university and the area's economic opportunities were cited as major reasons for Blacksburg's top position on the "Top 10 Cities to Raise a Family" list on www.homes.com, a popular real estate site.

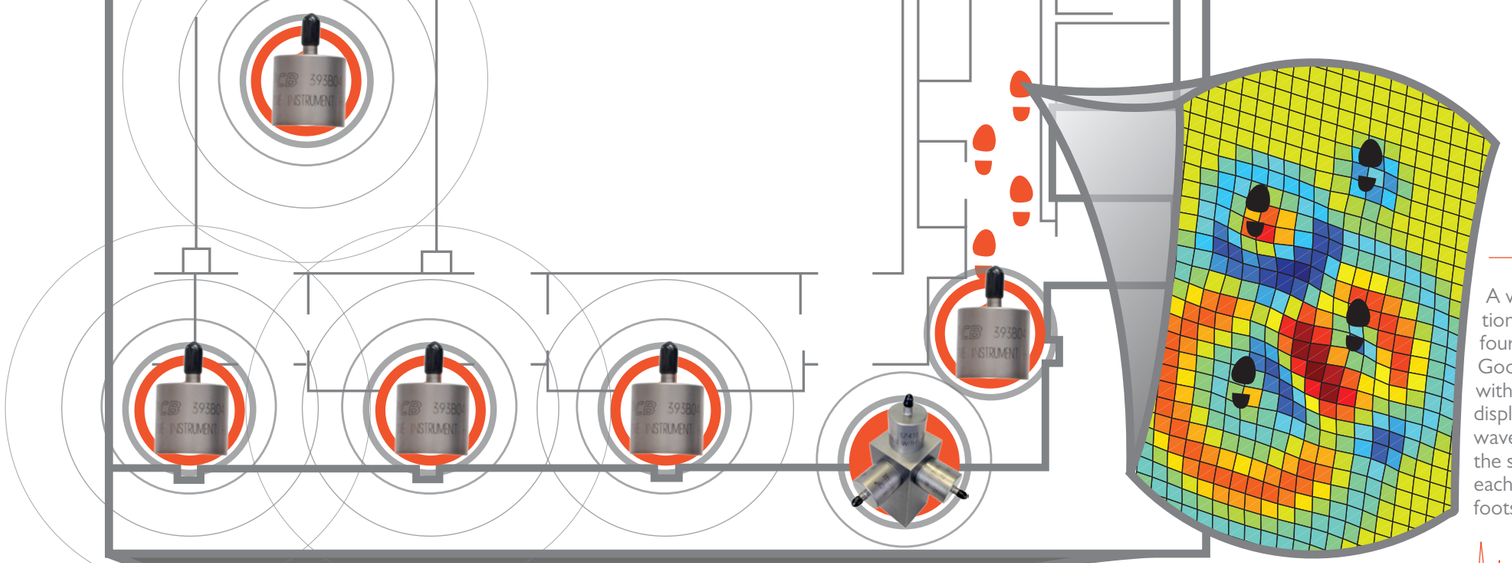
Hokies also endeavor to keep their neck of the woods as pretty as the town's. Virginia Tech's dedication to campus forestry management and environmental stewardship has earned the university recognition as a Tree Campus USA from the Arbor Day Foundation for the past three years.

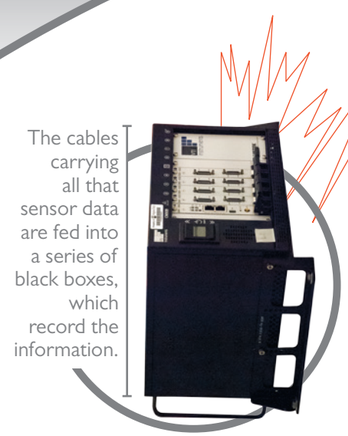
The Sensors Within

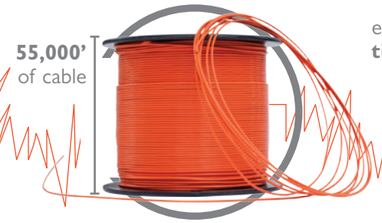
by MASON ADAMS

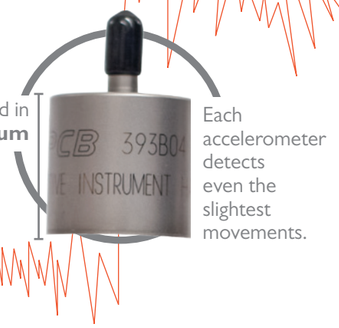
Goodwin Hall knows where you are. Opened in June 2014, the newly built engineering building is rigged with **241 accelerometers** that measure motion and vibration inside and outside its walls. The building—the world's most-instrumented for measurement of vibrations—contains three times as many sensors as the world's next most-measured building.











Vibrations large and small—from earthquakes to footsteps—are catalogued by sensors.

The accelerometers are placed throughout the building and synchronized. Because each sensor records information in only a single direction, they're frequently used in combination with one another. That's especially the case at the building's corners, where trios of sensors are mounted in triaxial formations to cover a range of motion and essentially produce a 3-D picture of what's happening.

Pablo Tarazaga and Mary Kasarda, the professors in the Department of Mechanical Engineering who proposed and implemented the sensors, are still working on the early stages of what will become a multi-decade project. They're helping develop a baseline of building movement, which will be useful as a filter for future experiments and data projects.

Eventually, the data could be used to "program" the building for more efficiency. If the building senses that every person within its walls has gathered on a particular floor in winter, it may consequently heat that floor while reducing the temperature elsewhere, saving on energy costs. If there's a fire, the building may be able to transmit information to firefighters arriving on the scene. Long-term, the building will tell maintenance crews where it needs work.

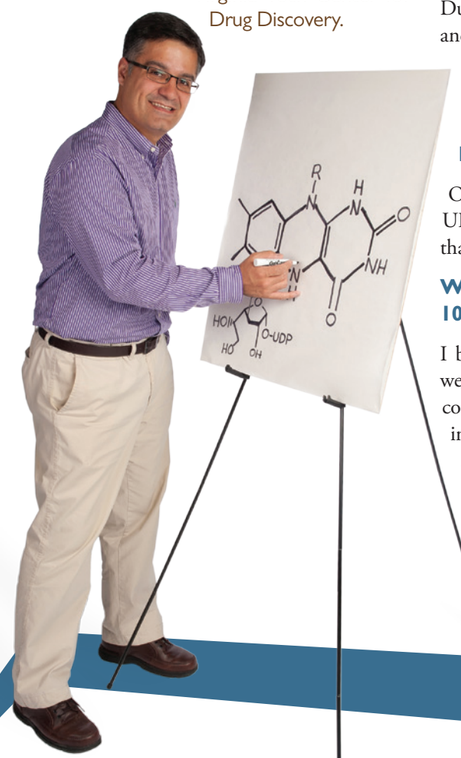
The accelerometers mounted throughout the building will eventually be complemented by additional sensors that measure information such as temperature and light.

Watching:
For a photo gallery and video on the sensors, visit www.vtmag.vt.edu.

Pablo Sobrado
Atomic Design

by AMY LOEFFLER
photo by CHELSEY ALLDER

Pablo Sobrado, an associate professor of biochemistry in the College of Agriculture and Life Sciences, studies human pathogens that cause a variety of diseases, including Chagas disease, tuberculosis, and various fungal infections. Because these diseases are estimated to affect millions in tropical regions, Sobrado is working to develop cost-effective drugs to improve the health and well-being of citizens in some of the neediest corners of the globe. For his work, Sobrado was awarded the National Technology Prize from the Costa Rican government, the country's highest scientific honor. He is a founding member of the Drug Discovery Consortium for Chagas Disease and the Virginia Tech Center for Drug Discovery.



What drew you into this field?

I have always been a curious person, which is a common or perhaps a required characteristic of scientists. In high school, I was amazed by how well the chemical mechanism of some enzymes was understood. I was interested in learning how scientists were able to understand how enzymes function. The results from enzyme/drug discovery research have the possibility of improving the quality of life for many people around the world.

What excites you most about molecular science and drug development?

That has to be the journey from knowing very little about enzymes and how they function to understanding how they work at the atomic level. Our results have led to breakthroughs in the identification of enzyme inhibitors, which are molecules that block the activity of the enzyme.

You study Chagas disease, a vector-borne illness that once was closely associated with Bolivia and rural Latin America, but has recently made its way to Virginia. Does the spread of the disease bring more urgency to your research?

Due to the migration of millions of people from endemic areas in Mexico and Central and South America, it is estimated that more than 200,000 people infected with the T. cruzi parasite—the parasite that causes Chagas disease—live in the United States, including Virginia. New cases are also expected from transfusions of blood containing the parasite. Therefore, finding a cure is urgently needed.

Beyond the Petri dish, how is your research applied to other areas?

Our work has revealed the structure and mechanism-of-action of an enzyme called UDP-galactopyranose mutase, or UGM. Simply put, the enzyme provides the "blueprint" that can be used to accelerate the development of new drugs.

What advances do you foresee in molecular research in the next five to 10 years?

I believe that the major advance will come from computational biology. With this, we will be able to design from scratch an enzyme with a desired function. Similarly, computational biology will accurately predict the potential role of a compound as an inhibitor or as a substrate for a particular enzyme.

What do you foresee as the most challenging obstacle in enzyme and drug discovery research?

The major obstacle is development of drug resistance. As we embark into a drug discovery program, we need to be aware of selecting drug targets that have low potential for developing drug resistance.

Amy Loeffler is a science writer in the College of Agriculture and Life Sciences.

Wu Feng
Computer Dreamer

by STEVEN MACKAY
photo by LOGAN WALLACE

Wu Feng is a professor and the Elizabeth and James Turner Fellow in the Department of Computer Science, as well as a professor with the Bradley Department of Electrical and Computer Engineering. His research focuses on the intersection of computer architecture, systems software and tools, middleware, and applications. Best known for his research in energy-efficient parallel computing, Feng was named a 2014 Outstanding Faculty Award winner by the State Council of Higher Education for Virginia.

What first drew you to computers?

My father purchased a Radio Shack Color TRS-80 in 1978, when I was 12 years old. I spent the summer immersed in learning how to make the computer do what I wanted it to do. I combed through two computer manuals and taught myself a new "foreign" language called BASIC. I tackled a wide range of prescribed problems from the manuals, ranging from the pragmatic—creating a bank account simulation with deposits, withdrawals, and balance queries—to the more frivolous: playing a tic-tac-toe game. While each problem required different logical reasoning and thinking, tic-tac-toe afforded me the most intellectually stimulating challenge, as I had to create an automated computer player that could consistently win a game of tic-tac-toe against a human. I finished the summer of 1978 with a simultaneous sense of empowerment and bewilderment.

A major focal point of your research is "green computing." What comprises your ideal supercomputer?

If I was to go on a holy grail quest for the ideal supercomputer—which will likely not exist in my lifetime—it would be a supercomputer with zero carbon footprint, one that generates its own power and does not require extravagant power and cooling facilities.

You named one of your first self-built computer nodes Green Destiny, after a sword from the film "Crouching Tiger, Hidden Dragon." Where else do you find inspiration?

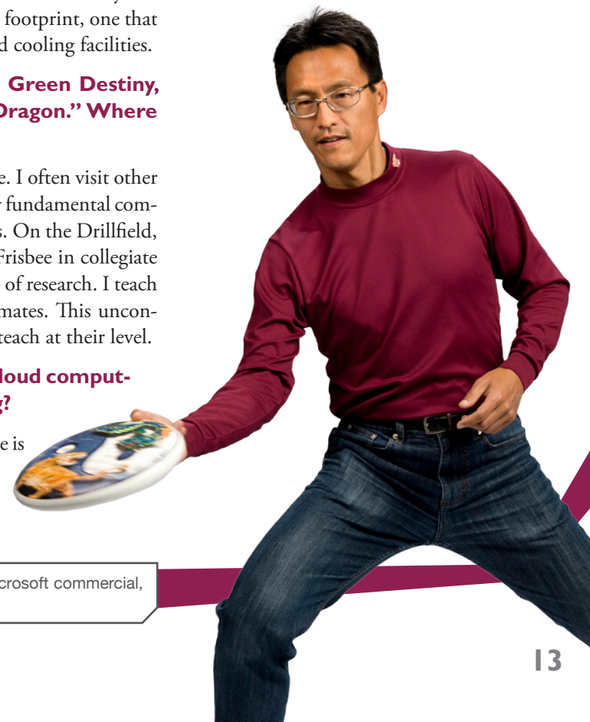
Much of my inspiration and ideas come when I am outside the office. I often visit other academic environments on campus, which helps me understand how fundamental computer science concepts may be recast and applied in other disciplines. On the Drillfield, I throw a Frisbee or football with lab members and play Ultimate Frisbee in collegiate leagues, which relaxes my mind to be more receptive to new avenues of research. I teach STEM and computing to my children and their friends and classmates. This unconsciously forces me to think about new and more accessible ways to teach at their level.

Microsoft recently filmed a commercial with you about cloud computing. For the uninitiated, what exactly is cloud computing?

Folks should view cloud computing much as they view electricity. One is a computing utility, while the other is an electrical utility. We do not think twice about turning on a light switch and drawing electricity from an electrical substation. Cloud computing is effectively drawing computing from a data center. Why the interest in our research on data-intensive biocomputing or, more generally, "big data" problems in the cloud? We are escalating the application and use of this computing utility that we call the cloud to solve significant scientific problems on a large scale. We are conducting the research necessary to create biocomputing tools, applications, and environments for the cloud. This involves not only orchestrating and coordinating computer resources, but also memory, storage, and network resources in the cloud.

Steven Mackay is the College of Engineering communications manager.

Editor's note: For more on the university's big data efforts, see the story on page 16.



On the move:

To see Feng's 2013 TEDxVirginiaTech speech and photos from the Microsoft commercial, visit www.vtmag.vt.edu.

The Science of Virginia

Inaugural science festival captivates thousands

by MASON ADAMS
photos by LOGAN WALLACE

Downtown Roanoke's pedestrian bridge over Norfolk Southern's railroad tracks loomed in the background as Joe Wartenby talked about the Virginia Tech Steel Bridge Design Team's work on a smaller structure.

Families attending the Virginia Science Festival in Roanoke,Virginia, watched and explored the team's bridge as Wartenby, a senior majoring in civil engineering, described the American Society of Civil Engineers' bridge competition: how the bridge must fit into a small box with no pieces sticking out, how the team has a limited time for setup, and how the structure is tested and points are awarded.

Nearby, other Virginia Tech student teams showcased an off-road Baja vehicle, a human-powered submarine, and a formula-style racecar. And that was just a small fraction of what was available to see on the closing day of the inaugural Virginia Science Festival.

"That's a big part of what the science festival is about: taking what people are doing and bringing it to a space where kids can enjoy it, the general public can enjoy it," said Phyllis Newbill, studio associate for outreach and engagement at Virginia Tech's Institute for Creativity, Arts, and Technology (ICAT).

With events across Virginia, the festival played out Oct. 4-11, bookended by jam-packed Saturdays in Blacksburg and in downtown Roanoke. From the coalfields to the coast, from Northern Virginia to Southside, a total of 16 sites hosted events that ranged across the scientific spectrum, with a particular focus on STEM (science, technology, engineering, and mathematics) education.

The festival originated when Science Museum of Western Virginia officials brainstormed ways to bring their educational mission into the community while College of Science Dean Lay Nam Chang and Communications Director Rosaire Bushey sought ways to mark the college's 10th anniversary. Based on Bushey's proposal for a science fair, the college and the museum joined forces. Provost Mark McNamee and his staff, particularly Susan Short, associate vice president for engagement, worked with Jim Rollings and Michael Hemphill, respectively the museum's executive director and director of marketing and development, to further develop the idea and then secure a $10,000 grant from the Science Festival Alliance.

The idea picked up steam quickly and blossomed into a statewide event once U.S. Sen. Mark Warner got wind of it. Warner and fellow U.S. Sen. Tim Kaine agreed to serve as co-chairs of the festival, and sites around Virginia began to develop programming.

"To see [the festival] go from local to statewide the first year out of the box is a real source of pride for me," said Rollings.

Virginia Tech's Continuing and Professional Education, School of Education, and ICAT worked together to spearhead the university's contributions to the festival. "A big piece of the ICAT mission is educational innovation—finding ways to think about K-12 education and to think about more informal education," Newbill said. "The science festival comes as part of that mission."

Scheduled during Fall Family Weekend, the campus festival day included more than 100 exhibits and speakers, showcasing Virginia Tech's world-class faculty, students, and programs.

"What a great opportunity for family members to learn about what kinds of thought leaders are at Virginia Tech," said Short.

Various branches of the U.S. Armed Forces brought pieces of heavy equipment that proved to be kid magnets. NASA Langley Research Center and WDBJ7's Weather Fest, which were major attractions, appeared at both the Blacksburg and the Roanoke events. Likewise, the Tuxedo Pandas, a group of STEM-focused 7th- through 10th-graders in Montgomery County, drew attention with their robots, panda hats, and tuxedo T-shirts.

In Southwest Virginia, the Bristol Motor Speedway hosted more than 40 teachers for a workshop about engaging students in science through stock cars, with discussions on vehicle safety, engineering, helmet research, and racing physics.

Closer to the coast, the Virginia Institute of Marine Sciences in Gloucester Point, Virginia, staged several events during the week of the festival, including a moonlight beach walk and undersea crafts.

In Richmond, Virginia, scientists helped students steer digital mice through a maze to put a ball in a hoop—an exhibit known as rat basketball.

About 5,000 people attended the Blacksburg festival day, another 5,000 attended the Roanoke events, and an additional 5,000 people came to campus for Hokie BugFest on the Roanoke festival day.

Showcase: The inaugural Virginia Science Festival drew about 15,000 people to events in Blacksburg and Roanoke.

Bugs and more:
For a photo gallery and a video on the festivities, visit www.vtmag.vt.edu.

Fortune-telling

and other uses of big data at Virginia Tech

by MADELEINE GORDON and MASON ADAMS

So long, crystal balls.

Through the use of big data, Naren Ramakrishnan and his team from the computer science department's Discovery Analytics Center (DAC) may make forecasting the future as commonplace as forecasting the weather.

*The term "**big data**" refers to the use of algorithms and other tools to train computers to spot trends in collections of information that are too massive and complex to analyze with traditional methods. The proliferation of data has accelerated with the integration of computers into our daily lives, from social media on our phones to tracking buying habits at the grocery store.*

Virginia Tech's efforts stand at the forefront of the big data movement, with labs and professors across the commonwealth conducting increasingly data-driven research as the university looks to build additional capacity for future initiatives. Maintaining a strong presence in Blacksburg as well as in the National Capital Region allows for significant collaborations in the domains of intelligence analysis, national security, and health informatics.

"To Virginia Tech's researchers, big data represents an important opportunity to create knowledge and provide insight by leveraging large, potentially unstructured data sets," said Scott Midkiff, the university's vice president for information technology and chief information officer and a professor in the Bradley Department of Electrical and Computer Engineering.

Projects like DAC's EMBERS and the Virginia Bioinformatics Institute's (VBI) Network Dynamics and Simulation Science Laboratory (NDSSL), which simulates disasters to evaluate emergency response and disaster preparedness policies, are telling examples of big data's potential.

EMBERS—A system developed by the Discovery Analytics Center that provides a continual, automated analysis of open-source data to forecast significant societal events.

NDSSL—For a disaster resilience study, the Virginia Bioinformatics Institute's Network Dynamics and Simulation Science Laboratory created a simulated environment using big data methods to evaluate disaster preparedness policies and interventions.

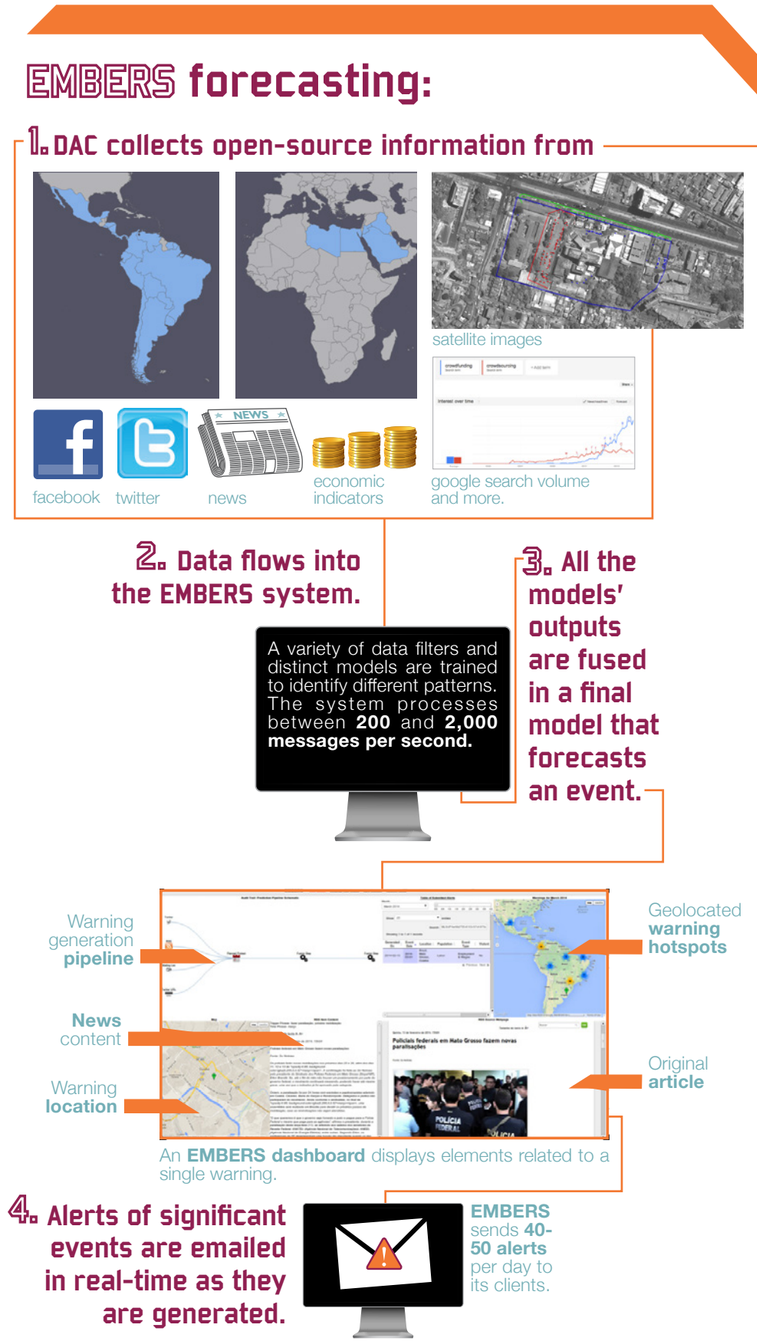
Forecasting the future

EMBERS, the acronym for "early model-based event recognition using surrogates," provides a continual, automated analysis of open-source data—everything from Facebook posts and website searches to satellite images and restaurant reservations made online—to forecast significant societal events such as disease outbreaks, domestic crises, and elections in countries around the globe.

Once a trend or pattern is recognized, EMBERS applies thresholds learned by the algorithms that process past data and events. If the threshold is met, an alert is sent to a third party for evaluation. Training the computers to recognize trends is not very different from teaching an email system to recognize spam, said Ramakrishnan, the Thomas L. Phillips Professor of Engineering and DAC's director.

"The science of big data is about designing algorithms that can transform raw data into actionable knowledge or intelligence," Ramakrishnan said. "There isn't one specific, magic algorithm or threshold in EMBERS. There are a variety of data filters and distinct models trained to identify different patterns. All these models' outputs are then fused into the final model that forecasts the event and produces the alert."

EMBERS now sends 40 to 50 alerts per day to its clients.



"In EMBERS, when we say forecasting, we really are forecasting," Ramakrishnan said. "A lot of projects have the benefit of hindsight, and [people] look back and say, 'Oh, we could have predicted that,' but we send forecasts before the event happens."

Rather than filtering just a few hundred emails, though, EMBERS since its inception has collectively sorted through more than 21 terabytes of data, looking only at a small portion of the world. For perspective, 1 terabyte of data could store 1,000 to 5,000 movies.

EMBERS processes between 200 and 2,000 messages—a tweet, news item, blog post, or stock value—per second. With such a wide breadth of information, there are bound to be widespread inaccuracies, such as rumors, spam, or news stories that are later redacted. However, EMBERS' algorithms are designed to weed out misinformation, Ramakrishnan said.

Not surprisingly, EMBERS is getting attention from the federal government; the project is funded by the Intelligence Advanced Research Projects Activity (IARPA), which is part of the Office of the Director of National Intelligence. DAC was one of three teams chosen to compete in IARPA's Open Source Indicators (OSI) program. Starting in April 2012, DAC's team vied for full funding from IARPA, alongside industry competitors Massachusetts-based Raytheon BBN Technologies and California-based HRL Laboratories.

For two years, the three teams focused their forecasts on about 20 countries in Latin America. EMBERS accurately forecasted several events there, including riots following the impeachment of

Selected big data efforts at Virginia Tech:

- The Bradley Department of Electrical and Computer Engineering at Virginia Tech compiles radio astronomy data to advance knowledge of cosmology, pulsars, and other heavenly phenomena.
- The Virginia Tech Transportation Institute collects and analyzes massive amounts of video and sensory data from cars, trucks, and motorcycles as part of its naturalistic driving studies.
- The Pamplin College of Business has launched the Center for Business Intelligence and Analytics, an interdisciplinary resource that encourages big data research, study, and applications in the business world. The center's goals also include developing an interdepartmental minor in business intelligence and analytics. With specialty areas in social media analytics, text analytics, health analytics, and more, the center is working with the Virginia governor's office and many large corporations on big data and business analytics projects. In one successful project focused on quality control, researchers mined online data to detect product defects.
- Graduate students and faculty from the College of Liberal Arts and Human Sciences, the Discovery Analytics Center, and University Libraries collaborated with the University of Toronto to mine data from more than 100 different newspapers chronicling the 1918 influenza pandemic. The project, which sought to understand how newspapers shaped public opinion and represented authoritative knowledge during the deadly pandemic, was one of 14 projects approved for funding in the National Endowment for the Humanities and the Social Sciences and Humanities Research Council of Canada's Digging into Data Challenge.
- Researchers in the Virginia Bioinformatics Institute and the Center for Peace Studies and Violence Prevention used disease transmission models to study criminal incarceration, examining how incarceration can be transmitted to the family and friends of those who are incarcerated. Synthesizing publicly available data from a variety of sources, the researchers generated a realistic, multigenerational synthetic population with contact networks, sentence lengths, and transmission probabilities.
- Part of information technology, Advanced Research Computing (ARC) supports cutting-edge computing resources, including the Blue Ridge and HokieSpeed supercomputers, that serve researchers across the university. Virginia Tech's investment in high-end computational architectures is paying off for researchers by processing data generated from projects ranging from geospatial image data to genomic assembly.
- In the College of Natural Resources and Environment, the geography department is using massive amounts of radar data from the National Weather Service and the National Climatic Data Center archives to create a 3-D immersive tornado in the Moss Arts Center's Cube. Researchers hope to unlock the power of big data to improve the understanding of the underlying physics of atmospheric phenomena and provide instruction in the area of atmospheric dynamics. In addition, the college's new Center for Natural Resources Assessment and Decision Support is using big data sets to model the future sustainability of Virginia's resources, beginning with forestry resources.

For his efforts in big data and cloud computing, Professor Wu Feng—featured in a Q&A on page 13—is also being featured in one of Microsoft's global advertising campaigns. One of the ads credits Virginia Tech scientists and engineers with harnessing "supercomputer power to analyze vast amounts of DNA sequencing information and help deliver lifesaving treatments" in the fight against cancer. To see a photo gallery of the commercial shoot with Feng on campus, visit www.vtmag.vt.edu.

Paraguay's president in 2012, Hantavirus outbreaks in Chile and Argentina in 2013, and elections in Panama and Colombia in 2014.

IARPA monitored the three teams' progress while an independent government contractor assessed the quality of forecasts. Each month, EMBERS and the other teams would receive a scorecard evaluating their forecasts based on five criteria: lead time, mean probability score, quality score, recall, and precision.

EMBERS scored at or above target in most of the categories, forecasting events with a mean lead time of 7.54 days. Of the three teams awarded an initial contract, DAC was the only team to secure a contract for the third and final year of funding. (DAC expects to secure funding to continue its forecasting work.)

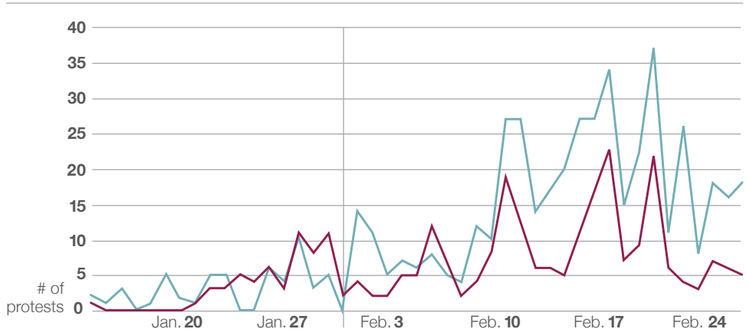
Jason Matheny, OSI program manager at IARPA, said DAC's team has "been able to accurately forecast hundreds of societal events, days to weeks before they occur, with a low false-alarm rate."

DAC has widened its focus from Latin America to the Middle East and North Africa. Since June 2014, EMBERS has been sifting through information gathered from seven Middle Eastern countries, including Bahrain, Egypt, Iraq, Jordan, Libya, Saudi Arabia, and Syria.

Because of the geographic change, Ramakrishnan and his team have had to adapt several models to the new region. DAC now has a Middle East expert on its team to help understand the complex linguistics, which vary between dialects and between written and spoken word, and the myriad cultural differences from country to country.

"In the Middle East, expression of discontent happens differently than in Latin America. You have to have a much better local understanding of how people voice

Spread of protests in Venezuela, January and February 2014



EMBERS: Student protests in Venezuela

EMBERS successfully forecast student-led protests in Venezuela that initially began due to the attempted rape of a student, but morphed into broader protests against police brutality and other issues. In addition, **EMBERS also forecast** that the protests would turn violent and that they would spread to multiple cities.

concerns and how they communicate [their discontent], for instance," Ramakrishnan said.

While forecasting the future may sound fanciful, it holds a number of practical applications.

"Forecasting civil unrest is useful for people and groups as they make travel plans," Ramakrishnan said. "It also helps governments understand what people are frustrated about, know what the hot-ticket items are, and [decide] what they can do about it. It helps them understand what the citizens' priorities are. What are the most important grievances?"

Simulating disasters

Big data initiatives are leading the way to predicting the future—and they are being used to determine how to deal with that future.

VBI's NDSSL created a simulation environment using big data methods to evaluate disaster preparedness policies and interventions.

Madhav Marathe, a VBI professor and NDSSL director; Christopher Barrett, a professor and VBI's executive director; and Stephen Eubank, a professor and NDSSL deputy director, led a large team that modeled human behavior using a combination of many data sources to simulate a nuclear detonation in Washington, D.C., depict the behavior of more than 730,000 simulated D.C. residents, and evaluate the emergency response.

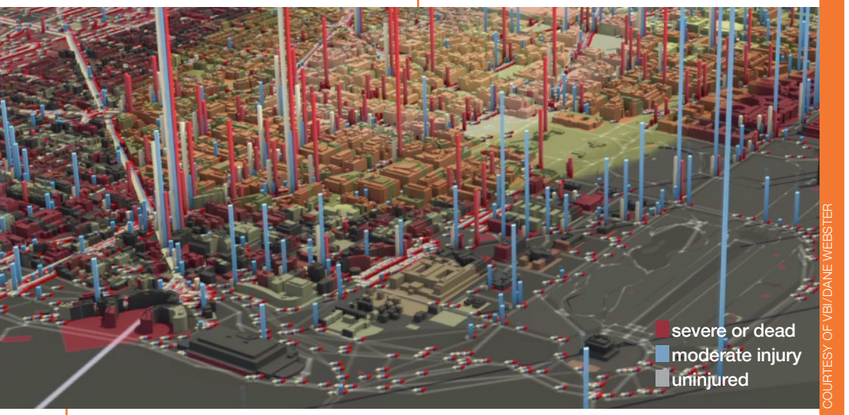
Using massive amounts of data, including the American Community Survey, tourism reports, transportation routes, cell-tower communication data, hospital registries, power-network data, and surveys of human behavior in disasters, the team generated synthetic individuals to gauge their likely motivations and reactions in the midst of the disaster.

"The event … allows us to collect information from varied sources and build a synthetic, but realistic representation of the event, as well as what I would call a physical world, the infrastructure world, and a social world," Marathe said. "All three worlds have to come together and be represented meaningfully to do the analysis because otherwise you're missing one of the three things."

Encompassing a 48-hour span in the midst of a nuclear disaster, the simulation produced several terabytes of data, the

NDSSL disaster resilience study:

1. NDSSL collected open-source information (census and infrastructure data, etc.) **to create more than 730,000 synthetic individuals in a simulated infrastructure.**



COURTESY OF VBI/ DANE WEBSTER

A simulated nuclear blast in Washington, D.C.
The light gray gradient indicates the radiation dosage from fallout. The bars indicate aggregate counts of individuals in different health states at the various locations.

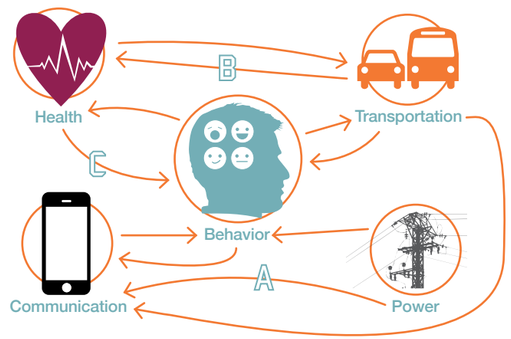
2. The model tracks behavior and how individuals interact with infrastructure.

For instance:

A. Availability of power affects ability to communicate

B. Route traveled exposes person to radiation and to risk of injury

C. Health state determines a person's likely behaviors



3. Decision-makers in public safety and other areas can use simulations to improve disaster resilience by taking proactive measures.

In the lab:

For a video about NDSSL, visit www.vtmag.vt.edu.

result of the unimaginably complex algorithms and computer modeling the team had created. Millions of simulated individuals were incorporated into a single, mineable dataset based on real-world information, Barrett said.

The team found that even a small increase in the ability to provide functional communication systems would allow people to do a substantially better job coordinating activities such as finding family members. Because humans' first instinct in the wake of a disaster is to use their phone, communication systems tend to falter with the magnitude of texts and calls. Such findings allow the lab to provide decision-makers with better information.

"This is a really important finding, and this could not have been done in this particular form had we not put all the data together, filled in, made a consistent representation, taken the things forward, and then mined for nuggets within this," Marathe said.

Said Barrett, "Even though human behavior is a black box in a black box in a black box, we still can come very close to getting very rational, reasonably stated ways that you would expect people to move."

With the rapid pace of technological advances, information from big data simulations can be generated more quickly than ever. Marathe said the time it takes to run a simulation has decreased from a couple of days to mere minutes.

In addition to improved technology, Eubank attributes the growth of big data to the changes in the way society collects information.

"We had no idea that 20 years from when we started a transportation project that it would be commonplace for people to report their location on a minute-by-minute basis to the world," Eubank said.

> "Built upon interdisciplinary collaborations, Virginia Tech's approach to big data exemplifies the role of the 21st-century research university, strategically investing in resources to study and solve complex societal problems."
>
> —President Timothy Sands

Living in a data-driven world

Scientists and researchers working with big data foresee even more innovation on the horizon.

In fact, those like Ramakrishnan, Marathe, Barrett, and Eubank—who have made a habit of dealing with the future—see the future of big data happening at Tech.

"I think that Virginia Tech has provided us with an environment and ecosystem to carry out this research over the [past] 10 years which has been very, very conducive to do this and I certainly value this. Tech has been very supportive of our work," Marathe said. "It is very cool to have an institute that allows us to do things in a very novel and aggressive way."

Barrett sees their big data research as world-leading, explaining that Virginia Tech's approach to computationally enabled social science and the development of a synthetic information platform are conceptually different from anything else in the field.

Ramakrishnan also echoes the sentiment that Tech is at the forefront of big data research. "By creating DAC, we have brought together an interdisciplinary group of researchers from computer science, statistics, electrical and computer engineering, and mathematics. We have initiated graduate and undergraduate courses in this topic and hope to be a one-stop shop for the university and beyond in leading research and educational efforts in big data. The IARPA EMBERS project is an example of how DAC has led an interdisciplinary effort in this space, and we have just begun," he said.

As Virginia Tech's researchers continue to develop new uses for big data, the university has upgraded its computer systems to keep pace and ensure the capacity to house the collected information. Midkiff, the university's vice president for information technology, sees collections of big data as a chance to re-evaluate Virginia Tech's missions and operations.

The investment in big data initiatives in Blacksburg and in the National Capital Region allows for greater connections with industry partners while also making use of data to better serve society. "Without improving the lives of people who actually produce social data, big data is more than just a passing trend," said Christopher Walker, DAC program manager.

The wave of research also is moving into classrooms as the university presents students with more opportunities to innovate. Many degree programs—computer science, electrical engineering, statistics, and many more—already include big data elements, while two interdisciplinary undergraduate degrees have been introduced (see the sidebar at right).

"Virginia Tech is working to ensure that all of our graduates are prepared to thrive in a society that is data-driven and networked," Midkiff said.

No matter what the future holds, big data research has found a home at Tech.

Madeleine Gordon, a senior English and communication major, was an intern with Virginia Tech Magazine. Emily K. Alberts, formerly the Discovery Analytics Center's public relations and marketing specialist and now the Department of Engineering Education's office manager, contributed to this article.

Virginia Tech offers new data-centric majors

As the world becomes more data-driven, Virginia Tech is incorporating aspects of big data into classes and academic programs across campus. Additionally, Tech is offering two new, interdisciplinary undergraduate degrees based largely around big data: environmental informatics in the College of Natural Resources and Environment and computational modeling and data analytics in the College of Science.

The environmental informatics major incorporates information technology, data analysis, natural resources, geospatial science, and ecological modeling to enable students to explore and apply information science to the sustainable management of the natural world.

Students develop skills in remote sensing, ecosystem management, spatial data analysis, statistics, Web and database management, and sustainability analytics that can be utilized in many environmental professions and applications, ranging from forestry and landscaping mapping to pollution modeling and watershed ecology.

The College of Science's computational modeling and data analytics major draws together mathematical modeling, modern data science, and high performance computing. The degree is targeted at students from a variety of disciplines, especially those with a deep curiosity for understanding how the world works by developing computer simulations and mathematical models.

In addition to algorithm design and modeling, the major will also address important ethical considerations, ranging from data collection to the responsibility of a scientist to present clear and unambiguous explanations to those responsible for making public policy.

Boosting soil productivity and crop yields.

Building capacity in developing nations.

Overhauling curriculum.

Researching ways to use more of the world's water.

Developing more resilient crops.

Across the globe,
Virginia Tech is

Sowing the Future

Part Two

by JESSE TUEL
photo illustration by JIM STROUP

Editor's note:

In this second installment of a two-part story, we examine Virginia Tech's international efforts to provide food and water to a growing population. For the fall edition's article on the university's stateside efforts, visit www.vtmag.vt.edu.

Rain doesn't have far to fall in Ecuador.

In the clouds: Corinna Clements, a senior majoring in agricultural and applied economics, and Austin Larrowe, a senior majoring in agricultural and applied economics and agricultural sciences, spent two weeks in Ecuador talking to farmers about a project to curb deforestation by using a better variety of the naranjilla plant. Photos by Zeke Barlow.

The volcanic mountains that rise from the country's dramatic terrain often pierce the rainclouds and seem to scrape the sky with slopes so steep they challenge even the most surefooted hikers.

Long gone are the trees that once covered the landscape, replaced by a patchwork quilt of farms that blankets the Andes Mountains, each one producing potatoes, wheat, maize, and other crops that grow heartily in soil as rich as cake batter. Locals clad in the colorful woolen shawls and Panama hats that typify Andean dress work the land with the sweat of their brow, a good back, and crude tools. They take pride in the cornucopia of food they grow and sell at farmers markets around the country.

Over the past few decades, as the country's population has swelled, thousands of new mountainside farms have sprung up, each one moving farther up the hillside as owners clear-cut the trees that once bound the soil to the mountains.

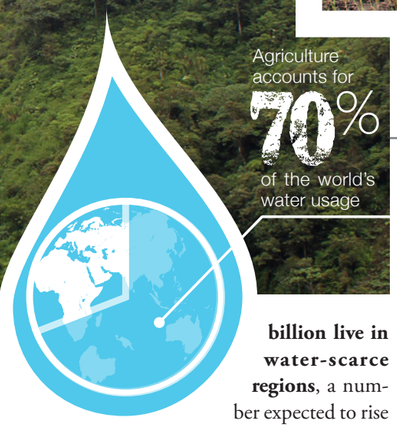
Problems arise when a deluge of rain meets steep mountains and deforested land. Raindrops smacking into freshly tilled dirt creates runoff that erodes the soil. Valuable nutrients wash away, as do the pesticides that farmers overapply. In cities and towns downstream, the water supply is polluted and sometimes undrinkable. Silt-laden rivers regularly overflow their embankments, causing hundreds of millions in damages yearly. The land that was once so fertile has lost much of its potency.

The situation is playing out in similar fashion in countries across the globe, as hundreds of Virginia Tech faculty, staff, and students help humanity face perhaps its greatest challenge ever: providing food and fresh water to a growing population.

"The story of what is happening in Ecuador is far from unique," said Jeff Alwang, a professor of agricultural and applied economics in the College of Agriculture and Life Sciences (CALS), who has worked in South America for decades with others from Virginia Tech. "All over the world, nations are facing the challenge of feeding populations on limited lands. As agricultural production expands into more marginal areas, there are myriad challenges, from maintaining or increasing productivity to reducing soil erosion and lowering damages from toxic chemicals. At Virginia Tech, we are trying to help ease this pressure by sharing our knowledge that will help feed the world in a sustainable and profitable way."

Mounting pressures

Add a billion people here, a billion there, and the systemic pressures on the globe's resources can seem insurmountable. By 2050, the world's population could **increase from 7.2 billion today to 9.6 billion**, according to a 2013 United Nations report. **In turn, the Earth's food pantry will have 37.5 percent more people to feed**, when 805 million are already undernourished today. And the Earth's water spigot will have more thirst to quench. **Today, 1.6 billion live in water-scarce regions**, a number expected to rise to 2.8 billion by 2025, according to the World Bank.



The individual demands of the interconnected system amplify each other. Agriculture accounts for 70 percent of the world's water usage, and experts estimate that water inputs to agriculture will have to double by 2050 to feed the growing population. In addition, aquifer depletion threatens traditional irrigation and drinking water sources, with an underreported side effect: A recent study found that as much as 42 percent of the annual sea-level rise can be attributed to irrigation runoff, as depleted soil fails to absorb the groundwater and surface water pumped onto crops.

Meanwhile, carbon emissions trap warmth in the atmosphere, shrinking glaciers, tinkering with surface and ocean-water temperatures, shifting jet streams, and altering microclimates. Water, the most elemental human need, is also a destructive force.

"Climate change is really water change," said Luke Juran, an assistant professor in the College of Natural Resources and Environment's (CNRE) geography department who studies the intersection of water and disasters. Juran expects the frequency and intensity of hydrometeorological hazards such as hurricanes, droughts, severe thunderstorms, and blizzards to increase—"an unfolding, more permanent disaster that's creeping up," he said.

The natural world's volatility, of course, seeps into human behavior. In the mid-1990s, Yannis Stivachtis, as a research fellow at the United Nations Institute for Disarmament Research, argued for greater economic, social, developmental, and environmental investment in the Middle East and northern Africa. The associate professor and director of international studies in the College of Liberal Arts and Human Sciences' Department of Political Science saw that demographic and economic trends in the region pointed toward a young population with limited access to food, clean water, health care, and economic opportunities—limitations that paved the way for extremism. Despite calls for a comprehensive approach to regional issues and a substantial investment and aid plan, Congress didn't want a new Marshall Plan, which rebuilt European economies after World War II, nor did the American people envision global engagement of such magnitude, Stivachtis said.

"States have to deal with economic, social, developmental, and environmental issues in a very comprehensive way. Otherwise, we face problems at a global scale," said Stivachtis, offering as an example neighboring countries fighting over water resources. "It's only a disaster that makes people change course of action, and this change is generally more expensive than the investment that was initially needed to prevent it."

Capacity building

In the carrot-versus-stick dichotomy of foreign policy, the carrots are offered through Virginia Tech's Office for International Research, Education, and Development (OIRED). With a portfolio approaching $100 million, OIRED manages projects in some 30 developing countries. Two primary thrusts are the Innovation Labs—the Sustainable Agriculture and Natural

LOGAN WALLACE

ZEKE BARLOW

Feeding the future: (Opposite page) Sekouna Diatta, a graduate student at Virginia Tech, is an associate professor at the University of Dakar. Tom Thompson, head of the Department of Crop and Soil Environmental Sciences, dubbed Diatta the "unofficial dean of the Senegalese students" at Virginia Tech. (At left) To ward off pests in Ecuador, researchers are helping farmers plant a more resistant strain of the naranjilla.

Resource Management (SANREM) lab and the Integrated Pest Management (IPM) lab—funded by the U.S. Agency for International Development's (USAID) Feed the Future initiative. At Virginia Tech, the two programs operate alongside the Innovation for Agricultural Training and Education (InnovATE) program, also USAID-funded, and the Women and Gender in International Development program, which ensures that OIRED programs are gender-sensitive.

InnovATE Director Tom Hammett, a professor in CNRE's Department of Sustainable Biomaterials, recently traveled to Jordan, where the agricultural sector, though hampered by the availability of water, has the potential to export tomato, squash, and cucumber crops to the Middle East and Europe. Farmers employ water-user associations to decide how to share water and enforce limits, and the InnovATE team learned about how the associations work so that the lessons can be applied in other countries.

Whereas SANREM and IPM are collaborative applied research programs, InnovATE works with overseas agricultural training and educational institutions to improve curricula, strengthen administrative capacity, and build infrastructure, which in turn develops the human and institutional capacity necessary to achieve food security, reduce poverty, and conserve natural resources.

"My mantra is that agricultural education and training are very closely tied to health, natural resources, gender equity, economic development, and youth and workforce development," Hammett said. "If the U.S. is really interested in helping food security—and we see that food security around the world impacts the U.S.—then the U.S. should be interested in improving agricultural education and training capacity."

Give a man a fish, and he'll eat for a day. Teach a man to fish, and he'll eat for a lifetime. Such sentiments are behind the idea of capacity building in developing nations. And the efforts sometimes begin with pests.

In developing countries, pests cause production and post-harvest losses of 25-30 percent, said IPM director Muni Muniappan, who works with his colleagues to track the movement of pests and diseases around the globe. IPM is working in 17 countries in six tropical regions, developing solutions wherever possible and preparing countries for oncoming pestilences.

The papaya mealybug was decimating papaya, eggplant, and tomato crops in India before Muniappan and others introduced parasitic wasps that fed on the mealybug's larvae. Not only did the solution spare the ecosystem the ineffective use of pesticides, but it prevented crop devastation that would have totaled between $524 million and $1.34 billion over a five-year period.

Working in more than a dozen countries, Virginia Tech's SANREM scientists help farmers develop conservation agriculture production systems (CAPS) that encourage year-round soil cover, minimize soil disturbance from tilling, and utilize crop-rotation systems.

In Mali, soil improvements and conservation of groundwater have simplified the retrieval of water, a task typically performed by women. In Cambodia, SANREM techniques are leading to healthier soil and less deforestation, and the use of mulch and cover crops instead of tilling.

With SANREM's 10-year run at Tech expiring this academic year, the university applied for but didn't receive USAID's subsequent "sustainable intensification" funding. "We're very disappointed we didn't win [the funding]," said Michael Bertelsen, OIRED executive director. "We are proceeding to search for SANREM-related projects to go after in order to capitalize on our experience and personnel with this project."

All told, the OIRED efforts currently involve some 300 Virginia Tech faculty, staff, and students. Said Bertelsen, "[The outreach] all fits into the land-grant mission and Ut Prosim. It's projecting the land-grant mission overseas—the research, the education, and the outreach."

"Virginia Tech is a major player in the USAID Feed the Future initiative," said Guru Ghosh, vice president for outreach and international affairs. "The very survival of the human race is at stake, especially in the vulnerable regions of the world."

Teaching the world

Sekouna Diatta is keeping a close eye on his Virginia Tech professors.

Pursuing a master's degree in the Department of Crop and Soil Environmental Sciences, Diatta already holds a Ph.D. from a Senegalese institution and is an associate professor at the University of Dakar. In Senegal, professors customarily lecture from a chapter summary without expecting student discussion. A syllabus is rarely used. But in the U.S., students read materials beforehand and know what to expect from the class.

PHOTOS COURTESY OF CONRAD HEATWOLE

Sustainable outcomes: In Zambia, Conrad Heatwole, an associate professor in the Department of Biological Systems Engineering, has spent eight years monitoring watersheds and demonstrating sustainable practices.

"I'm learning a lot by the way they're teaching here—how they relate with students, how they coordinate activity. I am looking deeply at aspects of Virginia Tech life, to think [that] it can help me initiate, innovate, when I'm back in Senegal," Diatta said.

Wangui Gichane (international studies '13, crop and soil environmental sciences '13), a graduate student from Northern Virginia with Kenyan roots, is surveying the curricular needs of the agriculture-related departments at five Senegalese universities and how to empower students using learner-centered strategies in lieu of teacher-centered learning—precisely the difference that Diatta has come to appreciate. "It's a big part of distributing knowledge," Gichane said of reforming Senegalese curricula. "It's an important step in establishing overall food security."

Three-fourths of the population in Senegal works in agriculture, yet 70 percent of the rice is imported. "Between these two statistics, we need to have an adequate answer to provide food by ourselves. I hope that we are in the right way to get the answer. If you correctly identify a problem, you have at least half the solution," Diatta said, adding that he's glad Virginia Tech is helping us "to answer the questions by ourselves."

Improving soil productivity

Despite adequate rainfall in Zambia's Luangwa River basin, villagers have a name for November, December, and January: "the hunger season."

"I see people planting corn in the fields, and it gets 6 inches high," said Conrad Heatwole, an associate professor in the Department of Biological Systems Engineering in CALS and the College of Engineering (COE).

Degraded soil prompts the farmers to clear forest land, which leads to great yields in the first few years … yields that dramatically drop as nutrients are depleted. For instance, farmers often sweep organic residue from the fields and burn it, simply because their fathers did so. After five to seven years, the topsoil is gone. So at the sight of 6-inch corn, farmers repeat the cycle, which shoves agricultural land farther into forest land, driving up transportation costs and distancing farmers from community infrastructure.

"They'll say, 'This land is spent, this land is not productive anymore.' It seems like an inevitable outcome to them," Heatwole said. "They've never seen sustainable outcomes."

Similar soil issues are found in Senegal. Commonly sandy, acidic, and saline, most soils are infertile due to a lack of plant nutrients. Soils are bereft of organic matter because crop residues are removed for fuel, animal feed, and building material. In Haiti, massive deforestation leads to similar problems with soil quality. "It is safe to say that at least half of the world's fertile topsoil has been lost through erosion and degradation," said Tom Thompson, head of the Department of Crop and Soil Environmental Sciences.

However, soil productivity can be greatly—and simply—improved with the use of organic matter, such as leaving crop residue on the fields instead of removing the residue for fuel and fodder, and adding animal manure. Tech's research efforts are focused on such efforts. Indeed, 40 percent of crop and soil environmental sciences department faculty members are involved in OIRED projects in Haiti and Senegal.

Thompson and Associate Professor Wade Thomason have made a combined 25 trips to Haiti in the past three years alone, partnering with Haitian agronomists and hundreds of farmers via a SANREM project to implement conservation agriculture practices and build capacity among Haitians.

For eight years running, Heatwole has traveled twice a year to Zambia, monitoring four watersheds and demonstrating the potential of sustainable practices. "The productivity in that area is just a small fraction of what it could be," he said. "The potential is great to feed themselves and have significant exports."

The idea of boosting productivity is promising. A July 2014 article in the journal Science examining 17 key global crops—16 of the highest calorie-producing corps, along with cotton, for its intensive water and nutrient needs—found that current yields are 50 percent below "realistically attainable" yields and that closing the yield gap could provide enough calories to meet the needs of about 850 million people.

In certain spots around the globe, the yield gap is already closing. Adopting improved bean varieties is leading to an average yield gain of 53 percent in Rwanda and 60 percent in Uganda, said Catherine Larochelle, a research assistant professor in CALS' Department of Agricultural and Applied Economics. The gains produce ripple effects: Families earn more, and shorter production cycles free up land and labor for other uses. Beans are mainly grown by women, and the extra time can be invested in handcrafts and tending the health, education, and nutrition of children. And new varieties are often more nutritious, fighting the hidden hunger of nutrient deficiency.

Heartier crops

Growing rice is water-intensive, for sure. But don't flood it. When completely covered, the plant tries to quickly grow and reach the surface, leading to an energy crisis, carbohydrate starvation, and death. In rice-producing nations, flash floods cost more than $1 billion in rice losses annually.

Ten years ago, however, Takeshi Fukao, an assistant professor in the crop and soil environmental sciences department, was at the University of California, Riverside, where he worked with collaborators to analyze the functional importance of a gene dubbed "Submergence 1-A" that amplifies flood tolerance. Today in South and Southeast Asian countries, rice cultivars carrying the gene (transferred through conventional breeding methods rather than genetic modification) react much differently to a flood. In a passive strategy, the submerged plant reduces its metabolism and energy consumption, restarting photosynthesis once the water subsides.

"It's like they're in hibernation," said Bishal Tamang, a Nepalese Ph.D. student working with Fukao on research into genes associated with flood and drought tolerance.

As climates change around the world, leaving farmers to contend with more flooding, the submergence tolerance gene offers researchers an advantage because the entire DNA sequence, submergence tolerance, and metabolic mechanisms are now known quantities that can serve discovery in other species. "This is a very good model for stress tolerance," Fukao said of Submergence 1-A.

Worth its salt

Three concepts—recycling, conserving, and desalination—point the way forward for the world's water supply. Today, about 1 percent of the world's water is utilized, said Jason He, an associate professor of civil and environmental engineering in COE. In coming decades, providing water for agriculture and drinking may well require using wastewater and ocean water to a much greater extent.

In He's Hancock Hall lab, in a student-made, lidless container the size of a washing machine, water gurgled through numerous vertical PVC pipes that lined the container's edges and disappeared beneath the rolling surface water. With a 100-liter capacity, the device is the world's largest microbial desalination system.

He's research has two directions. The first is developing microbial fuel cells that harness electrical energy from bacterial activity and organic waste. The second is using that energy to desalinate water. The potential synergies—picture a wastewater treatment facility built next to an ocean that generates energy and clean water—are profound. The next step is scaling up the process to the point that industry collaborators are ready to invest.

Juran, the CNRE assistant professor, encourages viewing wastewater as a resource. Urine and feces can be safely neutralized, giving the water new life as an irrigation source and more. "We need a paradigm shift," Juran said. "We can look at wastewa-

ZEKE BARLOW

Provost Mark McNamee (center) posed with six faculty members in the water cluster (from left to right): Zach Easton, Luke Juran, Kelly Cobourn, Ryan Stewart, Meredith Steele, and Venkat Sridhar. Not pictured is the seventh member of the cluster, Daniel McLaughlin.

ter as a resource that serves other purposes. We have to realize that we're capped with a finite amount of water. Every day it's more polluted. Every day it's more stressed by more people. We're the variables. We have to adapt. Something's got to give, and it's got to be us. We can't make more water."

Clustering experts

Just how does a university marshal its resources to tackle challenges as big as water? One way is faculty hires. In the 2013-14 academic year, CNRE and CALS teamed up to hire seven faculty members to fill the ranks of a water cluster and establish a premier water resources program.

The cluster complements Tech's existing experts—more than 125 already study various aspects of water—by exploring such subjects as the effects of climate change on agriculture, management of water and natural resources, transport of chemicals to surface water and groundwater, and development of decision-support tools to mitigate the negative impacts of human activities, said Saied Mostaghimi, CALS' associate dean of research and graduate studies.

By encouraging collaboration, the cluster's interdisciplinary model matches the trend at research funding agencies. "Agencies are focusing on funding interdisciplinary research because most of our global issues are too complex for any one discipline to solve, and there is a need to develop interdisciplinary teams to address these issues," Mostaghimi said.

One such issue is urbanization. By 2050, 78 percent of the world's population will live in cities, compared to 54 percent today, according to the World Health Organization. The trend is positive for reasons of efficiency, said Meredith Steele, an assistant professor in the crop and soil environmental sciences department who studies cities and how land cover and land change affect watersheds and water quality at a regional and continental scale. Double a city's size, and its carbon emissions won't increase by the same rate, Steele said. "You don't often think about saving cities to save nature, but everything I've seen points to that's the direction we need to go in."

Another member of the cluster, Venkat Sridhar, an assistant professor in biological systems engineering in CALS and COE, seeks to develop and implement hydrological and water management models to map the availability of resources over time and space, thus providing strategies for sustainable agricultural production in a future beset by climate uncertainty. Achieving this goal—as he knows and the cluster's structure illustrates—requires an interdisciplinary approach. "The issue in front of us, providing food and water to humanity, is so complex that innovation becomes necessary," Sridhar said. "My research lab will tremendously benefit from the synergies of various efforts across campus to start addressing food and water sustainability."

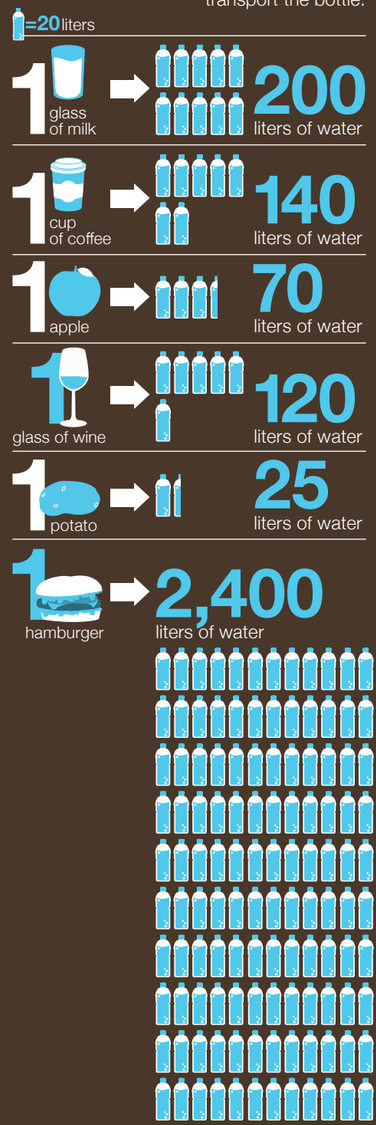
Matching the water cluster's interdisciplinary approach, a new bachelor's degree program titled "water: resources, policy, and management"—approved in November 2014 by the State Council of Higher Education for Virginia—draws experts from five Virginia Tech colleges. "In order to sustainably manage the resource, understanding the human side of water is as important as understanding the science," said Stephen Schoenholtz, the CNRE professor of forest hydrology and soils who will coordinate the program with an advisory committee representing faculty from 10 departments. Offered through the Department of Forest Resources and Environmental Conservation, the degree has eight specialization options, including one in international water management and another in water, climate, energy, and global issues.

From Blacksburg classrooms and labs to Ecuadorian mountaintops, from desalination in the Middle East to agricultural curriculum in Senegal, Virginia Tech is fully engaged in addressing humanity's most foundational needs.

Zeke Barlow, communications manager for the College of Agriculture and Life Sciences, contributed to this article, including the opening section on Ecuador.

Virtual Water

You use far more water than you imagine. Consider virtual water, the water embedded in our consumer products. With a glass of wine, consider the water it took to make the glass bottle and the label, and to transport the bottle.



Source: Luke Juran, College of Natural Resources and Environment

The world will soon have to provide food and fresh water to 10 billion people.

Are you optimistic?

"I am cautiously optimistic. … It's certainly doable to double crop yields in most parts of Africa. We have the knowledge. We have the technology. It's a matter of building capacity."

—Tom Thompson, head of the Department of Crop and Soil Environmental Sciences

"I am optimistic simply because we do not have a choice. I just pray that we do [solve the problem] early enough before many people suffer even more. For a solution to happen, a worldwide effort on political and social levels has to materialize, in which water shortage becomes an integral part of our thinking in everyday activities, from legislation down to washing our cars."

—Mohammad Al-Smadi (Ph.D. biological systems engineering '08), who is working on a comprehensive water resources project in Saudi Arabia, attempting to quantify resources and forecast the potential for additional water resources.

"Yeah, definitely. Because there is a continuous effort. Scientists all over the world are fighting this problem."

—Bishal Tamang, Ph.D. student, Department of Crop and Soil Environmental Sciences

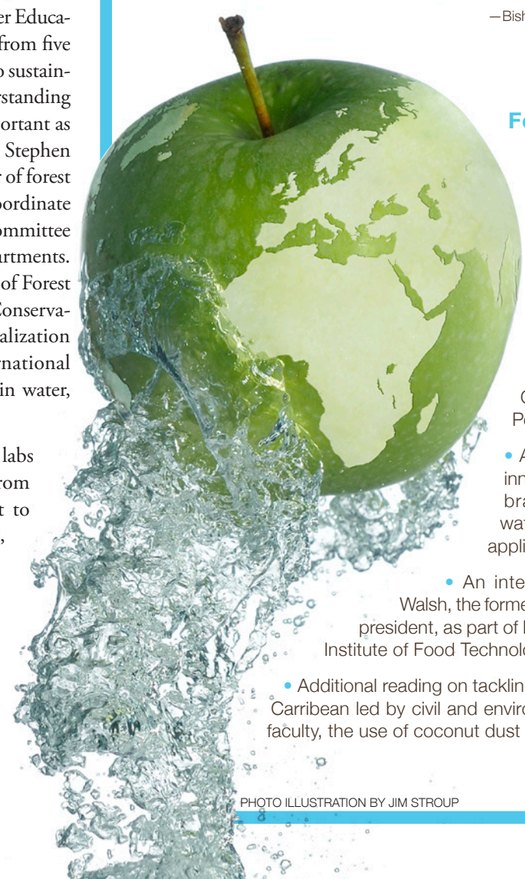


PHOTO ILLUSTRATION BY JIM STROUP

For the rest of the responses to "Are you optimistic?" visit www.vtmag.vt.edu. There, you'll find a wealth of additional material:

- Q&As with alumni Mohammad Al-Smadi, engaged in a water resources project in Saudi Arabia, and Guy Hareau, with the International Potato Center in Peru
- A story on alumnus Abhishek Roy's innovations in reverse osmosis membranes for desalination, industrial water, and residential water purification applications
- An interview with current student Brian Walsh, the former national Future Farmers of America president, as part of FutureFood 2050, an initiative of the Institute of Food Technologists
- Additional reading on tackling food waste, a water project in the Carribean led by civil and environmental engineering students and faculty, the use of coconut dust to protect seeds, and much more.

COURTESY PHOTO

Monument Man

by NIKKI CLEMONS

Washington, D.C., is one of the most recognizable cities in the world, its skyline, monuments, memorials, and buildings featured in countless movies, television shows, and photos. In particular, the city's monuments define the events and people that have shaped the United States.

Kenneth Terry (civil engineering '94, MBA '14) would know. As lead project manager for the National World War II Memorial, lead engineer on the Martin Luther King Jr. Memorial, and, most recently, project executive leading repairs on the Washington Monument, Terry has left his imprint on the landmarks of the nation's capital.

Terry's first assignment after graduating from Virginia Tech was the Ronald Reagan Building and International Trade Center. As a project engineer with Tompkins Builders, he spent two-and-a-half years coordinating the fabrication and installation of huge stones that form the exterior façade of the building. "I gained a lot of experience on that project in terms of new stone fabrication and installation," Terry said. "I was just lucky to be on the project, and I learned a lot. Then about eight years later, the World War II memorial came around, and I already had an unusual amount of experience with new stone construction."

In June 2001, under a joint venture between Tompkins and Grunley-Walsh, Terry became the project manager for that memorial, which remembers the 16 million who served in the U.S. armed forces, the more than 400,000 who died, and those back home who supported the war effort. The memorial holds special meaning for Terry. "Both of my grandfathers were in the military, and they were in the war. And, of course, everyone was touched by the conflict," said Terry. "I worked on that project every day for three years. Each project I've worked on has its interesting stories and memories, but the World War II Memorial was the most rewarding and the one I had the most personal connection with."

COURTESY PHOTO

Point person: From his vantage point as the project executive leading recent repairs on the Washington Monument, Kenneth Terry '94, '14 has a dynamic view of some of Washington, D.C.'s most recognizable buildings.

Barry Owenby, assigned by the American Battle Monuments Commission as the memorial's project executive, worked alongside Terry. "Ken was very proactive in problem avoidance. And when an issue came up, he focused on fixing the problem, not fixing the blame," Owenby said. "Ken is a man of integrity. He also has a very effective manner in dealing with clients, subordinates, and his leadership. He has a tremendous reservoir of professional experience and knowledge."

In 2007, Terry was asked by the Martin Luther King Jr. Memorial Foundation to serve as the project executive on a memorial to commemorate the civil rights leader. The design for the memorial—the first on the National Mall dedicated to an African American—was selected through a competition administered by Virginia Tech's Washington-Alexandria Architecture Center. (To read the story from the winter 2012-13 edition, visit www.vtmag.vt.edu/winter13.)

Most recently, Terry, now with Grunley Construction, led the restoration of the Washington Monument, which was damaged when a 5.8-magnitude earthquake hit Virginia on Aug. 23, 2011. "Initially after the earthquake happened, the U.S. National Park Service had what they call their 'special access team' assess the damage," said Terry. "They rapelled down the four faces of the monument over a period of four to five days with cameras and photographed every instance of damage."

From there, the team created a set of designs to guide the repairs. "Once we arrived at the site, we erected the scaffolding, which took about three months, and once that was in place, we could more easily inspect the areas," said Terry. The restoration project lasted from November 2012 to May 2014.

Terry wasn't the only Hokie working on some of the most visible and important structures in the country. "On each of these projects, there was a significant number of people from Virginia Tech involved," Terry said. "On the World War II memorial, the contracting officer was an alum, and one of the designers went to the architecture school. On the Washington Monument repair, one of the engineers had just graduated. And there are plenty of people from the National Park Service who are alumni as well. One of the neat things about working in D.C. is that you run into a lot of people [from Virginia Tech]."

Besides his specialty in memorials, Terry also helped restore St. Elizabeth's Hospital, a mental health facility in D.C., from 2006-09. "Building buildings is very different than building or restoring memorials," he said. "The attention that the memorials draw makes them complex because there

are so many people [involved at] every step of the way. Politically, building memorials is more challenging, but from a technical standpoint, building buildings is more challenging."

Terry said his time as an undergraduate provided him with a base of engineering and construction knowledge. "I also learned the importance of working within a team to accomplish a project, relying on every members' ideas and strengths to solve problems and achieve the common objective," Terry said.

Andree Yaap, a project executive for Grunley's interiors department, works with Terry, who as a deputy operations manager supports the department's human resources needs. "Ken has excellent people skills," Yaap said. "He is dependable, friendly, hardworking, and a great team player. If I had to pick his greatest strength, I would say it is his problem-solving and planning skills."

In May 2014, Terry completed his MBA at Virginia Tech's Northern Virginia Center in Falls Church, Virginia. "[The MBA] helped me to fill a lot of gaps in my knowledge of how to manage the business side of the construction industry," he said. "I learned a lot from my professors and fellow students about topics which I intuitively figured out through my years of working experience, but never fully understood."

> "Ken has a tremendous reservoir of professional experience and knowledge."
>
> —Barry Owenby, World War II memorial project executive

What's next for Terry? Two projects are quite prominent—at the Smithsonian's National Museum of American History and the National Museum of Natural History. He's also completing two D.C. apartment buildings—perhaps the least recognizable projects in the portfolio of America's monument builder.

English major Nikki Clemons was a Virginia Tech Magazine intern.

CARRIE COX

Guiding: Cadet Ray Pereira and Master Gunnery Sgt. Lance Jones, the Second Battalion's senior enlisted advisor, share a strong bond.

The Virginia Tech Corps of Cadets has the mission of preparing young men and women of strong character to become leaders in the military and in public and private sectors.

As the corps has continued to grow—it now numbers more than 1,000 cadets for the third consecutive year—the corps' leadership saw that more staff members were needed to effectively mentor and develop these future leaders. As a result, in summer 2013, the corps hired three senior enlisted advisors, one for each battalion.

By far, enlisted members make up the vast majority of those in the U.S. military, serving as the backbone of the force, and they will look to our graduates as their leaders. Having corps staff who have served and risen through the enlisted ranks to teach and guide cadets has greatly improved cadet experiences and the leadership development program at Tech. For example, Lt. Col. Charles Payne, Third Battalion deputy commandant, is now aided by Sgt. Maj. David Combs, the battalion's senior enlisted advisor.

Cadet Lt. Col. Tyler Dick has noticed the impact. "Sgt. Maj. Combs has provided the noncommissioned officer perspective of leadership from an extensive and diverse military career. His guidance has led to significant changes in our daily operations, training, and professional development in just over a year," Dick said.

Even those cadets looking to serve outside of the military are being influenced by the new advisors. Command Sgt. Maj. Daniel Willey, First Battalion's senior enlisted advisor, shares a unique perspective on career development with cadets. "After serving over 30 years in the Army, I also went through the job search process less than two years ago," Willey said. "I can relate to what the members of the Citizen-Leader Track have to do as they get close to graduation and seek employment."

Cadet Ray Pereira said that his senior enlisted advisor in Second Battalion, Master Gunnery Sgt. Lance Jones, has had a profound impact. "When I was a cadet first sergeant, Master Gunnery Sgt. Jones … taught us how to have the moral courage to hold our people, including friends, to standards. He instilled a level of pride and confidence in each of us that was tempered by a sense of humility," Pereira said. "Master Gunnery Sgt. Jones has been an integral part of my development as a leader, and I will not forget the lessons that he has taught me."

Willey relishes his role as an advisor. "I truly believe that leaders are not born, they are built. Starting with quality stock is important, but the fundamental truth is that building leaders of character is an art that requires passion—a passion that is driven by caring for those who will stand their watch for the next 30 years. There is no doubt that the world is now, and will be for the foreseeable future, in a state of persistent conflict. Serving the needs of the United States in both industry as well as our military will require leaders of character. Helping to shape the next generation of leaders is an honor."

Maj. Carrie Cox is the executive officer for the Corps of Cadets.

JIM STROUP

Kenneth E. Cooke '92

Accounting for Future Hokies

by ALBERT RABOTEAU

Kenneth E. Cooke started giving back to Virginia Tech even before it was his alma mater. In 1992, months before earning his bachelor's degree in accounting, he donated several thousand dollars.

"I didn't have a lot of money, but I made [giving] a priority," said the native of Richmond, Virginia, who now lives in Manhattan in New York City and is a vice president at Goldman Sachs. "A university provides you a foundation and learning. If you graduate, there's no way you didn't have a great experience, and so you have to make the path a little easier for those who come after you."

While that mindset inspired Cooke to donate regularly for more than 20 years, it also led him to support the university in numerous other ways, including serving on the advisory board of the Pamplin College of Business' Department of Accounting and Information Systems. In January and October of 2014, he returned to campus to speak at Pamplin events. And he was a driving force in Goldman Sachs' hosting the annual Hokies on Wall Street event in April 2014. Cooke also gives back to his profession by chairing the board of the National Association of Black Accountants (NABA).

"The chance to be a mentor and help develop a sense of community in the professional world is fantastic," he said.

During his student years at Virginia Tech, Cooke said he found a strong sense of community, which was fostered in part by Barbara Pendergrass, whom he considered a mentor. She was an assistant to the vice president for student affairs while Cooke was enrolled, but she later served as dean of students for many years.

"To my mother's horror, I had a scholarship offer at U.Va. and still came to Tech, which gave me no money, but I loved the people and the campus," Cooke said.

After his mother let him chose the school he thought best fit him, Cooke did follow her urging to study accounting because it was a field with strong hiring demand. After earning his degree, Cooke, who is a certified public accountant, worked for Coopers & Lybrand, Philip Morris USA, General Electric, and Genworth Financial before joining Goldman Sachs, where he oversees financial and regulatory reporting related to derivatives.

"It's really interesting," Cooke said. "In today's environment, with regulatory reform around derivatives, there are always new issues and opportunities to develop both your career and the skills that you have."

Through his involvement in NABA and when speaking with Virginia Tech students, Cooke regularly touts the opportunities available in his field. Giving to support programs in the Department of Accounting and Information Systems that prepare students to take advantage of those opportunities is something Cooke also does regularly.

"I think there's an obligation for people to give back," he said.

Albert Raboteau is the director of development communications.

JIM STROUP

Richard Crowder '60, '62

A Good Harvest

by ALBERT RABOTEAU

Richard Crowder's work in agriculture may have begun with driving mules on a small tobacco farm in Virginia's Mecklenburg County, but it's taken him all over the world in his role as a driving force opening up global trade opportunities.

As an undersecretary with the U.S. Department of Agriculture from 1989 to 1992, Crowder managed the Food, Agriculture, Conservation, and Trade Act of 1990, commonly known as the "Farm Bill," and was the nation's agriculture negotiator for the Uruguay Round of multilateral trade talks that led to the creation of the World Trade Organization. He headed two missions for President George H.W. Bush to the former Soviet Union to address food needs and policies.

He later served as the nation's chief agricultural negotiator for the Office of the U.S. Trade Representative within the Executive Office of the White House—a post with ambassador's rank. After leaving that position, he served as a special advisor to the trade representative's office before joining the faculty at his alma mater in 2008.

"At this stage of my life, I'm doing what I can to give back to help Virginia Tech, particularly the students," said Crowder (agricultural and applied economics '60, M.S. '62), who also earned a Ph.D. from Oklahoma State University.

In 2013, Crowder was appointed the C.G. Thornhill Professor for Agricultural Trade, a position endowed the previous year by C. Gordon Thornhill Jr. (animal science '75). Crowder said having a named professorship is a powerful endorsement that helps his efforts on collaborative projects. Along with teaching, Crowder works on multiple initiatives to promote Virginia agriculture.

The commonwealth saw record levels of exports in 2012 ($2.61 billion) and 2013 ($2.85 billion). The 2014 figures are expected to be announced in March 2015, at the Governor's Conference on Agricultural Trade. That annual event began after Crowder reached out to Virginia's agriculture community to initiate a conference focused on agricultural trade and policy.

"One of the good things about the conference is it brings together Virginia Tech, the Virginia Farm Bureau, Virginia Department of Agriculture and Forestry, and Virginia Port Authority," Crowder said. "You have four key organizations that are linked to the success of agriculture, and those four organizations are working well and collaboratively with each other to promote the interests of Virginia's agricultural and forestry industries."

In addition to his notable accomplishments in the educational and government fields, Crowder has a distinguished history in industry, having held senior executive positions with Wilson & Co., Pillsbury, Armour Swift-Eckrich, DEKALB Genetics, and the American Seed Trade Association.

"He's held a broad range of positions and, at every step of the way, his actions and his work have been important for U.S. agriculture," said Bob Stallman, president of the American Farm Bureau Federation, which in 2013 presented Crowder with its highest honor, the Distinguished Service Award.

Albert Raboteau is the director of development communications.

Permanence:

Endowed chair positions, professorships, and fellowships recognize faculty members of exceptional accomplishment or promise. Made possible by donations, these positions typically provide their holders with funds to support research or supplement salary. Visit http://bit.ly/vtendfac to learn more.

Book Notes

FACULTY/STAFF

nonfiction

Wilson Greenlaw (animal science '64), "Has the Whippoorwill Cried: Recollections, Whoppers, and Rib-tickling Anecdotes from Stafford County by a Native Son," memoir, self-published.

Robert Klauber (Ph.D. engineering science and mechanics '82), "Quantum Field Theory: Basic Principles and Quantum Electrodynamics," textbook, Sandtrove Press.

Grady Koch (electrical engineering '91), "LEGO Optics: Projects in Optical and Laser Science with LEGO," science, Createspace.

James "Jimmy" Page (finance '89, M.S. health and physical education '95), Jon Gordon, and Dan Brittan, "One Word That Will Change Your Life," motivational, Wiley.

Courtney Thomas (political science '02, M.A. '06, Ph.D. planning, governance, and globalization '10), assistant professor, political science department, "In Food We Trust: The Politics of Purity in American Food Regulation," history, politics, University of Nebraska Press.

Chaz Weaver (civil engineering '98), "The Valley Baseball League: A History of Baseball in the Shenandoah Valley," sports, Lulu Publishing Services.

fiction

Frankie Bailey (psychology '74), "The Red Queen Dies," mystery, Minotaur Books.

Robert DiFulgo, (M.A. education '83), "Titanic's Resurrected Secret-HEW," historial fiction, iUniverse.

Jeffrey Johnson (architecture '85), "The Hunger Artist," novel, Meddler Press.

Kirsten Lopresti (communication '92), "Bright Coin Moon," young adult, Sky Pony Press.

poetry

William "Bill" Glose (civil engineering '89), "Half a Man," military, FutureCycle Press.

The College of Architecture and Urban Studies' "50: Photographic Journal 1964-2014" celebrates the college's "spirit of place" over the past half-century. The book is divided into five decades, each with a preceding timeline of key events. While the book is not intended to be exhaustive or comprehensive, the assemblage of images serves as a historical documentary as well as a standalone art book. Find the book at the University Bookstore, Volume II Bookstore on University City Boulevard, and www.50years.caus.vt.edu.

featured author

Jan McInnis (communication '82) has spent more than 20 years as a comedian, comedy writer, and keynote speaker. While at Virginia Tech, she worked as a WUVT disc jockey. Inspired by her years as a marketing director, McInnis has spent 20 years performing comedy and humor keynotes for thousands of organizations. She has sold jokes to radio stations, greeting card companies, websites, a syndicated cartoon strip, and late-night television shows. An excerpt of her self-published memoir, "Convention Comedian: Stories and Wisdom from Two Decades of Chicken Dinners and Comedy Clubs," is reprinted below.

I once got to do comedy at a company party on a turntable, or Lazy Susan for those of you over 50. The room was stationary but the part of the floor that I performed on spun around, making a 360-degree lap every 10 minutes. In a 60-minute show, everyone got to see my face six times. There was a wall behind me, so people on each side of the room couldn't see each other, which made it even more interesting because I'd spin slowly into one part of the room, annoy the people who had forgotten there was comedy, and then I'd spin out. Sixty minutes of this. …

I got another chance to spin at an event a few years later, but instead of the floor spinning, it was just me! The company that hired me said that since there would be more than 1,000 people in attendance, they wanted to make sure everyone could see me. So they put me on a pedestal in the middle of the room, with people sitting all around me, and asked me to spin while I told jokes. I've always wanted to be put on a pedestal— figuratively, not literally. I didn't know about the spinning until I arrived at the event, and the client kept asking me before the show, "So do you think this is okay?" I refused to say yes because I didn't want to take the blame for it, so I just responded, "I'll try it." I did end up having a lot of fun with it, and even though the show went very well, I would not recommend spinning comedy. This is when I decided that being famous would come in really, really handy because I could put my foot down and demand that I not spin. But I needed the money and I'm not famous, so spin I did.

Submission guidelines are available online at www.vtmag.vt.edu/bookreview.html. To submit a book, mail it to Book Notes, Virginia Tech Magazine, 205B Media Building, Virginia Tech, 101 Draper Rd. NW, Blacksburg, VA 24061. You can also email your name, the name of the publisher, the genre, and a brief description of the book to booknotes@vt.edu. We must receive the book within one year of its publication date. Photo by Chelsey Allder.

alumni association

A motto with real meaning

Since President Timothy Sands arrived on campus more than seven months ago, he has made several astute observations about Virginia Tech based on his perspectives of other institutions he has attended or served. One of those observations involves how our university motto is woven so tightly into the fabric of the university and the entire Hokie Nation. *Ut Prosim* (That I May Serve), adopted in the late 1800s, is both a life value and a commitment of paramount importance to students, faculty, and staff. For alumni, the motto remains embedded in their lives and is practiced daily through their professions, volunteerism, and commitments to family and personal relationships.

President Sands' discovery is a refreshing observation and a confirmation of a phenomenon we generally take for granted. Yet there are many examples of how our university benefits from the service rendered by its campus family and its many thousands of alumni spread across the globe. We are fortunate to have a culture of service that is instilled in every student and faculty and staff member, often extending into their lives beyond Tech.

Service at Virginia Tech is best illustrated by the philanthropic and volunteer service projects performed by students, both within student organizations and on a collective basis. Thousands of students come together for large-scale events, such as the annual Big Event, where they perform up to 1,000 service projects on a single Saturday. For a number of years, Relay For Life has been staged as a 24-hour event that raises in excess of $500,000 annually, setting consecutive national collegiate fundraising records for cancer research.

In communities around the world, our alumni engage in every conceivable avenue of service to better their communities and the quality of the human condition. Many of our alumni chapters engage in service activities, and they continue to increase both their hours of service and numbers of projects adopted each year. There is no better tribute to our university than those who honor our motto by living it each day and building on the reputation that so easily captured the attention of our new president. He discovered in his first days on campus that Virginia Tech truly is "for life," an attitude which includes a motto that is practiced with pride and real passion.

Tom Tillar '69

Vice President for Alumni Relations

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contributors

Tom Tillar '69
Vice President for Alumni Relations
Dave Hunt
Communications Director
Shirley Fleet
Class Notes Editor

IVAN MOROZOV

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A. Carole Pratt '72—vice president
Lance L. Smith '68—past president
Thomas C. Tillar Jr. '69—secretary-treasurer

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Susan Bull Ryan '68
Gregory J. Sagstetter '07
Judy McIntire Springer ' 95
Karen E. Torgersen '78, '86
Ellen B. Vance ' 76
G.T. Ward '49, '52*
Justin A. Yalung '05
Kai M. Zuehlke '05

*Honorary directors

DAVE HUNT

The Alumni Association Board of Directors, comprised of 32 elected directors and nine honorary directors, met in October 2014 to review Alumni Association programs, including networking initiatives, diversity outreach, corporate and entrepreneurship activities, student mentoring opportunities, and efforts to engage more alumni. The board meets next in April, with its committees holding various meetings in the interim.

Alumni Association Board of Directors ballot

The Alumni Association Board of Directors nominating committee has proposed the following nominees for election to three-year terms from 2015 through 2018. Please vote for up to six nominees and return the ballot by April 1. Results will be announced at the board meeting in late April.

Return to:
Virginia Tech Alumni Association
Holtzman Alumni Center (0102)
901 Prices Fork Road
Blacksburg, VA 24061

____ Thomas J. Fast (management, finance '06), Long Island City, New York
____ Deborah J. Barackman-Flippo (marketing management '83), Centennial, Colorado
____ Colin L. Goddard (international studies '08), Washington, D.C.
____ Gregory J. Sagstetter (philosophy, political science '07), Moseley, Virginia
____ Brian T. Sullivan (political science '93), Princeton, New Jersey
____ Claudia K. True (biological sciences '81, D.V.M. '86), Ashland, Virginia

Write-in nomination

_____

Signature

_____

New Black Alumni and Ex Lapide societies

New alumni societies have been formed to serve the interests of black alumni and LGBTQA+ (lesbian, gay, bisexual, transgender, queer, asexual, and other) alumni, and the Alumni Association welcomes the opportunity to engage with and learn from these Hokies through the programs created by their societies.

The Black Alumni Society is an organization serving all black alumni. Future activities include the 2015 Black Alumni Summit in Tidewater, Virginia, and the 2016 Black Alumni Reunion on the Blacksburg campus.

Ex Lapide ("out of stone," in Latin) is a society for LGBTQA+ alumni and their allies. Activities include a fall reunion held in October, a fall tailgate with the University of Virginia's Serpentine Society, and the Year Zero Graduation Reception with recent grads.

The societies work to promote closer fellowship among their constituents, establish and strengthen relationships with the university, and assist with the university's ongoing diversity and inclusion efforts.

Both societies are affiliated with the Virginia Tech Alumni Association and the Office of the Senior Vice President and Provost. For more information, contact Latanya Walker at latanya@vt.edu or 540-231-8970. To receive information about the societies, visit www.diversity.vt.edu/alumni and sign up for the mailing list(s).

ANNE WERNIKOFF

The Black Alumni Reunion is just one of the events the Alumni Association sponsors for special constituency groups.

MICHAEL KIERNAN

Class of '64 and the Old Guard

A total of 330 alumni and guests, including 180 members from the Class of 1964, returned to campus in fall 2014 for a 50th reunion. They toured campus to explore how Virginia Tech is inventing the future and enjoyed a Hokie football victory against Western Michigan. Each year, the reunion banquet includes induction into the Old Guard, an organization of alumni who graduated more than 50 years ago.

Alumni who reach this milestone anniversary are automatically members of this honored group of Hokies and are invited to return to campus each year for the Old Guard Reunion. The next Old Guard Reunion, on May 20-22, includes anniversary dinners for the classes of 1945 (70th), 1950 (65th), 1955 (60th), and 1960 (55th), and dinners for the classes of 1961, 1962, 1963, and 1964. Registration opens early in 2015. Learn more and see highlights from the May 2014 Old Guard Reunion at www.alumni.vt.edu/oldguard.

2015 travel tours

Amsterdam

Paris Immersion
AHI
April 6-17 • $3,295*

Cuban Discovery
Go Next
April 9-17 • $5,399*

A Toast to Provence and Burgundy
Go Next, A-ROSA Stella
May 1-9 • $3,669*

Waterways and Canals of Holland and Belgium
AHI
May 2-10 • $2,495*

Isles and Empires of the Adriatic
Go Next, Oceania Cruises' Riviera
May 2-11 • $2,999* (air included)

Southern Culture and Civil War
Go Next, American Queen
May 14-23 • $4,699*

Sicily - Alumni Campus Abroad
AHI
May 15-24 • $2,795*

River Routes and Channel Crossings
Go Next, Oceania Cruises' Marina
May 18-June 3 • $5,299* (air included)

Exotic Mediterranean
Go Next, Oceania Cruises' Nautica
May 19-31 • $3,999* (air included)

Essential Europe Grad Trip
AESU Alumni World Travel
May 22-June 9 • $3,725

Swiss Alps and the Italian Lakes
AHI
June 5-14 • $3,295*

Pearls of the Mediterranean
Go Next, Oceania Cruises' Riviera
June 15-23 • $2,699* (air included)

www.alumni.vt.edu/travel

* Dates and prices are subject to change. Listed price is the base price per person on double occupancy without air, except as noted. Free air is based from select North American gateway cities. The Alumni Association encourages all alumni to consider purchasing travel insurance.

Normandy - Alumni Campus Abroad
AHI
July 1-9 • $2,895*

Coastal Alaska
Hosted by Dwight Shelton, vice president for finance and chief financial officer
Go Next, Oceania Cruises' Regatta
July 7-14 • $2,299* (air included)

Passage of Lewis and Clark Expedition
Go Next, American Steamboat Company's American Empress
July 18-26 • $3,795*

Nordic Pathways
Hosted by Patricia A. Perillo, vice president for student affairs
Go Next, Oceania Cruises' Marina
Aug. 1-14 • $5,499* (air included)

North America's Five Majestic Great Lakes
Go Next, MS Saint Laurent
Aug. 1-10 • $4,199*

Baltic Marvels
Hosted by Tom Tillar, vice president for alumni relations
Go Next, Oceania Cruises' Nautica
Aug. 19-27 • $2,999* (air included)

Coastal Maine and New Brunswick
AHI
Aug. 26-Sept. 2 • $3,895*

Tuscany - Alumni Campus Abroad
AHI
Sept. 16-24 • $2,795*

Jewels of the Aegean and Holy Lands
Go Next, Oceania Cruises' Riviera
Sept. 16-27 • $4,299* (air included)

Iberian Princes and Palaces
Go Next, Oceania Cruises' Marina
Oct. 23-Nov. 3 • $3,799* (air included)

Country Music
Go Next, American Steamboat Company's American Queen
Oct. 24-Nov. 1 • $2,699*

Mediterranean Artistic Discoveries
Go Next, Oceania Cruises' Riviera
Nov. 6-18 • $3,999* (air included)

Nordic Pathways

The splendors of Northern Europe await you while sailing from London to Copenhagen aboard Oceania Cruises' elegant Marina, hosted by Patricia A. Perillo, vice president for student affairs. Depart Southampton for Belgium, and travel back in time in 14th-century Bruges, a lovely city of quaint gabled buildings. Next is eclectic Amsterdam, Europe's dynamic cultural hub filled with galleries and museums, followed by the port of Warnemünde, where a drive takes you to Berlin, a city teeming with landmarks. Explore the "City of Roses and Ruins," Visby, encircled by 13th-century walls, then continue to Helsinki, where ultra-modern masterpieces coexist with stunning medieval structures. Sail to one of Russia's most enchanting cities, St. Petersburg, to visit its cathedrals and majestic palaces. Before concluding your voyage in Copenhagen, admire the old-world charms of Tallinn.

DAVE HUNT

Columbarium expanded
Located on a grassy knoll with a view of the Duck Pond, Virginia Tech's columbarium contains niches for either individual or dual interments. Each niche is covered with a maroon granite square, on which name(s) will be engraved with gold-filled lettering. A few of the first 60 niches are still available to reserve, and an expansion housing an additional 60 niches was recently completed. For more information or to reserve a niche, contact Jay Whitlow at 540-231-6285 or JOWHITL4@vt.edu.

Successful alumni connect through Hokie Nation Networking

The Virginia Tech Alumni Association offers Hokie Nation Networking, a professional networking program designed to bring alumni together to make long-lasting connections. (The association's multifaceted efforts in networking were described in this magazine's fall edition commentary by Tom Tillar.) Whether you are recruiting employees, identifying new clients, or looking for a job or career change, there are Hokies who can help.

A cornerstone of the program is a series of professional networking events that target specific professions and connect alumni with experts in those fields. These events provide opportunities for Hokies to grow in their careers, identify new talent to bring into their organization, and discuss trends in their field.

A recent Hokie Nation Networking event centered on finance took place at the Sobe Bistro and Bar in Arlington, Virginia, on Oct. 28, 2014. Alumni gathered for an evening of professional networking, drinks, and appetizers. The event was sponsored by Wells Fargo, Ameriprise Financial, and Access National Bank. Previous events have focused on real estate, hospitality and tourism, technology careers, and the collective areas of legal, financial, insurance, and banking services.

This spring, the Alumni Association will host a technology-focused event during the South by Southwest festival in Austin, Texas. Open to all alumni, the event will be held from 6-8 p.m. on March 16 at the Capital Factory in Austin.

Proposed or planned events, topics, and locations include startup companies in Blacksburg, Virginia; defense in Washington, D.C.; energy in Houston; finance in Charlotte, North Carolina; aerospace in Huntsville, Alabama; healthcare in Nashville, Tennessee; real estate in Richmond, Virginia; biotechnology in Baltimore; engineering in Greenville/Spartanburg, South Carolina; and startups in Boston. To submit recommendations for an event or to learn more about the program, please contact Katie Marquis at kmarquis@vt.edu.

In addition to events hosted by the Alumni Association, alumni chapters are hosting networking events throughout the country. For information about events taking place in your area, find your local chapter's website or Facebook page at www.alumni.vt.edu/chapters. If you don't have a local chapter and are interested in starting one, please contact Ginny Ritenour at ginnyrit@vt.edu.

To strengthen the networking initiative, the Alumni Association offers a suite of online resources at www.alumni.vt.edu/hnn. The Hokie Nation Network site leverages LinkedIn, the alumni directory, job listings (no PID or password required), webinars, and other career resources designed to help Hokies connect with fellow alumni. These resources can be invaluable to anyone interested in professional networking and career growth.

For more information about Hokie Nation Networking, please visit www.alumni.vt.edu/events/networkingevents.html or contact Katie Marquis at kmarquis@vt.edu.

2015 DRILLFIELD SERIES

The Drillfield Series continues in 2015 with weekends devoted to fine dining, energy, the history and legacy of Southwest Virginia, student applicants, and a women's weekend, along with special events to connect with fellow alumni for a golf tournament or a microbrew festival. Make plans now to attend these events designed for alumni and their families and friends, and take advantage of the specially discounted accommodations available at The Inn at Virginia Tech.

Food for Thought - Feb. 20-21

Experience a taste of the Southern Hemisphere at the Alumni Association's annual food and wine-pairing weekend. Enjoy a light, healthy lunch paired with delicious labels from Australia and New Zealand. A food demonstration by The Grove chef and a wine presentation are also included. At dinner, partake in a progressive sequence of locally sourced food inspired by the flavors of Latin America and enhanced by wines from Chile, Argentina, and more. A Friday option (for an additional $35) includes preparing a meal with an executive chef at one of Tech's award-winning dining halls.

$150 per person

What Fuels our Planet? - March 20-21

At panel discusions with Virginia Tech faculty and industry representatives, hear unbiased perspectives on the energy sources that power the planet. Tour Virginia Tech's energy research facilities. Learn how technology advancements are creating new opportunities to harness alternative energy sources, and how developments at the university have the potential to change local communities and the world. The weekend culminates with the Union Bank Innovation Challenge, at which student teams will present business plans focused on clean energy.

$150 per person

The Rich Heritage of Southwest Virginia - June 5-6

Enjoy lectures and tours of regional homes in this historical look at the pioneers who settled the area in the 18th and 19th centuries, influencing the origin of Virginia Tech. Highlights include a lunch and tour at Smithfield Plantation, the original home of four Virginia governors, with a presentation on the contributions of Col. William Preston and the opening of Kentucky lands for settlement by colonists pushing westward. James I. Robertson Jr., author and Alumni Distinguished Professor Emeritus, will be among the featured speakers.

$150 per adult; $100 per child age 5-12

MICHAEL SHROYER

Alumni and Legacy Weekend July 10-11

The "Day in the Life of College Admissions" program assists 2016 and 2017 high school graduates and their parents in navigating the application process. Program highlights include pointers for conducting an effective college search, a behind-the-scenes look at college admissions, and application preparation tips from admissions professionals.

$130 per adult; $100 per student

Women's Weekend at Virginia Tech July 17-19

Connect to self, to others, and to Virginia Tech. Feed the soul, enlighten the mind, and invigorate the body as we connect and network with alumnae, women friends, family members, and fans, as well as faculty, administrators, staff, and students. You will engage and celebrate with women who love Virginia Tech, while getting to know several of our women leaders, including Professor Laura P. Sands, the university's first lady, and Board of Visitors Rector Deborah Petrine (business administration '78). Join in this special weekend to care for yourself and deepen connections with the Virginia Tech community.

$150 per person

2015 SPECIAL EVENTS

3rd Annual Hokie Classic Golf Tournament at the Pete Dye River Course - June 15

Join fellow alumni, guests, and friends for a captain's choice golf tournament at the award-winning Pete Dye River Course. Registration includes greens fees, cart, scoring and door prizes, a commemorative keepsake, adult beverages, lunch, and a post-tournament dinner in the beautiful clubhouse overlooking the New River. Enjoyable for golfers of every skill level, the tournament will feature several coaches and former players from the university.

$135 per person; $500 per foursome

JIM STROUP

2nd Annual Summer Beer Festival at Virginia Tech - June 27

Calling all craft beer lovers! Experience a unique beer festival with live entertainment, guest appearances, and more than 40 local, regional, and national breweries pouring their best brews. Join friends at the Holtzman Alumni Center for frosty tastings and food favorites from local restaurants. Those who arrive early on Friday, June 26, can join in a "tap takeover" in downtown Blacksburg featuring some of the brews offered on Saturday.

$25 per person in advance; $35 on day of festival; $60 VIP section admittance

For more information on the events, visit www.alumni.vt.edu/drillfieldseries/.

Alumni, we want to hear what you've been doing. Mail career, wedding, birth, and death news to Class Notes, Virginia Tech Alumni Association, Holtzman Alumni Center (0102), 901 Prices Fork Rd., Blacksburg, VA 24061; email the news to fleets@vt.edu; or submit the news online at www.vtmag.vt.edu/submit-classnote.php, where photos may also be uploaded for consideration.

Alumni mailing addresses may be viewed online at www.alumni.vt.edu/directory by logging in with your Virginia Tech PID and password. For assistance, call 540-231-6285.

career accomplishments
weddings
births and adoptions
deceased

'37 **Arthur A. Kirk** (BIOL), Portsmouth, Va., received the Outstanding Individual Philanthropist award from the Association of Fund-raising Professionals.

'40 **William F. Diamond** (ME, EM), Lexington, Ky., 7/28/14.

'41 **J.F. Belton Jr.** (ME), Elgin Air Force Base, Fla., 7/12/14.
William F. Crigler Sr. (CE), Radford, Va., 8/5/14.
Clayton H. Hudson Jr. (CHE, CHE '46), Roanoke, Va., 7/11/14.

'42 **Leroy Hutzler III** (CHE), Portland, Ore., 8/1/14.
Sherwood A. Roudabush (AGED '48), Christiansburg, Va., 7/31/14.
Sebert L. Sisson (AGED), Richmond, Va., 7/23/14.

'43 **Bertram D. Aaron** (EE), Williamsburg, Va., received a commendation from the Virginia Symphony Orchestra for 18 years of work and council.

L. Lee Nottingham Trower (BAD '49), Eastville, Va., 7/19/14.

'44 **Jack S. Harris** (BAD), Glen Allen, Va., 7/24/14.
Robert V. Lester (BIOL), Wytheville, Va., 7/23/14.
Edward W. Norwood (ME '47), Houston, 7/16/14.
Jesse W. Vipperman (AGED), Ridgeway, Va., 8/6/14.

'46 **Clark D. Barger Jr.** (ME), Buchanan, Va., 8/8/14.
John E. Gerngross (EE), Santa Barbara, Calif., 6/26/14.

'49 **Edwin C. Hastings** (BAD '50), Roanoke, Va., 8/9/14.
J.A. Urquhart Sr. (IE '48), Southport, Conn., 8/22/14.

'50 **Harold E. Wingert** (ME) and Vada Anderson, Winston-Salem, N.C., 4/12/14.

A. Jackson Airheart Jr. (ME), Roanoke, Va., 8/11/14.
David B. Brown (ME), Huntsville, Ala., 1/27/14.
Stuart L. Dance III (ASE), State College, Pa., 7/23/14.
Charles T. Hildreth Jr. (ME), Canton, Ohio, 12/28/13.
Ray V. Poole (IE), Winston-Salem, N.C., 8/8/14.
Melvin M. Spence (BC), Virginia Beach, Va., 6/28/14.

'51 **John M. Davis** (MINE), Parker, Colo., 7/26/14.
Richard L. Ford Jr. (ARE), Gloucester, Va., 8/6/14.
Stuart B. Higginbotham (BAD), Granbury, Texas, 7/15/14.
C. Franklin Jordan (AGRN), Chesapeake, Va., 7/22/14.

John Grado, namesake of Virginia Tech's Grado Department of Industrial and Systems Engineering, died Nov. 27. Grado (industrial engineering and operations research '51) grew up in Bristol, Virginia, and enrolled at Virginia Tech at age 16, but suspended his studies to serve during World War II. Grado became chief industrial engineer of Fitchburg Paper Co. in 1956, then became corporate vice president of Litton Industries after the company bought Fitchburg Paper. In 1983, he bought the company from Litton and renamed it Technographics. In 1999, Grado sold the company and retired. He was the first member of the Department of Industrial and Systems Engineering's advisory board and the first member of a college-wide advisory board.

STEPHANIE CRAWFORD PHOTOGRAPHY

Seanene R. White '07, Christiansburg, Va., a son, Jackson Isaiah, 2/19/14.

'52 **R. Gordon Echols** (ARCH, ARCH '54), Lynchburg, Va., 7/18/14.

'53 **Bennett O. Minor III** (DASC), Mechanicsville, Va., 7/29/14.

'54 **Don N. Link** (AGED), Mount Sidney, Va., 7/1/14.
Preston L. Parrish Jr. (CHE), Mechanicsville, Va., 5/26/14.
John W. York (METE, METE '63), St. Petersburg, Fla., 6/10/14.

'55 **W.E. Blalock** (GAG), Baskerville, Va., was inducted into the Virginia Livestock Hall of Fame.
Arden N. Huff (ANSC), Dugspur, Va., was inducted into the Virginia Livestock Hall of Fame.

Lyman H. Reynolds (IE), Kingsport, Tenn., 8/9/14.

'56 **Frederick R. Diehlmann Jr.** (BAD '55), Dunkirk, Md., 8/9/14.
William I. Parker III (BAD), Richmond, Va., 8/1/14.
Jerome G. Theisen (EM), Loganville, Ga., 6/10/14.

'57 **S.A. Burnette** (CHE, CHE '58, CHE '67), Irvington, Va., 8/8/14.
Joseph D. Ford III (ME), Ellicott City, Md., 8/6/14.
Barrett E. Norris (RS), Goose Creek, S.C., 8/2/14.

'58 **Thomas C. Ligon Jr.** (EE), Hull, Mass., 7/15/14.
Wanda Buck Marshall (POUL, EDBS '73), Ashburn, Va., 8/11/14.
Frederick W. Snider Jr. (EE '59), Newark Valley, N.Y., 7/21/14.

career accomplishments
weddings
births and adoptions
deceased

COREY WATKINS, SKYRYDER PHOTOGRAPHY

Catherine Jean Mansdoerfer '11 and Michael Mansdoerfer Jr. '10, Blacksburg, Va., 5/24/14.

DUSTIN GARDNER BOWLER

Dustin L. Gardner Bowler '08 and Lauren T. Robinson '08, Norfolk, Va., 5/31/14.

JOE PARKER

John M. Parker '11 and Kelly M. Phillips Parker '11,'13, Blacksburg, Va., 6/7/14.

MJJ PHOTOGRAPHY

Kara James Vellines '09 and Michael J. Vellines '11, Pembroke, Va., a son, Gavin Michael, 7/12/14.

Robert Turner (architecture '72) died on Oct. 12, 2014. Turner's career as an architect took him to Chicago, London, and Paris before he moved back to Blacksburg in 2011. His accomplishments include designing Utopia Pavilion in Lisbon, Portugal, and Canary Wharf Development in London. He received the 2014 Distinguished Achievement Award from Virginia Tech.

'59 **Fred Webb Jr.** (GEOL, GEOL '65), Boone, N.C., was named a Fellow by the Geological Society of America.

'60 **Robert S. Parker** (EE), Bethesda, Md., 2/7/14.
Ronald L. Thacker (EE '61), San Francisco, 8/14/14.

'61 **Joseph C. Botkin** (ME '62), Oxford, Md., 7/26/14.
Sidney B. Chappell Jr. (BAD), Bullock, N.C., 11/11/13.
Merrill E. Myers (BC), Colonial Heights, Va., 2/21/14.

'62 **James T. Roberts Jr.** (BAD), Savannah, Ga., received the 2013-14 Savannah State University Urban Planning Award for Community Resiliency.

Lee C. Haas (EE), Cary, N.C., 12/13/13.

Robert S. Ponton (GE), Drakes Branch, Va., 8/14/13.
Garland R. Proco (BAD, BAD '66), Hoschton, Ga., 8/8/14.
Clifford D. Russell (PHYS '63), Lakewood, Colo., 7/9/14.

'63 **Robert F. Sawallesh** (MKED), Valrico, Fla., received the Military Officers Association of America Leadership Award.

Ronald W. Frank (BED '69), Newport, Va., 7/9/14.
Roger L. Hayes (DE), Nokesville, Va., 3/14/14.

'64 **Fred L. McConnell** (CE, CE '67, CE '72), Glen Allen, Va., 4/12/14.
Frederick C. Nisbeth Jr. (BAD '63), Richmond, Va., 5/6/14.

'65 **Thomas D. Rust** (CE), Herndon, Va., received the American Society of Civil Engineers' Outstanding Projects and Leaders "OPAL" award.

William L. Griffith (BAD), Danville, Va., 7/4/14.

'66 **Thomas E. Phillips Jr.** (ECON), Ashland, Va., earned an advanced investment strategist certificate in portfolio and risk management from the Investment Management Consultants Association.

C.A. Womack Jr. (PSCI '67), Naples, Fla., 8/4/14.

'67 **Sandra Braly Blanton** (BIOL), Littleton, Colo., 11/15/13.
Richard L. Dorson (PAD '68), Fuquay Varina, N.C., 3/5/14.
Peter Labosky Jr. (FW, FPR '71), Boalsburg, Pa., 8/6/14.
Leonard E. Ringler (BAD), Newport News, Va., 7/13/14.

'68 **Joseph L. Cavallaro** (METE), Seabrook, S.C., 7/21/14.

'69 **A. Robert Kidd Jr.** (BAD '70), Salem, Va., retired after 45 years of service with Kroger Co.'s mid-Atlantic division grocery merchandiser.

George M. Martin (ACCT), Shawsville, Va., 7/11/14.
Charles J. Schultz (MGT), Williamsburg, Va., 7/11/14.
Sharon Wilson Weber (MAED '70), Boyce, Va., 8/2/14.
Klaus C. Wiemer (PHYS), Dallas, 8/8/14.

'70 **Mark F. DiGiulian** (EE '71), Warrenton, Va., 6/27/14.

'71 **John W. Asherman Jr.** (IE '72), Coatesville, Pa., retired after 24 years of service as a financial analyst and director of costing with Jones Apparel Group.

Charles R. Johnson (CE), Reston, Va., 6/28/14.

'72 **Clyde H. Smythers Jr.** (HIST), Blacksburg, Va., 8/12/14.

'74 **H. Wayne Cheek** (AGRN), Waynesboro, Pa., 7/27/14.
Eleanor S. Gray (EDBS), Woodbridge, Va., 8/6/14.
Dalton R. Proctor (EDAD), Cary, N.C., 6/30/14.
Irene Kostin Romano (ENGL, ENGL '75), Wheeling, W.Va., 2/18/14.

'75 **Jim Mize** (FW, AGEC '77), Simpsonville, S.C., wrote a book, "A Creek Trickles Through It," that was awarded first place in craft for excellence in outdoor books by the Southeastern Outdoor Press Association.

Donald B. Beane (PAD '76), Alexandria, Va., 7/4/14.
Paul D. Schweinsberg (BIOC), Burlington, N.C., 8/7/14.

'76 **David R. Lohr** (CHE), Glen Allen, Va., received the 2014 Distinguished Service Award from Virginia Tech's College of Engineering.
David W. Roop (EE), Richmond, Va., received the Institute of Electrical and Electronics Engineers' Power and Energy Society award.
Jimmie L. Wade (ACCT), Roanoke, Va., was appointed to the Tuesday Morning Corp. board of directors.

'77 **John G. Casali** (PSYC, IEOR '79, IEOR '82), Christiansburg, Va., received the Joseph L. Haley Writing Award from the U.S. Army Aviation Medical Association.
Timothy A. McDermott (GEOG '78), Ashland, Va., is chief development officer for FeedMore, an organization comprised of the Central Virginia Food Bank, Meals on Wheels Serving Central Virginia, and the Community Kitchen.
J. Reese Voshell Jr. (ZOOL), Floyd, Va., was named professor emeritus by the Virginia Tech Board of Visitors.

Donald R. Grimes (EDAD), Penn Laird, Va., 7/20/14.

'78 **Bruce G. Wood** (FIN), Maidens, Va., is senior manager at Capital One in Richmond, Va.

Ronda Yarbrough Covington (EDVT), Chesapeake, Va., 7/26/14.
R. Mark Gostel (ARCH '79), Norfolk, Va., 8/8/14.

'79 **Allen F. Harper** (ANSC, ANSC '82, ANSC '92), Franklin, Va., was named professor emeritus by the Virginia Tech Board of Visitors.

Peter R. Beckjord (FOR), Highland, Md., 7/14/14.
Michael J. Luciano (CHEM '73, CHEM), Andover, N.J., 7/28/14.

'80 **Bryan L. Carper** (HIST), Colonial Heights, Va., retired from SunTrust Investment Services after a 32-year career and is now vice president of stewardship ministries for the Virginia United Methodist Foundation.
Irene Ellis Leech (HIDM, HIDM '82, HIDM '88), Elliston, Va., was honored by the Consumer Federation of America for a distinguished lifetime of service to consumers.
Curry A. Roberts (PSCI '81), Richmond, Va., is president of the Fredericksburg Regional Alliance.
Wayne H. Robinson (FIN '81), Greensboro, N.C., was appointed by Gov. Terry McAuliffe to serve on the Virginia Tech Board of Visitors.

Wesley H. Rowley III (BIOL), Springfield, Mo., received Drury University's Faculty Award for Teaching for challenging, engaging, and inspiring students.
Horacio A. Valeiras (CHE), La Jolla, Calif., was appointed by Gov. Terry McAuliffe to serve on the Virginia Tech Board of Visitors.

'81 **Ann Miller Ebberts** (MKTG), Alexandria, Va., is chief executive officer for the Association of Government Accountants.
Thomas D. Mullin (FW '80), Liberty, Maine, received the 2013 Donald Harward Award for Faculty Excellence in Service Learning from Main Campus Compact.

Carol Echols Banks (MKTG), Marietta, Ga., 7/7/14.

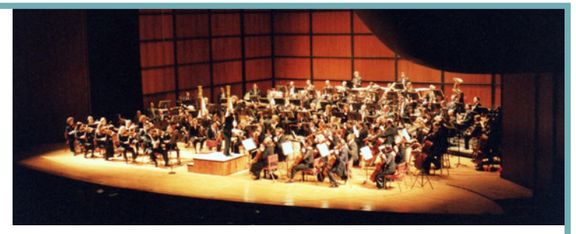
'82 **John F. Moore** (EDCI), Blacksburg, Va., was named managing director emeritus of Technology-enhanced Learning and Online Strategies by the Virginia Tech Board of Visitors.

'83 **Mary Kathryn Burkey Owens** (ENGL), Chesterfield, Va., was named in the 2015 edition of "Best Lawyers in America."

Jennifer J. Boatright (HLED), Williamsburg, Va., 8/13/14.
Lynn P. Hemler (ME), Schwenksville, Pa., 6/27/14.

'84 **Thomas R. Fox** (FOR), Christiansburg, Va., was named the Honorable Garland Gray Professor of Forestry by the Virginia Tech Board of Visitors.
Lillie Anderton Robinson (EDVT, EDVT '89, EDVT '90), Sanford, N.C., was elected as the 17th national president of Eta Phi Beta Sorority Inc.
V. Randall Tinsley (FIW), Summerfield, N.C., was recognized in the 2015 "Best Lawyers in America" guide as an industry leader in the fields of environmental law and litigation.

COURTESY PHOTOS



Bertram Aaron '43 (at right) led efforts to keep the Virginia Symphony Orchestra in Williamsburg.

1940s alum has hand in saving symphony orchestra

by NIKKI CLEMONS

When a declining audience made the Virginia Symphony Orchestra (VSO) consider leaving the Williamsburg, Virginia, area, Bertram Aaron (electrical engineering '43) recruited his friends and, in 1996, organized the Virginia Symphony Society of Greater Williamsburg (VSSGW), a branch of the VSO Board of Directors, to support the symphony so that it could continue to perform.

"I thought it was a disaster," Aaron said of the possibility of losing the symphony. "This is a great symphony, one of the top 10 in the country."

The VSSGW raises awareness and funds for the VSO and arranges social functions and performances. Since the group was formed, the VSO has played four sold-out performances in Williamsburg. In June 2014, the symphony's board of directors adopted a resolution recognizing Aaron's dedication and service.

Organizing the VSSGW has been just one of Aaron's interests. From working with the U.S. Army Signal Supply Agency from 1950-53 to organizing the first West Coast Chapter of the Microwave Theory and Techniques Society, and from organizing and chairing a symposium for the Virginia Breast Cancer Foundation to helping develop the Williamsburg Kiwanis Colonial Polo Cup, Aaron has an illustrious history of service.

On the professional front, Aaron founded an engineering company, Bertram D. Aaron & Co. Inc., and made a commitment to reach out to others. "I made it a point, contrary to others in my industry, to meet the senior executives and senior engineers of the organizations with whom I did business," said Aaron, who is now retired. "It was a constant, invigorating learning experience. I had to deal with all types of people, from the good to the miserable."

Whether running his company or organizing fundraisers, Aaron has prioritized finding common goals with others. "I believe that if you have people motivated to do a job in which they have an interest and ownership, it matters not if it is volunteer or paid."

English major Nikki Clemons was a Virginia Tech Magazine intern.

'85 **Susan G. Magliaro** (EDCI, EDCI '88), Christiansburg, Va., was appointed to Virginia's Standards of Learning Innovation Committee by Gov. Terry McAuliffe.

Nikki D. Shapiro (ANSC), Rye Brook, N.Y., started her own company, "Goal Tender: Engage More. Sell More," a coaching firm that specializes in communication skills for sales and public speaking.

A. Stuart Craig (FIN), Richmond, Va., 7/13/14.

Philip M. Jardine (AGRN), Knoxville, Tenn., 7/9/14.

'86 **Mark J. Abbott** (HIST '85), Delaplane, Va., is co-founder of Revelation Corporate Wellness.

Eldridge R. Collins III (AGE), Cedar Park, Texas, is the global program manager for Dell Inc.'s International Organization for Standardization certifications.

Jean-Venable Robertson Goode (AGEC), Henrico, Va., is president-elect of the American Pharmacists Association.

Bradford A. King (COMM), Ashland, Va., was named in the 2015 edition of "Best Lawyers in America."

James B. Lackey (AOE), Madison, Ala., is executive director of the U.S. Army Aviation and Missile Research Development and Engineering Center at Redstone Arsenal.

Claudia J. Rawn (MATE), Knoxville, Tenn., was named a 2014 American Society for Metals International Fellow.

Clayton B. Davis (MSCI), Arlington, Va., 7/25/14.

'87 **Deborah Brockett Abbott** (HIST), Delaplane, Va., is a co-founder of and personal trainer for Revelation Corporate Wellness.

Carl S. Kirby (GEOL, GEOL '89, GEOL '93), Lewisburg, Pa., was named a Fellow by the Geological Society of America.

'88 **Phillip M. Millett** (MKTG), Crestwood, Ky., retired after 26 years of service in the U.S. Air Force and the Air National Guard.

Michael C. Maguire (AE), Chester Springs, Pa., 8/9/14.

'89 **Tamara D. Pritchard** (CE), Bristol, Va., is the location and design engineer for the Virginia Department of Transportation's Bristol district.

John K. Shaw Jr. (BAD, BAD '91), Martinsburg, W.Va., is assistant vice president for auxiliary enterprises at Shepherd University.

Michael B. Glasgow (CHEM) and Cindi N. Souleret, Richmond, Va., 3/22/14.

'90 **Christina M. Motley** (COMM), Raleigh, N.C., won seven awards at the 2014 National Federation of Press Women Communications Contest banquet.

'91 **Daniel J. Field** (SYSE), Hopkinton, Mass., 7/17/14.

Keith N. Wood (ME), Blacksburg, Va., 7/10/14.

'92 **Graham T. Dozier** (HIST), Richmond, Va., edited a book, "A Gunner in Lee's Army: The Civil War Letters of Thomas Henry Carter."

Kirsten M. Scimecca Lopresti (COMM), Oak Hill, Va., wrote a novel, "Bright Coin Moon."

Mark E. McLain (CE, CE '99), Colonial Heights, Va., was named the Hokie Hero for the East Carolina University football game.

Anthony S. Tate (COMM, BAD '94, ASPT '12), Roanoke, Va., is senior economic development specialist in Virginia Tech's Office of Economic Development.

Rachel L. Brisbin Cox (ME), Chesapeake, Va., 7/6/14.

'93 **Dwayne R. D'Ardenne** (HORT), Roanoke, Va., was awarded the public works manager credential by the American Public Works Association.

'94 **Amy E. Coates Madsen** (HIST), Reisterstown, Md., was appointed to the Internal Revenue Service's Advisory Committee on Tax Exempt and Government Entities.

Charles D. Hartenstine (ARCH), Charlotte, N.C., is an associate with the KSQ/Peterson architectural firm.

C. Patrick Hogeboom IV (CE), El Paso, Texas, was named the Hokie Hero for the William & Mary football game.

Nancy G. McGehee (SOC, SOC '99), Blacksburg, Va., is the head of the Department of Hospitality and Tourism Management at Virginia Tech.

'95 **Teresa Culver Armstrong** (ACCT), Lewisville, N.C., is senior vice president for BB&T in North Carolina.

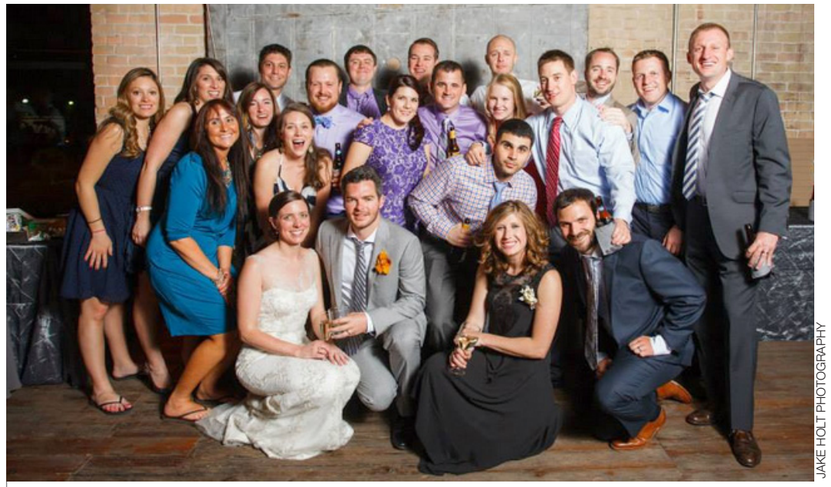
Mary Busardo Glasscock (ACCT), Vienna, Va., is associate vice president and chief business officer at Georgetown University Medical Center.

George T. Probst (ISE, ISE '00), Blacksburg, Va., had his photos featured on Yahoo during Shark Week.

'96 **Caty Borum Chattoo** (COMM), Arlington, Va., hosted a documentary screening series on campus for "Stand Up Planet."

Joshua R. Lorenz (PSCI), Murrysville, Pa., was named to the 2014 Pennsylvania Rising Stars list of the top up-and-coming attorneys.

'97 **Mehul P. Sanghani** (ISE '98, PSYC '04), Vienna, Va., was appointed by Gov. Terry McAuliffe to serve on the Virginia Tech Board of Visitors.



JAKE HOLT PHOTOGRAPHY

Kiel T. Dolence '07 and Cara E. Offterdinger '07, Austin, Texas, 4/5/14.

LINDSAY REAMES

Tony C. Reames '04 and Lindsay Potts Reames '04, Amelia Court House, Va., a daughter, Hollis Shannon, 12/20/13.

ERIK UNGER

Erik David Unger '02, Jamestown, N.C., a son, Isaac Edward, 9/28/14.

CHELSEY ALLDER

Virginia's adjutant general, Brig. Gen. Timothy Williams '85, spoke to cadets in October 2014.

Alumnus serves as Virginia adjutant general

by NIKKI CLEMONS

A Hokie sits at the helm of the Virginia Army National Guard, the Virginia Air National Guard, and the Virginia Defense Force. In June 2014, Brig. Gen. Timothy Williams (management science '85) was sworn in as the new adjutant general of Virginia.

Williams, a member of the Corps of Cadets during his time at Tech, follows a long tradition of service. "My dad was in the Army, and my grandfather was in the National Guard and served in the Navy during World War II," said Williams. "My older brother, Class of '79, was in the corps and also went into the National Guard." After graduating from Tech, Williams spent five years on active duty and then worked at Virginia Tech for two years as a corps recruiter. He went on to become an active guardsman.

His service experience helped prepare him to take on the role of adjutant general. The role was an adjustment as Williams began working at a national level, engaging with congressional and state delegations and working with senior military leaders, the National Guard, the Army, and the Air Force, he said.

Williams' time in the corps molded him. "It certainly did shape my early career and my want to serve and then go into the military," Williams said. "I would credit the corps with my ability to do well as a lieutenant and captain. Virginia Tech has been a big part of our family. My wife was in the corps, my sister was in the corps, and my cousins were Hokies, as well. It's a family affair."

On Oct. 30, Williams came to campus as a guest of the Corps of Cadets' Maj. Gen. W. Thomas Rice Center for Leader Development to speak about the benefits of joining the National Guard and the Virginia National Guard, as well as the organizations' values embodying the slogan, "Always Ready, Always There."

English major Nikki Clemons was a Virginia Tech Magazine intern.

career accomplishments
weddings
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deceased

'98 **James G. Jenkins** (GBUA), Blacksburg, Va., received the 2014 American Accounting Association/ Deloitte Foundation Wildman Medal Award for his study on how brainstorming meetings can help auditors detect fraud.
David B. Langston Jr. (PPWS), Suffolk, Va., is director of Virginia Tech's Tidewater Agricultural Research and Extension Center.
Amy M. Zielenbach (PSCI), Tampa, Fla., is senior underwriter for Payroll Management Inc.

'99 **Myra Blanco** (ISE, ISE '02), Christiansburg, Va., is director of Virginia Tech Transportation Institute's new automated vehicle center.
Heather J. Dunahoo (ACCT), Chicago, Ill., was appointed as assistant inspector general for audits for the U.S. Railroad Retirement Board's Office of Inspector General.

'00 **Dorothy Bagwell Durband** (HIDM), Lubbock, Texas, is director of the School of Family Studies and Human Services at Kansas State University.
Justin D. Fair (BCHM), Indiana, Pa., is an associate professor in the Department of Chemistry at Indiana University of Pennsylvania.

James B. Bean (HNFE, BAD '13) and **Katherine K. Maloney** (HD '14), Arlington, Va., 4/12/14.

Charity Gravitt Chung (BCHM), Montgomery Village, Md., a son, 3/1/14.
Brian Slingerland (FIN), South San Francisco, Calif., a daughter, 5/24/14.

'01 **Stephanie R. Mendez** (ACCT), San Francisco, is senior manager for Ernst & Young LLP.

Samantha Woods Scaman (MGT), Springfield, Va., a son, 8/29/14.
Matthew C. Snare (CE, CE '02) and **Miriam Scheidt Snare** (AE '02), Nottingham, Md., a daughter, 4/26/14.

'02 **Katherine E. Annett-Hitchcock** (CT), Raleigh, N.C., is an associate professor at North Carolina State University.
Sara J. Baker (COMM), Lincoln, Neb., received a doctorate in communication from the University of Nebraska-Lincoln and accepted a tenure-track position in Eastern Illinois University's Department of Communication Studies.

Adam S. Bengston (CPE) and **Lisa V. Conley-Bengston** (ARCH '05), Knoxville, Tenn., a son, 7/18/14.

'03 **Matthew Butt** (PSCI), Poway, Calif., was named the Hokie Hero for the Georgia Tech football game.
Ashlie Kiracofe Howell (MKTG), Middlebrook, Va., was elected to the Virginia Foundation for Agriculture in the Classroom.
Amy E. Kiser (TA), Marion, Va., was a finalist in the Women's Health Magazine "Next Fitness Star" competition.

James S. Miller (ME) and **Kate D. DeBragga Miller** (EPP '03, MNR '13), Lynchburg, Va., a daughter, 1/11/14.

Harold D. Pitts (BAD), Clearwater, Fla., 6/28/14.

'04 **Christopher J. Vavricka Jr.** (PSYC, LSBC '09), Marlton, N.J., is a Fellow at Okayama University in Japan, where he conducts research.

Matthew D. Hickman (CSES, AAEC) and **Tara S. Hickman** (BIOL, VM '08), Horntown, Va., a son, 10/30/13.
Anthony C. Reames (CSES) and **Lindsay Potts Reames** (AAEC, PAPA '06), Amelia Court House, Va., a daughter, 12/20/13.

'05 **Monica Kimbrell** (HD, HD '13, GSCR '13, GSCR '13), Blacksburg, Va., is director of student recruitment and career development for Virginia Tech's College of Liberal Arts and Human Sciences.

Robert L. Mott III (ME) and **Amory Cooper Mott** (ME '07), Roanoke, Va., 6/28/14.

Morgan L. Bracken (CS) and **Erin Hawkinson Bracken** (COMM '05), Arlington, Va., a son, 6/6/14.
David C. Parsons (AAEC) and **Rebecca B. Parsons** (BIOL), Chatham, Va., a daughter, 8/24/14.

'06 **Adam S. Abramson** (ENGL), Brooklyn, N.Y., the director of digital marketing for NBC's late-night shows, won an Emmy award with "The Tonight Show Starring Jimmy Fallon."
Johanna L. Gusman (BIOL), Manila, Philippines, was awarded a 2014-15 Fulbright-Clinton Fellowship in Samoa.
Travis S. Ireson (SOC), Big Stone Gap, Va., was named the Hokie Hero for the Western Michigan football game.

Sarah A. Misyak (HNFE, HNFE '08, HNFE '14), Christiansburg, Va., was selected for the first class of Engagement Faculty Fellows at VT Engage: The Community Learning Collaborative.
Sonia A. Schmitt (BAD), McLean, Va., is senior director for General Dynamics Information Technology's Intelligence Solutions Group.

Stacy Whipple Daley (FIN) and J.C. Daley, Fairfax, Va., 4/26/14.

Benjamin W. Deen (MKTG) and **Cynthia Ahari Deen** (AHRM '07), Leesburg, Va., a son, 9/11/14.

'07 **Nicholas T. Fisher** (HNFE), Forest, Va., earned a doctor of pharmacy from Virginia Commonwealth University.
Andrew P. McCoy (BCSM, DEDP '08), Blacksburg, Va., was named a Preston and Catherine White Fellow by the Virginia Tech Board of Visitors.

Kevin O. Denny II (CS) and Jamie S. Ross, Greenbelt, Md., 2/21/14.
Cara E. Offterdinger (ENGL, PSCI) and **Kiel T. Dolence** (PSCI), Austin, Texas, 4/5/14.
Kyle A. Edwards (HIST) and **Maggie E. Crosby** (MKTG '09), Staunton, Va., 7/5/14.
Kelly L. Griffin McCann (BIOL) and Peter McCann, Christiansburg, Va., 3/15/14.
Bradley J. Shepherd (ME) and **Laura Richards Shepherd** (BIT), Virginia Beach, Va., 8/9/14.

Caroline K. Osborne (CHEM, BIOC), Lovettsville, Va., 9/4/14.

'08 **Joshua W. Petrus** (AHRM), Watertown, N.Y., was named the Hokie Hero for the University of North Carolina football game.
Paul D. Roche III (STAT), Herndon, Va., is a mathematical statistician for the U.S. Army Test and Evaluation Command.

Abhishek Roy (MACR), Minneapolis, received the Sustainability Innovator Award from Dow Chemical Company and the 2014 Virginia Tech Outstanding Recent Alumni Award.
Darren M. Zega (ME), Vienna, Va., was named the Hokie Hero for the Ohio State football game.

Laura Valentine Breedlove (ITDS) and William B. Breedlove, Birmingham, Ala., 6/14/14.
Dustin L. Gardner (ME) and **Lauren T. Robinson** (PSYC), Virginia Beach, Va., 5/31/14.
Elizabeth Rogers Johnson (BIOL, PSYC) and **Matthew S. Johnson** (CEM), Wendell, N.C., 8/7/14.

'09 **Kristen L. Casto** (ISE), Ashburn, Va., received the Joseph L. Haley Writing Award from the U.S. Army Aviation Medical Association.
Allison B. Chambliss (CHE), Baltimore, Md., earned a doctorate in chemical and biomolecular engineering at Johns Hopkins University.

Ryan C. Neely (MKTG), Greensboro, N.C., is director of digital at Salesfactory + Woodbine.
Nathan B. Roberts (FIN) earned his wings with the U.S. Marine Corps and is stationed in Okinawa, Japan.

Brian A. Ball (BIO) and **Michelle S. Skeen Ball** (COMM, ENGL), Charlottesville, Va., 6/28/14.

Kara James Vellines (ENGL) and **Michael J. Vellines** (CE '11), Pembroke, Va., a son, 7/12/14.

'10 **Catherine L. Kropff** (EDPE), Roanoke, Va., is director of Hokie Wellness in the Department of Human Resources.

Michael L. Mansdoerfer Jr. (PSYC) and **Catherine Christensen Mansdoerfer** (HNFE '11), Radford, Va., 5/24/14.
Erik J. Thomas (FIN) and Jennifer D. Thomas, Raleigh, N.C., 7/4/14.

career accomplishments
weddings
births and adoptions
deceased

BRETT PRICE

Laura Valentine Breedlove '08 and William Brian Breedlove, Nashville, Tenn., 6/14/14.

'11 **Laura B. Farmer** (GSCR, EDCO), Salem, Va., was named an assistant professor in the Virginia Tech College of Liberal Arts and Human Sciences' educational research program.

Kelsey A. Pecsek (COMM), Fort Worth, Texas, is managing editor of Quarter Horse News, a magazine covering the Western performance horse industry.

Patricia S. Smith (BAD), Christiansburg, Va., is director of multicultural programs and services at Virginia Tech.

John M. Parker (ENSC, CSES) and **Kelly M. Phillips Parker** (BIOL, HNFE, PH '13), Milford, Va., 6/7/14.

'12 **Christina C. Duell** (BSE), Oakton, Va., is serving in Panama with the Peace Corps, working on water and sanitation projects.

Emily M. Jasper (BAD), Richmond, Va., is content manager for Create Digital and attended the 66th Emmy Awards to interview winners and celebrities.

Nicholas A. Roberts (BIOC), Woodbridge, Va., graduated from the University of Virginia School of Medicine and received a leadership award. He earned his wings with the U.S. Marine Corps and will be stationed in Okinawa, Japan.

'13 **Kathryn E. Berlin** (HD), Herndon, Va., was selected for the Richmond Teacher Residency at Virginia Commonwealth University.

'14 **Kathryn Fiedler** (PPWS), Painter, Va., received a Fulbright grant to study agricultural processes and food safety in Bangladesh.

Shernita L. Lee (GBCB), Blacksburg, Va., received the Stroobants Award for Exemplary Graduate Scholarship in Virginia Tech's Initiative for Maximizing Student Development program.

Erica A. Lee (SOC), Blacksburg, Va., received the Fralin Life Science Institute Award for Exemplary Undergraduate Scholarship in Virginia Tech's Initiative for Maximizing Student Development program.

obituaries

faculty/staff

Karen J. Brewer, professor of inorganic chemistry in the Department of Chemistry in the College of Science, died Oct. 24, 2014. Throughout her career, she regularly visited K-12 classrooms and hosted students to promote chemistry as a career choice for women, and she received a College of Arts and Sciences Diversity Award in 1996. Her collaborations with other faculty members won the 2010 Popular Mechanics Breakthrough Innovator Award and the 2014 Alumni Award for Outreach.

Grant H. Turnwald, professor emeritus in the Virginia-Maryland College of Veterinary Medicine, died Sept. 27, 2014. An avid sailor and member of the Virginia Tech community since 1998, Turnwald served the veterinary college as associate dean for academic affairs from 1998 to 2009, led the college through important curricular revisions, and updated the college's professional curriculum.

friends

Dorothea "Dot" Torgersen, 84, of Blacksburg, Virginia, the former Virginia Tech first lady and wife of Tech's 14th president, Paul Torgersen, died. She became a Hokie in 1967 when her husband became a department head in the College of Engineering. She was an active volunteer in the community, a gracious hostess who welcomed two generations of Virginia Tech students into her home, and according to her family, "an avid Hokie sports fan who could be difficult to sit next to during games."

Kicking back

by KENEDY MCGRATH
photos by CHELSEY ALLDER

Several months ago, we asked on the Virginia Tech Facebook page for you to tell us where on campus you preferred to spend a sunny afternoon. The response, overwhelmingly, was the Drillfield and the Duck Pond. So we visited those two spots in October. For a photo gallery of additional images from the afternoon, visit www.vtmag.vt.edu.

Kenedy McGrath is a communication major.

"The Drillfield is a perfect spot to practice on Mondays because there is so much space, and it is also gives us publicity because people come up and ask us what we are doing. … There are 40 people on the roster and we are currently undefeated."

—Ragan Walker, captain of the women's rugby team, looking on as (above) senior Dani Barlow tackles freshman Liz Doggett.

"We come out here all the time when the weather is nice for lunch or a dinner picnic. The boys like to feed the ducks—[but] not the geese, because they are mean. … In the spring we actually saw the ducklings follow their mother around the pond and the boys loved it. Ezra loves the fish and Micah loves the ducks."

—Jessica Yalung '08 and her husband, Justin Yalung '05, with Ezra (left) and Micah

"This is our first time this year coming to the Duck Pond because of the weather. Feeding the ducks is a lot of fun because they aren't picky eaters."

—Mahtaab Bagherzadeh, a senior, with senior Ryan Schmitt

"I don't actually come out to the Drillfield that much, but the weather was nice and I'm waiting for practice to start. If I had a grass volleyball net, I would be out here more often. And the Drillfield needs to get Wi-Fi."

—Senior Trevor Kinaman, who plays on the men's club volleyball team

2015 Drillfield Series

The Drillfield Series continues in 2015 with weekends devoted to fine dining, energy, history and legacy, student applicants, and a women's weekend, along with opportunities to connect with fellow alumni for a golf tournament or a microbrew festival. Make plans now to attend these events designed for alumni and their families and friends, and take advantage of the specially discounted accommodations available at The Inn at Virginia Tech.

Feb. 20-21	Food for Thought
March 20-21	What Fuels our Planet?
June 5-6	The Rich Heritage of Southwest Virginia
July 10-11	Alumni and Legacy Weekend
July 17-19	Women's Weekend

2015 Special Events

June 15	Hokie Classic
June 27	2nd Annual Summer Beer Festival

The Rich Heritage of Southwest Virginia
June 5-6

Enjoy lectures and tours of regional homes in this historical look at the pioneers who settled the area in the 18th and 19th centuries, influencing the origin of Virginia Tech. Highlights include a lunch and tour at Smithfield Plantation (above), the original home of four Virginia governors, with a presentation on the contributions of Col. William Preston and the opening of Kentucky lands for settlement by colonists pushing westward. James I. Robertson Jr., author and Alumni Distinguished Professor Emeritus, will be among the featured speakers.

For more information on the events, visit www.alumni.vt.edu/drillfieldseries/.

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