



2014-15 **Annual Report**  
*Global Impressions*



*“As we aspire  
to become a truly global land-grant university,  
we must begin to define what that means for us.”*



# GLOBAL IMPRESSIONS: MESSAGE FROM PRESIDENT TIMOTHY D. SANDS

You never forget your freshman year. This holds true for both undergraduates and presidents. The 2014-15 year was a time of active transition and progress for all of us. The university community embraced the challenge (and embraced me) with optimism and enthusiasm.

During the past year, I have experienced a sense of community unlike anything I've seen elsewhere. The commitment to the discovery, application, and dissemination of knowledge along with the university-encompassing spirit of *Ut Prosim* (That I May Serve) create an ethos that is unique among land-grant institutions. Virginia Tech is a special place and I'm proud to be a Hokie.

The past year brought many landmark achievements that accelerated our potential to become a world-leading research institution, one that is known for both academic excellence and societal impact. Our place in various research and academic rankings rose, and we charted a new pathway to education excellence for undergraduates. We are moving forward to further establish how the land-grant institution can serve all parts of the commonwealth through solutions to everyday challenges. High above ground, we're helping pilot the nation in discovering how to safely and productively use burgeoning unmanned aircraft system technology. Researchers are harnessing the limitless potential of big data to benefit all and discovering new possibilities for diagnosing and treating cancer and brain ailments. And our outreach stretches around the world to help farmers in Africa and Asia.

As we aspire to become a truly global land-grant university, we must begin to define what that means for us. What achievements will we mark in 2047, the year of our 175th anniversary? How will we invent the future and make the world a better place?

In the coming months, the Virginia Tech community will engage in a visioning process to support two connected goals: advancing that aspiration to be a global land-grant institution and addressing the challenges and opportunities presented by the changing landscape of higher education. We must think beyond traditional timelines, mindsets, and paradigms. That's why we're calling the initiative

"Envisioning Virginia Tech – Beyond Boundaries." I encourage you to participate in the process by visiting [www.beyondboundaries.vt.edu](http://www.beyondboundaries.vt.edu).

As we consider our vision for the future, we will continue to vigorously engage the challenges and opportunities of the present. This means we must rethink some traditional "boundaries" that limit our potential and stifle innovation that can move us forward. As you will see in this report, that process has already begun, though we know we must do more.

We will think beyond the boundaries of Blacksburg and Roanoke to imagine a residential campus that extends across the commonwealth to Tidewater and the National Capital Region — and from there, throughout the nation and the world.

We will reach across the boundaries that separate us as individuals and create a more inclusive and diverse community — a community that reflects the rich complexity of the world in which our graduates will live and work.

We will work to remove the traditional disciplinary rigidity that can stifle connectivity, creativity, and innovation.

We will promote traditional scholarship with the expectation that our collaborative efforts will eventually have a purposeful impact on society.

We will seek to move beyond the boundaries of our current funding environment through a strategic focus on building our endowment and advancing relationships with government and industry partners.

We are poised to take the next step in Virginia Tech's evolution into a world-leading, service-to-humanity academy. We will be bold, imaginative, inventive, and connected. ■

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## 42%

of alumni are emotionally attached to Virginia Tech, more than **two times** the national average for other institutions.

Gallup-Purdue Index, 2015

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Match Day — when medical students learn if they've been accepted into a residency of their choice — was a success for every future physician in Virginia Tech Carilion School of Medicine's two graduating classes.



# PURPOSEFUL SERVICE TO SOCIETY

As a land-grant institution, Virginia Tech, in its role as a service-to-humanity academy where human capital and talent are committed to making a positive and lasting impact on the world, recognizes that *Ut Prosim* can take many forms.

## Integrating scholarship and the real world

In the National Capital Region (NCR), the university has implemented a Living Lab Model for education and research that seeks solutions for critical problems facing communities, both locally and around the world.

The living lab is a real-world learning environment that integrates co-creation, exploration, testing, analysis, and innovation in operational settings, building on Tech's presence in Northern Virginia to expose students to significant problems as an integral part of their educational experience. Through Tech's partnership with local government and industry, students learn while working in the operational systems that sustain a thriving metropolis, employing the nation's capital as their personal laboratory.

For example, Virginia Tech's partnership with Arlington County and the county's new fiber infrastructure, "Connect Arlington," wires students into local government, industry, and the public in a network. And through the Living Lab Model, NCR operations leadership, the Graduate School in the Northern Virginia Center, and Arlington County are cooperating to create a graduate certificate in translational public policy studies that is an integration of practice and scholarship designed to foster high-level collaborative planning, problem-solving, and decision-making skills across multiple sectors and organizations.

At the undergraduate level, the School of Public and International Affairs' Washington Semester is a 12-week program based at Tech's Washington-Alexandria Architecture Center. Through internships, course work, field trips, professional development sessions, and opportunities to engage with policymakers around the nation's capital, the Washington Semester links theory and practice in American democracy and governance.

The Washington Entrepreneurial Summer Session (WESS) immerses students in a lively urban neighborhood where they take part in cultural, educational, and social activities; work as part of a team in a new venture or startup company; and learn entrepreneurial skill sets through in-class work and assignments. The WESS program provides an opportunity for students to actively participate in an entrepreneurial ecosystem while at the same time learning about what it means to be an innovator, benefitting both students and the community.

## Just what the doctor ordered

In nearby Roanoke, the Virginia Tech Carilion School of Medicine and Research Institute is yielding positive results — economically and health-wise — for the region and for society in general.

From a purely economic view, the school and institute now have a total annual salary pool (not including benefits) of nearly \$16.5 million. The complex employs 278 people, including 35 doctoral students.

In addition, the medical school has 168 students and the graduate program (primarily in translational biology, medicine, and health, with students studying in both Roanoke and Blacksburg) will have about 82 doctoral students. The research institute's expenditures over the past five years have been more than \$107 million, and the economic impact of these expenditures, using the National Institutes of Health's standard multiplier of 2.21, is \$236 million, not including the salary impact of the medical school or the spending of the medical students.

But the impact of Virginia Tech Carilion School of Medicine and Research Institute is more than just economics. Its presence in the Star City and its link to the university helped persuade Harald Sontheimer, a nationally recognized expert on the biology of glial cells (the brain's most abundant cell type) and professor of neurobiology at the University of Alabama at Birmingham, to move his lab to Blacksburg and Roanoke to direct a university-wide neuroscience initiative as well as the new Glial Biology in Health, Disease, and Cancer Center at the research institute.

During his two decades in Birmingham, Sontheimer was credited with discovery of a major new therapeutic approach for the treatment of glioblastoma multiforme, the deadliest and most prevalent primary brain tumor in humans. Now, he and his team have also identified a gene that inhibits how well glioblastoma patients respond to treatment, and a possible way to suppress that gene in patients who express it.

Sontheimer is using a holistic and integrative approach in all aspects of his research, and that includes collaborating with research teams already studying brain tumors at the research institute and on the main campus in Blacksburg.

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**3,041**  
international  
students enrolled  
in fall 2014, a 6.7  
percent increase  
from 2013.

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# SERVING THE WORLD THROUGH *Ut Prosim*

Service takes many forms and touches lives in many ways.

## 45

1,221 Virginia Tech students studied in 45 countries, an increase of 15.1 percent from 2013-14.

## 10

The Global Education Office awarded 10 Curriculum Globalization Grants to encourage internationalization of courses.

### Taking the CRC model across the commonwealth

Model a research park after the highly successful Virginia Tech Corporate Research Center (CRC), but also add space to live, eat, shop, and exercise. The result is the Tech Center at Oyster Point, a 100-acre development in the heart of Newport News, Virginia, that has started to take shape amid ongoing construction.

Situated adjacent to the Thomas Jefferson National Accelerator Facility and within minutes of NASA's Langley Research Center, Tech Center is rapidly becoming a hub of entrepreneurial innovation for the region. The center is patterned after the CRC, which was named the 2010 Outstanding Research Park by the Association of University Research Parks and is a part of the university's innovation ecosystem, an environment that nurtures and commercializes ideas to benefit society.

- Virginia Tech has been working since 1993 with the Feed the Future Innovation Lab for Integrated Pest Management to raise the standard of living for people in developing countries by confronting new and emerging pest problems and invasive species. In January 2015, the university won a new \$18 million grant to continue that outreach. The Innovation Lab, managed by Virginia Tech's Office of International Research, Education, and Development, will commit its core resources to two groups of countries — one in Africa (Ethiopia, Kenya, and Tanzania) and one in Asia (Vietnam, Cambodia, Burma, Nepal, and Bangladesh).
- Ahmed Aly, from Cairo, Egypt, a mechanical engineering major, had a number of gratifying academic and research experiences at Tech, but just as fulfilling was his part in founding the Theta Delta chapter of Alpha Tau Omega (ATO) and his subsequent role as the fraternity's philanthropy chair.

Service is one of the fraternity's core values, and immediately after it was chartered, ATO partnered with Cycling4aCure, which was founded by Virginia Tech alumnus Patrick Acker in 2013, to raise money and awareness for cancer research and patient support. Then, Aly and five of his ATO brothers biked 200 miles to Charlotte, North Carolina, making stops along the way to donate bicycles to children with cancer.

After completing the Cycling4aCure bicycle trip, the 97 brothers of ATO organized a benefit concert in Burruss Hall that raised \$18,000, far surpassing their inaugural year goal of \$10,000.

- An 11-year veteran of the Virginia Tech Police Department, Senior Officer Stephanie J. Gallemore is known as someone who will always volunteer to take on a new project. So it comes as no surprise to her fellow officers that Gallemore was nominated to represent the university in the Governor's Award program.

In addition to her law enforcement responsibilities, Gallemore heads the department's fundraising efforts for Special Olympics. As part of that, she leads one of the most successful fundraisers held on campus each year, the police department's annual hot dog sale. In addition, Gallemore helps organize the annual Regional Special Olympics basketball tournament, Guns vs. Hoses softball tournament, Color Me Rad 5K, and the annual Law Enforcement Torch Run. ■

## JULY 2014

### McAuliffe fills board seats

Virginia Gov. Terry McAuliffe appoints three new members to the Virginia Tech Board of Visitors: Wayne Robinson '80, of Greensboro, North Carolina; Mehul Sanghani '98, of Vienna, Virginia; and Horacio Valeiras '80, of La Jolla, California. In addition, Michael Quillen '70, of Bristol, Virginia, the founder and retired chairman of Alpha Natural Resources, is reappointed.

### Association bestows economic innovation designation

The Association of Public and Land-Grant Universities (APLU) designates Virginia Tech an Innovation and Economic Prosperity University for its support of economic development in the region and state. James Woodell, APLU's assistant vice president of innovation and technology policy, says of the 14 universities that were chosen, "Not only are they doing good things, but they have a solid understanding of how to keep the momentum going."

## AUGUST

### Gastronomical offerings rank the best

For the third time in eight years, Princeton Review ranks the Virginia Tech dining program No. 1 in the nation. The university also ranks high in other categories in the review's annual college guide, "The Best 379 Colleges," including No. 2 in Town-Gown Relations Are Great; No. 3, Their Students Love These Colleges; No. 5, Happiest Students; and No. 5, Best Quality of Life.



Paul Torgersen (center) with former presidents T. Marshall Hahn (left) and Charles W. Steger (right).

## President and mentor passes away

Paul Torgersen, Virginia Tech's president from 1994 to 2000 and a teacher and mentor to students for 58 years, died March 29, 2015, at age 83.

"As a professor, a dean, and a president, Paul Torgersen has made a tremendous impact upon our institution," Virginia Tech President Timothy D. Sands said. "We are deeply saddened to lose him, but will always remain inspired by his legacy."

The university made major headway in its national profile in academics and athletics during Torgersen's presidency. The Virginia-Maryland College of Veterinary Medicine received full accreditation and U.S. News & World Report ranked the engineering and business colleges among the nation's top 50. During Torgersen's time as dean of the College of Engineering from 1970 to 1990, the college rose from the bottom 10 percent in research rankings nationally to the top 10 percent.

Torgersen's tenure as president saw a dramatic increase in the effectiveness of fundraising for the university, including \$337 million donated in The Campaign for Virginia Tech: Making a World of Difference. In addition, the university's endowment nearly doubled.

Torgersen is the namesake of two prominent structures on campus, Torgersen Hall and the Torgersen Bridge that spans the Alumni Mall.

Despite serving in senior leadership posts for the bulk of his professional career, Torgersen, who referred to himself as "a professor who is also serving as president," remained a dedicated teacher. For 58 years, starting before he arrived at Virginia Tech in 1967 and continuing until spring 2014, he taught at least one course annually. ■

Kids and adults alike benefited from the inaugural Virginia Science Festival.



## SCIENCE FESTIVAL A STATEWIDE HIT

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

Nearby, other Virginia Tech student teams featured in the first-ever, week-long Virginia Science Festival 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 in 16 sites across the commonwealth.

The festival originated when Roanoke-based Science Museum of Western Virginia officials brainstormed activities to bring their educational mission into the community while College of Science Dean Lay Nam Chang and others sought ways to mark the college's 10th anniversary. Based on a proposal for a science fair from Rosaire Bushey, then the college's communications director, the college and the museum joined forces.

A \$10,000 grant from the Science Festival Alliance gave the effort more impetus, and the idea blossomed into a statewide event once U.S. Sen. Mark Warner and fellow U.S. Sen. Tim Kaine agreed to serve as co-chairs. Virginia Tech's Continuing and Professional Education, School of Education, and Institute for Creativity, Arts, and Technology worked together to spearhead the university's contributions.

The festival day in Blacksburg included more than 100 exhibits and speakers, showcasing Virginia Tech's world-class faculty, students, and programs. In other parts of Southwest Virginia, the Bristol Motor Speedway hosted more than 40 teachers for a workshop about engaging students in science through stock cars. 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. ■

## SEPTEMBER

### Campus police welcome new chief

Kevin Foust is named chief of police and director of campus security, a position he had held on an interim basis since February 2014. Foust joined the Virginia Tech Police Department in 2011 as the deputy chief of police and assistant director of security after a 24-year career with the FBI. Foust succeeds Wendell Flinchum, who retired after a 29-year career with the university's police department.

### New transit hub to serve campus

The Board of Visitors discusses design concepts for a future Multi-Modal Transit Facility to be built by Blacksburg Transit on Perry Street, which will become the transit hub for campus. The facility will include an indoor transit rider waiting area, enhanced facilities for the Hokie Bike Hub, and a locked bicycle storage area. Bus loops will replace the current hub in front of Burruss Hall, reducing the number of buses travelling around the Drillfield.

### Building name honors largest university donation ever

The university renames the Signature Engineering Building Goodwin Hall in recognition of the philanthropy of Alice and Bill Goodwin. The Richmond couple committed the largest single donation in Virginia Tech history to assist in construction of the 155,000-square-foot facility. The Goodwins, who initially made their gift anonymously, are charter members of the President's Circle of the Ut Prosim Society, and Bill Goodwin received Virginia Tech's University Distinguished Achievement Award in 2005.



Unmanned aerial vehicles  
could add more than

**\$13.6 billion**

to the national economy by the  
end of the decade.



Virginia Gov. Terry McAuliffe examines a  
drone after a demonstration flight over  
an “accident scene” on the Smart Road.

# TESTING THE HEIGHTS OF TECHNOLOGY

Technology innovation took to the skies at Virginia Tech during 2014-15 as the university's Mid-Atlantic Aviation Partnership continued to explore the integration of unmanned aircraft systems (UAS) into national airspace.

The partnership, which Virginia Tech leads, held demonstrations designed to test everything from checking the viability of proposed energy pipeline routes to delivering medications to remote areas. And in a real-world application, a UAS was used to help look for a missing University of Virginia student.

"The UAS program is a perfect example of what we strive for ... putting an emerging technology to work in ways that will improve our safety and quality of life," said Roop Mahajan, director of the Institute for Critical Technology and Applied Science, which is the headquarters for the Mid-Atlantic Aviation Partnership (MAAP).

In December 2013, the Federal Aviation Administration (FAA) selected Virginia Tech, along with academic partners Rutgers University and the University of Maryland and more than 120 industry partners, as one of six national test programs to conduct research to integrate unmanned aircraft into the nation's airspace. By summer 2014, MAAP's test-site program was fully operational.

In an early demonstration of UAS potential in summer 2014, FAA Administrator Michael Huerta joined leaders from Virginia, Maryland, and New Jersey at the Smart Road in Blacksburg to watch engineers use a multi-rotor unmanned aircraft to gather information at a mock accident scene on an interstate highway.

MAAP also used unmanned aircraft to help Albemarle County authorities look for missing student Hannah Graham in October 2014, and then in November 2014 held a meeting to introduce emergency managers and first responders like those involved in the search to possible uses of the technology.

Later in the year, the partnership used a fixed-wing unmanned aircraft to inspect an energy pipeline route near Fork Union in rural Virginia. The flight was a step toward safer and more economical aerial inspections, researchers said.

"If we validate unmanned aircraft technologies, we can reduce risks to pilots and the public and more efficiently protect the country's critical infrastructure," said David Yoel, chief executive officer of American Aerospace Technologies Inc., which provided the unmanned aircraft.

In June 2015, MAAP also received FAA authorization to use research flights to deliver pharmaceuticals and other medical supplies to a free medical clinic site in Wise, Virginia.

"This is an example of using UAS technology for a socially significant purpose while also opening up economic opportunities," said Jon Greene, MAAP's acting associate director.

## Forecasting the future with big data

Another leading technology effort at Tech also involves clouds — of a sort. Scientists and researchers in Blacksburg and Northern Virginia working with big data are leading the field into new realms of innovation.

One project is Early Model Based Event Recognition using Surrogates, or EMBERS — Virginia Tech's effort to harness torrents of data to generate early warnings of events with a broad social impact. To accomplish this, the computer science department's Discovery Analytics Center (DAC) collects open-source information from satellite images, Facebook, Twitter, news, economic indicators, Google searches, and more. In the EMBERS system, a variety of data filters and distinct models identify patterns, and the outputs are fused in a final model that helps researchers forecast specific events.

Since its inception, the EMBERS team has correctly forecast such events as the riots after Paraguay's president was impeached, the Hantavirus outbreaks in Argentina, and election outcomes in Panama and Colombia.

"By creating DAC, we have brought together an interdisciplinary group of researchers from computer science, statistics, electrical and computer engineering, and mathematics," said Naren Ramakrishnan, the Thomas L. Phillips Professor of Engineering and DAC's director. "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."

In another big data project, this time 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. A team modeled human behavior using a combination of data

sources to simulate a nuclear detonation in Washington, D.C.; depict the behavior of more than 730,000 simulated residents; and evaluate the emergency response.

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 certain activities, such as finding family members.

Other efforts with big data implications include:

- The Bradley Department of Electrical and Computer Engineering compiles radio astronomy data to advance knowledge of cosmology, pulsars, and other heavenly phenomena.
- The Pamplin College of Business has launched the Center for Business Intelligence and Analytics, an interdisciplinary resource that encourages big data research among faculty members, study among students, and applications in the business world.
- Big data research has also led to a series of new majors and concentrations, as well as the injection of big data into numerous courses.

## TEACHING COMPUTERS THROUGH CLIP ART

Today's computers can play chess, vacuum floors, and win at "Jeopardy," but they have little in the way of common sense.

Devi Parikh, an assistant professor in the Bradley Department of Electrical and Computer Engineering, is hoping to change that with the help of clip art and a \$1 million Allen Distinguished Investigator Award from the Paul G. Allen Family Foundation.

Parikh uses cartoon scenes crafted from clip art to help computers "read" complex images. "The visual world around us is bound by common-sense laws depicting birds flying and balls moving once they've been kicked, but much of this knowledge is hidden from the eyes of a computer," she said. Computers, in other words, might have a lot of information about avian wing structure, but they don't necessarily know that birds fly.

"Simply labeling images with this information does not address the underlying problem of how it all fits together," Parikh said.

Parikh proposes to use crowdsourcing, leveraging hundreds of thousands of online workers, to illustrate the visual world using clip art. By learning to associate certain visual elements with the information in the text, the computer may eventually accumulate a lexicon of common sense that will help it understand the visual world like humans do.

"Learning common sense will make our machines more accurate, reasonable, and interpretable — all imperative toward integrating artificial intelligence into our lives and society at large," Parikh said.



The Mid-Atlantic Aviation Partnership includes test sites in Virginia, New Jersey, and Maryland and features more than 120 industry partners.

### SEPTEMBER 2014

#### Governor helps kick off college anniversary

Virginia Gov. Terry McAuliffe recognizes the 50th anniversary of the College of Architecture and Urban Studies with a certificate that highlights several achievements of the college over the past five decades.

### OCTOBER

#### University first to earn emergency designation

Virginia Tech is the first college or university in the country to earn accreditation by the Emergency Management Accreditation Program. Since the program's inception in 1997, only 54 emergency management programs have achieved accreditation, which involves meeting 64 rigorous national standards.

#### Lane Hall gains historic status

The Virginia Department of Historic Resources adds Lane Hall to its Virginia Landmarks Register. Three months later, Lane is also added to the National Register of Historic Places, only the second building on campus to be so designated (Solitude was the first). Constructed in 1888, Lane Hall was originally called Barracks No. 1.



## Students to navigate new educational paths

After two years consulting with all segments of the university community and learning from faculty members who piloted new courses and developed academic minors, Virginia Tech's University Council approved Pathways to General Education to replace the current Curriculum for Liberal Education.

The plan offers students three pathways to fulfill their general education requirements:

- A distributed model in which students choose approved courses from each learning outcome. This option is the one that is most similar to the current Curriculum for Liberal Education.
- Pathways Minors, which are interdisciplinary and designed to fulfill multiple learning outcome requirements.
- An Alternate Pathway, which is individualized by the student with oversight from a faculty advisor. This option may include such experiences as education abroad, undergraduate research, service learning, internships, co-curricular experiences, and more.

"It is our responsibility to give students the skills to succeed in a diverse and complex world," said President Timothy D. Sands. "The Pathways to General Education curriculum empowers students to choose a pathway that aligns with their goals and interests while meeting the needs of employers that are looking for graduates who can think critically, communicate clearly, and solve complex problems. Integration of ethical reasoning and intercultural and global awareness across the curriculum is in alignment with the university's InclusiveVT efforts."

Student voices were critical. The general education leadership team gathered feedback through the Student Government Association, student representation on governance committees, and focus groups comprised of various types of students.

Over the past academic year, eight faculty members served as Pathways Faculty Scholars, piloting courses and developing minors that promote best practices for general education.

Members of the University Curriculum Committee for Liberal Education with support from the general education leadership team will now develop an implementation plan that will proceed through the university governance system. The intent is for Pathways to General Education to be in effect for students entering in fall 2016. ■



## A WHIRLWIND OF WEATHER RESEARCH

When The Weather Channel meteorologist Jim Cantore stepped into a EF-5 tornado re-created in 3-D in a four-story immersive installation at Virginia Tech, his perspective was that of someone 7,000 feet tall. Beneath him was the landscape of Moore, Oklahoma. Around him was the storm that killed 24 people in May 2013.

With support from Virginia Tech's Institute of Creativity, Arts, and Technology (ICAT), a student and faculty team from the geography department in the College of Natural Resources and Environment created the storm in the Moss Arts Center facility known as the Cube — a highly adaptable space for research and experimentation in 3-D virtual environments.

The tornado project was born when Bill Carstensen, professor and head of the Department of Geography, told Benjamin Knapp, director of ICAT, about instructor Dave Carroll's 3-D images of storms. "We could build a tornado in the Cube," Carstensen told Knapp during intermission at an event at the Moss Arts Center.

Kenyon Gladu, a junior majoring in meteorology, and Trevor White, a master's student in geography, worked with radar data and did programming to retrieve and render NEXRAD (Next-Generation Radar) data from the Moore storm. Institute staffer Run Yu, a computer science doctoral student, placed the storm in the Cube.

The Cube allows complete tracking of where a subject is standing, moving, and looking. An Oculus head-mounted display provides an image of what the subject would see from any vantage point. If there are two people in the cube, they will see each other as avatars and will be able to see different points of view and exchange information.

"It's like a game environment in which you are embedded in the computer," explained Carroll. "You can then study storms from different perspectives than in the field. The ultimate goal is to bring real-time radar into the Cube. This has great potential for emergency managers." ■

The Weather Channel meteorologists Jim Cantore (kneeling) and Greg Forbes (standing, headset on) experience a 3-D tornado from the perspective of 7,000 feet in the air. The ultimate goal is to bring real-time radar into the Cube, which could aid emergency managers dealing with catastrophic weather events. Looking on in the coat and tie is Ben Knapp, director of the Institute of Creativity, Arts, and Technology.

## NOVEMBER

### Ceremony marks Sands' official installation

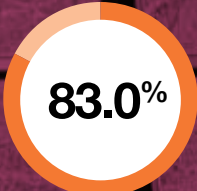
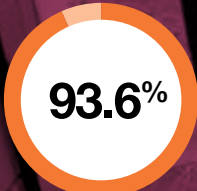
Virginia Tech's 16th president, Timothy D. Sands, is installed, with France A. Córdova, director of the National Science Foundation, delivering remarks at the formal ceremony. Sands had served as executive vice president for academic affairs and provost at Purdue University before taking over at Tech on June 1, 2014.

### Distler retires his voice

Paul A. "Tony" Distler retires as the voice of the Marching Virginians' halftime show after 40 years. Distler, an Alumni Distinguished Professor Emeritus, created the university's performing arts program after he came to Tech in 1967. He retired in 2004, but remains active as a teacher, performer, director, television host, producer, and nonprofit consultant.

### Research chief announces retirement

Robert W. Walters, vice president for research, announces he plans to retire Sept. 1, 2015. Walters has served Virginia Tech for 30 years, including eight years in his current role. During his tenure, research expenditures at the university grew by approximately \$191 million — from \$321.7 million in 2006 to \$513 million in 2014 — and its research expenditure ranking climbed to 38th.



Common space in the Human and Agricultural Biosciences Building 1.

# PUSHING BEYOND ACADEMIC BOUNDARIES

Universities must continually evolve in order to progress and create academic environments that prepare students to “respond to the challenges of a complex world,” as called for in Virginia Tech’s 2012-18 strategic plan, “A Plan for a New Horizon.” In order to thrive and to carry out the university’s motto, *Ut Prosim* (That I May Serve), today’s graduate must be able to work and think across disciplines and cultures and navigate a global marketplace of ideas.

In 2014-15, the university designed and approved a new general education curriculum, Pathways to General Education, and fashioned new majors and programs to provide greater academic depth and variety.

The efforts have been paying off. By February 2015, applications set a record, as more than 22,200 prospective students applied for the Class of 2019, a 7.6 percent increase over applications for the Class of 2018.

Among the new and innovative programs that are helping attract that diverse pool of talent:

- Computational modeling and data analytics is an interdisciplinary major in the College of Science that connects with the university’s strengths in big data. Bringing together mathematics, statistics, and computer science, with support from application disciplines, the degree program combines mathematical modeling, modern data science, and high-performance computing to teach students how to obtain and analyze data to create meaningful models. It will also address important ethical and policy considerations concerning the collection and use of data.
- The State Council of Higher Education for Virginia (SCHEV) approved two new majors for spring 2015 — microbiology and nanoscience. The bachelor’s degree in microbiology is the first program of its type in the commonwealth. Students with advanced microbiology knowledge are recruited into the broadest range of health, industrial, and environmental activities. The bachelor’s degree in nanoscience, which brings together physics, geosciences, chemistry, and biology, is only the second in the nation. It solidifies Virginia Tech’s place as a leader in research and education in one of the most critical technologies of the future.
- SCHEV also approved an undergraduate degree in neuroscience, which will be based in the College of Science’s Academy of Integrated Science starting in fall 2015. The new program continues the momentum started in 2011 when the College of Science introduced the Integrated Science Curriculum, creating a fully interdisciplinary approach to science by incorporating physics, chemistry, mathematics, biology, and statistics in a single four-semester course of study.
- Another degree approved for fall 2015 was the comprehensive bachelor of science — dubbed “water: resources, policy, and management” — housed in the College of Natural Resources and Environment, which had partnered with four other colleges to offer the program. Blending courses in water science with those in water policy, law, economics, management, and related social sciences, the program is the first of its kind at the undergraduate level in the United States and one of the most innovative interdisciplinary offerings in the country. The program addresses an expected 19 percent job growth in positions requiring a comprehensive understanding of water issues.
- The Department of Sociology added a major in criminology, while the English department began offering three distinct majors: literature and language, creative writing, and professional and technical writing. Meanwhile, the apparel, housing, and resource management department added a bachelor’s degree in residential environments and design.
- The University of Kent, Brussels, Belgium, partnered with Tech to offer graduate students the Two Capitals, Two Masters program, an innovative way to obtain two advanced degrees in international affairs in the capital cities of Brussels and Washington, D.C. The program is administered through the School of Public and International Affairs in the College of Architecture and Urban Studies.

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A record number of applications in 2014-15 led to a record

**6,300**  
**students**

matriculating in fall 2015.

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**7,911**  
**degrees**

were conferred in 2014-15.

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#1

Best campus  
food

#2

Town-gown  
relations  
are great

#3

Their students  
love these  
colleges

#5

Happiest  
students

#5

Best quality  
of life

## INTELLECTUAL PROPERTY CHANGE TO BOOST ENTREPRENEURSHIP

In addition to adding and adapting classes and majors, efforts to encourage student innovation got a huge boost when the Board of Visitors approved revisions to the university's intellectual property policy.

The guidelines clarify that the university generally does not claim ownership of intellectual property created by students. If students create intellectual property during academic course work, the students retain ownership of the idea as long as they aren't being paid by the university, the university has no pre-existing obligations in connection with the intellectual property, and any tools used in the development of idea are available to other students in the course.

"An important part of Virginia Tech's land-grant mission is to advance industrial and commercial uses of intellectual property, such as new inventions," said Dennis Dean, interim vice president for research. "We encourage activity that enriches our innovative culture and provides useful experience to entrepreneurial-minded students with exciting ideas, and the policy clarifies situations when the university does not claim ownership of ideas."

## STUDENT PERFORMANCE RECOGNIZED

In 2014-15, a number of students were recognized for their efforts to solve local, national, and international problems.

**Junior Beauvais**, a Haitian native who was pursuing his associate degree in agricultural technology in the College of Agriculture and Life Sciences, received a grant of about \$16,000 from the multinational pasta company Barilla to chase his dream of starting an heirloom seed bank in Haiti to house seeds that he hopes will produce more nutritious and more prolific crops. Better crops in turn will generate more cash for farmers and allow the farmers from his hometown, located near Jacmel in the southern part of the country, to send their children to school.

From surveying rural households in India to assessing the impacts of ovarian cancer progression in Denmark, six other Virginia Tech students and alumnae will be contributing to communities around the world in the 2015-16 year, as four graduate students and two recent alumnae were awarded U.S. Fulbright Student Program grants.

- **Emma Flemmig**, a Ph.D. candidate in crop and soil environmental sciences, will survey households in the Punjab state in India to measure dimensions of food security and agricultural productivity.

### NOVEMBER 2014

#### Alumni donate \$5 million to Pamplin center

Virginia Tech renames the Center for Innovation and Entrepreneurship in the Pamplin College of Business the Apex Systems Center for Innovation and Entrepreneurship in recognition of a joint commitment of \$5 million by alumni Brian Callaghan, Ted Hanson, Edwin "Win" Sheridan, and Jeffrey Veatch.

### DECEMBER

#### Grado department namesake passes away

John Grado, namesake of the Grado Department of Industrial and Systems Engineering, dies at age 87. Grado enrolled at Virginia Tech at age 16 and completed his bachelor's in industrial engineering and operations research in 1951. After entering the paper and printing business, Grado rose rapidly, eventually becoming a vice president of Litton Industries and then buying the former Fitchburg Paper from Litton and renaming it Technographics. Grado served on several College of Engineering boards and donated generously, as well.

### JANUARY 2015

#### Chief fundraiser Flanagan steps down

Elizabeth A. "Betsy" Flanagan, vice president for development and university relations, announces she will move from her position to become a senior fellow for advancement. When she came to Virginia Tech in July 2000, Flanagan immediately outlined an aggressive campaign that eventually raised more than \$1.1 billion, exceeding expectations. As a result of the operations she led, a number of major capital projects, such as the Moss Arts Center and Goodwin Hall, garnered key private support, and the university almost doubled its annual private gift income.





Chemical engineering major Bobby Hollingsworth earned a Barry M. Goldwater Scholarship.

- **Alexandra Hyler**, a Ph.D. candidate in biomedical engineering, will travel to Copenhagen to begin research to understand how the body's natural environment impacts the progression of ovarian cancer.
- **Rachael Kennedy**, a Ph.D. candidate in agricultural, leadership, and community education, will spend a year in Turkey investigating food-oriented social movements.
- **Rachel Kirk**, who earned bachelor's degrees in political science and French, will be serving as an English teaching assistant in Morocco.
- **Amanda Nelson**, a Ph.D. candidate in chemistry, will spend almost a year conducting research in synthetic chemistry in Germany.
- **Janani Ravi**, who earned bachelor's degrees in English and international studies, will serve as an English teaching assistant in Germany.

Three Virginia Tech students were awarded Barry M. Goldwater Scholarships for the 2015-16 academic year. They were **Donovan Buterakos**, a physics major; **Louis "Bobby" Hollingsworth**, a chemical engineering major; and **Christine Tin**, a biological sciences major.

A team of students from the Pamplin College of Business won the Virginia state championship in the annual ACG Cup investment banking case-study competition in Richmond. The M.B.A. students, who shared a \$2,500 prize, are **Ardian Daku**, **Cameron Hale**, **Ziyad Shalaby**, and **Jeffrey Tolley**.

**Students from the College of Architecture and Urban Studies** competed against 33 teams from 27 U.S. and Canadian universities in the second U.S. Department of Energy Race to Zero Student Design Competition and brought home the top awards for Excellence in Analysis and Excellence in Systems Integration. The annual competition is based on a scenario where a builder develops a high-performance home product line so energy efficient that renewable power can offset most or all of the annual energy consumption.

A Department of Aerospace and Ocean Engineering student team won first place in a NASA-sponsored competition with its design of a twin-fuselage unmanned aircraft fueled by liquid hydrogen. The team members, all seniors majoring in aerospace engineering, were **Jordan Ambers**, **Bennett Coffey**, **Katie Hettmann**, **Kyle Johnson**, **Brian Petrosky**, **Tristan Pietrzak**, **Matt Schmit**, **Cory Reed**, and **Sarah Woodward**. ■

## Top incoming student majors:

- General engineering
- University studies
- Biological sciences
- Business
- Human nutrition, foods, and exercise

## FEBRUARY

### Business college looks back at 50 years

The Pamplin College of Business celebrates its 50th anniversary. The college was established in 1965, and in 1969 the building housing it was named for Robert B. Pamplin, a 1933 business graduate who later became chairman and CEO of Georgia-Pacific Corp. The college itself was renamed in 1986 in recognition of a \$20 million gift from Pamplin and his son.

### Hincker to retire

Lawrence "Larry" Hincker, associate vice president for university relations, announces he will retire. Hincker, who holds an M.B.A. from Tech, has served as university spokesperson and the senior communications officer under four university presidents. Among many other accomplishments, Hincker established a branding campaign and a university-wide integrated marketing program.

### Tech is appealing to international students

A new U.S. News & World Report ranking recognizes Virginia Tech as an institution that appeals to students "who plan to enroll in universities outside of their own country." The 2015 U.S. News Best Global Universities ratings focus on academic research with an attempt to quantify three factors: global and regional reputation, research performance based on citations and publications, and data on faculty and Ph.D. graduates.



*“Have you ever been on a ship that’s on fire? It’s terrifying.”* Dominique Pineiro, Navy veteran

One day, robots like the one built by this Virginia Tech engineering team might help sailors fight those fires, as well as keep a constant onboard watch for various dangers.



# GLOBAL SOLUTIONS THROUGH RESEARCH

Virginia Tech continued its momentum in research growth by jumping forward two spots in the ranks of the nation's top research institutions based on 2013 numbers. In addition, in 2014 the university's expenditures crossed the \$500 million mark for the first time.

According to the National Science Foundation (NSF), Tech's ranking rose from 40th to 38th in the nation based on fiscal year 2013's \$496 million in research and development activity. At No. 23, it remains among the top 25 public research universities. And while the ranking for fiscal year 2014 is not yet available, research in the year totaled \$513 million, the highest ever for Tech.

Virginia Tech continues to rank in the top 5 percent of universities in the nation and is the only Virginia institution in the top 50.

"Our ranking as a research institution is just one of the ways to measure Virginia Tech's impact and momentum, and it is a signal to talented people everywhere that we are a university in action," President Timothy D. Sands said. "Virginia Tech's steady growth in research expenditures reflects our commitment to impactful scholarship across the continuum, from curiosity-driven research that leads to unexpected opportunities to problem-inspired research that results in solutions that benefit humanity today."

During 2014-15, Virginia Tech researchers and educators were involved in any number of leaps forward that provided value beyond the numbers involved.

Two projects are centered on discoveries to alleviate the impact of two conditions that profoundly affect children.

Sarah McDonald, an assistant professor at the Virginia Tech Carilion Research Institute, received a \$2 million, five-year grant from the National Institutes of Health to study how a common — and, in the developing world, sometimes deadly — childhood virus builds itself anew.

Rotavirus infects nearly all children worldwide within the first five years of life. It causes severe diarrhea and extreme dehydration, and although treatment is simple rehydration therapy, the lack of modern medical care in parts of the

developing world means rotavirus kills as many as half a million children each year. Despite decades of research, little is known about how the virus propagates.

"We're seeking to close critical gaps in knowledge about how rotavirus replicates its genome in tandem with the early stages of virion particle assembly," McDonald said. "That knowledge could foster the development of next-generation vaccines."

Also at the Virginia Tech Carilion Research Institute, scientists have developed a brain-imaging technique that may be able to identify children with autism spectrum disorder in just two minutes. This test, while far from being used as the clinical standard of care, offers promising diagnostic potential once it undergoes more research and evaluation.

"Our brains have a perspective-tracking response that monitors, for example, whether it's your turn or my turn," said Read Montague, the Virginia Tech Carilion Research Institute professor who led the study. "This response is removed from our emotional input, so it makes a great quantitative marker. We can use it to measure differences between people with and without autism spectrum disorder."

An earlier diagnosis can also have a tremendous impact on the children and their families. "The younger children are at the time of diagnosis," Montague said, "the more they can benefit from a range of therapies that can transform their lives."

## Firefighting humanoid robot blazes new path

Virginia Tech engineering students made history during a five-minute demo that saw their creation — an adult-sized humanoid robot — successfully use a hose to contain a live fire aboard a decommissioned U.S. Navy ship in Mobile Bay, Alabama.

The demo, four years in the making, is part of an effort by the U.S. Navy to better assist sailors in fighting fires, controlling damage, and carrying out inspections aboard ships via user-controlled unmanned craft or humanoid robots. The

## Virginia Tech libraries

**1.2**  
million visitors

**5.4**  
million online searches

**2.5**  
million journal article downloads

**5.8**  
million digital repository downloads of locally created scholarship



Guha Shankar of the Library of Congress and Virginia Tech's David Cline, at the Library of Congress.

## Historian David Cline's oral histories bring the civil rights movement to life

When the Smithsonian's National Museum of African American History and Culture opens in 2016, visitors can tune into the voices of the civil rights movement, thanks to dozens of video oral history interviews conducted by Virginia Tech's David Cline.

An assistant professor of history specializing in 20th-century U.S. social movements, Cline spent the better part of a year traveling the country as a research scholar and a lead interviewer for the Civil Rights History Project, initiated by Congress and managed jointly by the Smithsonian and the Library of Congress.

Among his most memorable interviewees were:

- The Rev. Wyatt Tee Walker, the Richmond minister who was the Rev. Martin Luther King Jr.'s chief of staff and executive director of the Southern Christian Leadership Conference from 1960 to 1964
- John Carlos, one of the two sprinters who raised black-gloved fists on the medal stand at the 1968 Olympics in Mexico City
- Children's author, teacher, and women's advocate Mildred Pitts Walter
- Clarence Jones, who wrote the first draft of King's seminal "I Have a Dream" speech

Cline's work was touted as "invaluable" and "exemplary" by Guha Shankar, folklife specialist for the Library of Congress. "His ability to give the interviewees the space and time to open up and tell their story, and to do so sensitively, empathetically, and without stepping all over them, is quite remarkable," Shankar said. ■

firefighting robot is named SAFFiR, short for Shipboard Autonomous Firefighting Robot, and the U.S. Office of Naval Research envisions a future — long off, but tangible — in which every ship has a robot as a tool for firefighters.

Fifteen engineering students in the Terrestrial Robotics Engineering and Controls Lab and the Extreme Environments, Robotics, & Materials Laboratory helped conceive, design, build, and test SAFFiR, a bipedal 140-pound, 5-foot 10-inch creation. In a narrow ship hallway, the robot had to walk toward a sailor, stop, turn, locate the heat source of a fire behind a door, and (once the door opened) take a hose and blast the flames with water, all without falling or stopping. The robot passed the test.

### **Cutting down on consequences of concussions**

Virginia Tech is pushing forward in its pioneering work preventing sports head injuries by participating in a landmark \$30 million effort by the National Collegiate Athletic Association (NCAA) and the U.S. Department of Defense to combat concussions among college athletes and active service military personnel.

The initiative funds the most comprehensive study of concussion and head impact exposure ever conducted. It will enroll an estimated 25,000 male and female NCAA student-athletes during a three-year study period. For its part of the work, Virginia Tech will focus on athletes participating in various sports, including football, women's soccer, men's soccer, and women's lacrosse.

Student-athlete participants will receive a comprehensive preseason evaluation and will be monitored in the event of an injury. Data collected from injured students will later be used to help in the prevention of head injuries to members of the U.S. armed forces.

“We have a long history in this research area as we pioneered the concept of instrumenting student-athletes to better understand concussions starting in 2003, well before the dangers of head injuries suffered by athletes at youth, college, professional levels became a focus of the national media,” said Stefan Duma, head of the Department of Biomedical Engineering and Mechanics.

That work garnered national headlines and action by major sports organizations and helmet manufacturers. The NFL placed a poster of the helmet ratings system in all team locker rooms to educate players on helmet safety, and Pop Warner — the nation's largest youth football league — made national changes in practice schedules.

### **Improving safety; exploring driving automation**

- The Virginia Tech Transportation Institute (VTTI) captured two federal contracts potentially worth a combined \$55 million to further study safety efforts for commercial truck drivers and break new ground in the burgeoning field of automated vehicles. VTTI also garnered a \$16.4 million contract from the Transportation Research Board to make available more than 2 petabytes — more than four millennia of driving time — of naturalistic driving videos and accompanying data to researchers across the auto and highway industries.

### **Conquering nicotine addiction**

- Biological systems engineering Professor Mike Zhang is working on a vaccine that could help smokers conquer their nicotine addiction, potentially reducing smoking-related diseases and deaths. The National Institutes of Health awarded him \$2.4 million to develop the vaccine and test it on mice. He is performing the research in conjunction with Marion Ehrich, a professor of pharmacology and toxicology at the Virginia-Maryland College of Veterinary Medicine.

## **FEBRUARY 2015**

### **Peace Corps numbers up among alumni**

Virginia Tech ranks No. 11 among large schools in the Peace Corps' list of the top volunteer-producing colleges and universities across the country, with 43 alumni serving. Alumni from more than 3,000 colleges and universities nationwide have served in the Peace Corps since the agency's founding in 1961, including 651 Virginia Tech alumni.

### **Provost McNamee leaving position**

Senior Vice President and Provost Mark G. McNamee announces plans to step down from his position after 14 years. McNamee, a professor of biochemistry and biological sciences, led a university-wide reorganization to align academic units with institutional priorities, which resulted in the College of Arts and Sciences becoming the College of Liberal Arts and Human Sciences and the College of Science. Investments in health and life sciences led to an increase in U.S. Department of Health and Human Services research funding from approximately \$3 million to \$40 million. McNamee also oversaw numerous important capital projects, such as the Virginia Bioinformatics Institute.

## **MARCH**

### **Air Force awards posthumous medal**

The U.S. Air Force posthumously honors Matthew Joseph La Porte with the Airman's Medal for actions that saved lives on April 16, 2007. One of 32 students and faculty members who died that day, La Porte was a member of the Corps of Cadets and Air Force ROTC. He played tenor drum in the Highty-Tighties and was part of the cadet jazz ensemble, the Southern Colonels. La Porte was also a member of the highly competitive Armed Forces Special Operations Preparation Team.

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invention disclosures

19

U.S. and

15

foreign patents

163

patent applications

25

license and option agreements

#6

nationally for agricultural sciences research expenditures

### Biology-inspired engineering

- The new Center for Bioinspired Science and Technology (BIST) interdisciplinary research center brings together scientists whose research bridges engineering and biology, finding inspiration in owls' soundless flight, bats' remarkable echolocation, and other advanced biological systems. For example, owls' ability to fly noiselessly over their prey could suggest strategies for mitigating the noxious sounds produced by wind turbines.

### Corn stover-fueled cars

- A team of Virginia Tech researchers led by Percival Zhang, a professor in the Department of Biological Systems Engineering, discovered a way to create hydrogen fuel using a biological method that greatly reduces the time and money it takes to produce the zero-emissions fuel.

This method uses abundantly available corn stover — the stalks, cobs, and husks — to produce the hydrogen. The team's findings could help speed the widespread arrival of the hydrogen-powered vehicles.

### Preserving ecosystems

- As the nation's largest estuary, the Chesapeake Bay is a living laboratory to study the effects of weather and pollution on delicate ecosystems. And Zach Easton, assistant professor of biological systems engineering in the College of Agriculture and Life Sciences and the College of Engineering, will be doing just that with two water sustainability and climate grants from the National Science Foundation. Easton is the principal investigator on a \$600,000 grant and a co-principal investigator of another \$1.5 million grant led by Johns Hopkins University. ■

## APRIL

### Student is recognized for emergency work


Virginia Tech Rescue Squad member Ryan Johnson is named national Collegiate Emergency Services Provider of the Year by the National Collegiate Emergency Medical Services Foundation. The rescue squad has served the Virginia Tech community since 1969, making it the second oldest collegiate rescue squad in the nation.

### Hokie football helps economy

Virginia Tech home football games have an annual economic impact of some \$69 million, according to a Virginia Tech study, a 200 percent increase since the last such analysis 15 years ago. The five biggest categories where visitors dropped their dimes were hotels, restaurants, gasoline stations, shops, and grocery stores. Football supports almost 300 jobs in the area.

### New corps hall name honors Pearsons

The new Corps of Cadets residence hall is named Pearson Hall in recognition of James and Renae Pearson, an alumni couple who made a generous commitment to the corps and the College of Agriculture and Life Sciences. J. Pearson, who goes by his initial, earned his bachelor's in agricultural and applied economics in 1987, and Renae Pearson earned her bachelor's in family and child development in 1990. Pearson Hall is one of three new buildings that are part of a sweeping overhaul of the Upper Quad. The other two buildings are an additional residence hall, yet to be named, and the Corps Leadership and Military Science Building.



**Benjamin C. Jantzen**, assistant professor of philosophy;  
**Sonja Schmid** (middle), assistant professor in the Department of Science and Technology in Society; and **Sarah Ovink**, assistant professor of sociology, earned National Science Foundation CAREER awards.

# FACULTY MEMBERS PUSHING THE BOUNDARIES

Inspirational teachers prepare students for the global challenges they face once they graduate. A number of such educators were recognized for their efforts in 2014-15.

## “Brilliant” possibilities

**Nicole Abaid**, an assistant professor in the Department of Biomedical Engineering and Mechanics, was named by Popular Science magazine as one of its 2014 Brilliant 10 for her studies on how animals — most prominently bats — swarm. Her resulting insights may help improve the control of multi-agent systems, such as teams of underwater robotic vehicles that rely on sonar.

“Bats in swarms are navigating by echo-locating with loud ultrasonic calls, which they all can potentially hear,” said Abaid, the fourth Hokie to receive the Brilliant 10 designation from Popular Science during the past six years. “So, when they are flying in a group, they could run into a lot of problems by getting confused about which echoes are from their sounds and which are from the sounds their peers make, which is called jamming.”

## “Outstanding” discoveries

**Timothy Long**, a professor of chemistry in the College of Science, was named by Gov. Terry McAuliffe and the Science Museum of Virginia as one of three Virginia Outstanding Scientists for 2015. Long, who earned his doctoral degree from Virginia Tech, is the director of the university's Macromolecules Interfaces Institute.

Before returning to Tech, Long spent nearly a decade as a research scientist at the Eastman Kodak Co., and that experience with industry has helped him maintain partnerships with numerous companies, such as BASF, Elevance, IBM, and 3M.

Over the past 16 years, Long has received more than \$41 million in research funding and maintains a 20-member, interdisciplinary research group focusing on macromolecular structure and polymerization processes for the development of advanced technologies, including drug and gene delivery, sustainable food stocks, adhesives and elastomers, and biomaterials for health and energy. He has also received numerous research and teaching awards and holds more than 40 patents in macromolecular science and engineering.

## Promising CAREERS

Four Virginia Tech educators earned prestigious 2015 National Science Foundation (NSF) Faculty Early Career Development (CAREER) awards, which provide multiyear support to promising young faculty members.

- **Sonja Schmid**, an assistant professor in the Department of Science and Technology in Society in the College of Liberal Arts and Human Sciences, will use her \$420,000 over five years to study the prospects of creating a global nuclear emergency response plan. Officials are now paying more attention to how to respond to nuclear emergencies following the catastrophic failure of Japan's Fukushima I Nuclear Power Plant in a 2011 tsunami.

Key issues to be addressed in her research are how to convince the world that any nuclear accident is everybody's problem and how to mobilize an effective international response. As part of her award, she will write a curriculum to teach engineers and policy students how to respond when existing plans don't work.

Schmid, who is based in the National Capital Region, will partner with Virginia Tech's Nuclear Engineering Program in the College of Engineering and the Center for Public Administration and Policy in the College of Architecture and Urban Studies.

- **Sarah Ovink**, assistant professor of sociology in the College of Liberal Arts and Human Sciences, was awarded \$453,359 over five years to study how race/ethnicity, gender, and family income are linked to career success in science, technology, engineering, and mathematics. With the gap widening between low-wage jobs and highly paid professions, Ovink's research centers on inequalities in students' college achievement and subsequent career success.

“Existing studies typically focus on either gender or race/ethnicity as a primary factor influencing academic and career achievement,” Ovink said. “However, we know that

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**Nicole Abaid**  
is the  
**fourth Hokie**  
to receive the  
**Brilliant 10**  
designation  
during the past  
six years.

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among national public universities

(U.S. News & World Report)

there is no universal ‘woman’s experience,’ just as there is no universal ‘African-American experience’ when it comes to college and career.”

- **Benjamin C. Jantzen**, assistant professor of philosophy in the College of Liberal Arts and Human Sciences, was awarded \$443,427 to study how to enable machines to carry out scientific research on their own. Jantzen’s project addresses a perennial challenge in scientific research: Of all the variables related to a given phenomenon, which ones are relevant to discovering the scientific laws behind the phenomenon?

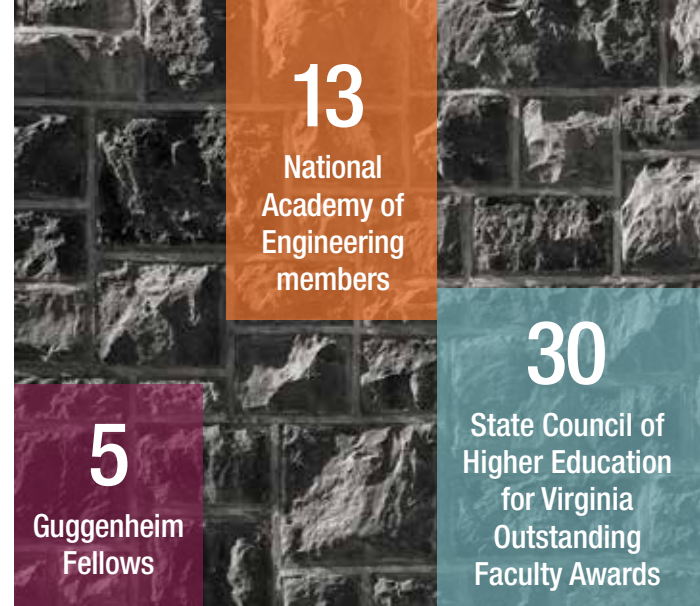
The project’s goal is to create a robot scientist by developing computer algorithms that can automatically choose the variables to be considered.

- **Bahareh Behkam**, assistant professor of mechanical engineering, earned her \$505,000 award for innovative work on improving bacteria-based cancer therapy. Developing more effective drug-delivery techniques is crucial because cancer is the second leading cause of death in the United States and because the number of new cases per year is expected to double by 2050.

Behkam plans to use part of the money to enhance recruitment of socioeconomically disadvantaged and ethnically underrepresented groups into science, technology, engineering, and mathematics.

Three faculty members earned **Fulbright Scholar Awards**, designed to create mutual understanding among people from different countries.

- **Christopher W. Zobel**, R.B. Pamplin Professor of Business Information Technology, will study disaster resilience at the Center for Disaster Management and Risk Reduction Technology at the Karlsruhe Institute of Technology in Karlsruhe, Germany. Disaster resilience is the ability to “bounce back” from the effects of a disaster, which is



especially important for critical infrastructure systems that support the daily operations of the global economy.

- **Anne Staples**, assistant professor of biomedical engineering and mechanics, will spend four months in Israel developing computer models for water flow through corals. Corals are an integral part of ocean ecosystems, home to 25 percent of marine life despite covering only 2 percent of the ocean floor. But corals are increasingly threatened as oceans become warmer, more acidic, and more polluted.
- **Carol A. Mullen**, a professor of educational leadership in the College of Liberal Arts and Human Sciences, researched educational leadership, administration, and social and global issues in China, focusing on how educators in China think about learning in the 21st century.

**Other recognition:**

- **Ezra 'Bud' Brown**, Alumni Distinguished Professor of Mathematics in the College of Science, was recognized with the first-ever Sister Helen Christensen Service Award

**APRIL 2015**

**Phlegar to head advancement effort**

President Timothy D. Sands appoints Charles D. Phlegar as the university’s first vice president for advancement. He heads a new unit formed by the merger of Alumni Relations, University Development, and University Relations. Phlegar comes to Virginia Tech from Cornell University, where he led a \$6 billion campaign and more than doubled annual private income giving to \$546 million. Phlegar not only grew up in Blacksburg, he earned both his bachelor’s and master’s degrees from Virginia Tech.

**MAY**

**Ruffner Medal goes to Sandra Davis**

Sandra Davis, of Blacksburg, receives the William H. Ruffner Medal, Virginia Tech’s highest honor. Davis owns BCR Property Management, which specializes in student housing in Blacksburg and Radford. Along with her husband, William C. “Jack” Davis, she is a member of the President’s Circle of Ut Prosim Society of donors. She is also a namesake of the Street and Davis Performance Hall in the Moss Arts Center.

**Agricultural sciences research rises in ranks**

The National Science Foundation (NSF) ranks Virginia Tech sixth in the nation in agricultural sciences research and development in 2013 with \$101 million in expenditures. The NSF defines agricultural sciences as agricultural production, aquaculture, international agriculture, soil sciences, natural resources and conservation, landscape architecture, agricultural chemistry, agronomy, animal science, fish and wildlife, forestry, and horticulture.



## Advancing Diversity: InclusiveVT

On March 14, Virginia Tech celebrated the 10th anniversary of its Principles of Community. That document, signed by Virginia Tech's Board of Visitors, former President Charles W. Steger, and many others, sent a strong signal that equality, diversity, inclusion, and respect are not the work of special commissions; they are an essential part of the fabric of our community. They are inherent in the spirit of *Ut Prosim* (That I May Serve).

During 2014-15, Virginia Tech not only reaffirmed the Principles of Community, but also showed its understanding of how those principles must actively evolve by banning discrimination against gender identity and gender expression among students, faculty, and staff.

The reaffirmation of the principles heralded a reorganization of diversity efforts and a new approach, called InclusiveVT, that provides a new framework to better engage all communities across the university in the effort to advance diversity and inclusion.

As part of that new impetus, the university's deans, vice presidents, and other senior leaders were asked to identify at least three initiatives designed to advance inclusion and diversity within their scope of responsibility. Leaders submitted the ideas to the President's Inclusion and Diversity Executive Council and the result was 86 proposed InclusiveVT initiatives.

Themes among the initiatives included mentoring opportunities for students, staff, and faculty; improved classroom environments; raising awareness of unconscious bias; and inclusive scholarship and pedagogy. By May 2015, progress reports on the initiatives were posted online to solicit public feedback.

In addition, as part of InclusiveVT, six university inclusion coordinators representing a broad cross section of the community were appointed to advocate for inclusion and diversity within their areas; serve as university resources; and assess and recommend policy, evaluate progress, identify opportunities, and address areas of concern.

Also during the year, the university became an institutional member of the National Center for Faculty Development and Diversity, fulfilling one of the initiatives of the Office of the Senior Vice President and Provost. This independent center provides professional development, training, and mentorship opportunities, focusing on helping faculty, particularly underrepresented faculty, become successful professors.

In February, 20 Virginia Tech faculty and staff members became the first at the university to earn the Diversity Advocate Certificate by completing 58 hours of in-depth training related to creating and maintaining a culture of inclusiveness.

"The drive here is to be sending the message that we are an inclusive campus," Sands said. "Students ... need to have an experience on this campus like they're going to have in the outside world." ■

3

Science Museum of Virginia Lifetime Achievement Award winners

13

Virginia Outstanding Scientist Awards

6

Presidential Early Career Awards

4

National Academy of Sciences members

65

Faculty with National Science Foundation CAREER Awards

from the Mathematical Association of America for his 40 years of outstanding service to the profession.

- The National Cooperative Soil Survey awarded its highest honor, the 2014 National Cooperator Achievement Award, to **John Galbraith**, Virginia Tech associate professor of crop and soil environmental sciences in the College of Agriculture and Life Sciences and a Virginia Cooperative Extension specialist. Galbraith set the trend for modern urban soil surveys in the late 1990s, and he coaches Virginia Tech's Soil Judging Team, which has won the National Intercollegiate Soil Judging Contest in three of the past five years.
- The American Political Science Association honored **Timothy Luke**, University Distinguished Professor of Political Science and chair of the Department of Political Science, with its 2014 career achievement award, recognizing him for a long and successful career as a writer, teacher, and activist. Among many accomplishments, Luke was a key organizer of the Virginia Tech Cyberschool and founder of the Center for Digital

Discourse and Culture. He created the nation's first entirely online master of arts degree program in political science.

- **Emmanuel Frimpong**, associate professor of fisheries science in the College of Natural Resources and Environment, was named a Carnegie African Diaspora Fellow. The scholar program will give Frimpong the opportunity to spend an extended period of time in his home country of Ghana, developing aquaculture, fisheries, and water resources management curricula and conducting research on aquaculture development for food security and the conservation of fish and fisheries.
- **X.J. Meng**, University Distinguished Professor of Molecular Virology, has been named a Fellow of the National Academy of Inventors (NAI). Meng, a virologist at the Virginia-Maryland College of Veterinary Medicine, studies emerging and reemerging viral diseases that impact veterinary and human public health. Virginia Tech President Timothy D. Sands is the only other member of the university community who is an NAI Fellow. ■

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Best value among national public universities (Kiplinger)

## JUNE

### Long-time alumni head to relinquish post

Tom Tillar, vice president for alumni relations for the past 20 years and interim senior vice president for advancement since February, announces he will step down. In 1971, Tillar, a 1969 graduate of Tech, began his career at the university in student union and Greek life programming in what is today the Division of Student Affairs. He joined the Virginia Tech Alumni Association staff in 1975. In time, he was named director of alumni relations and in the mid-1990s, vice president.

### Tech among top 100 for patents

Virginia Tech ranks among the top 100 universities in the world for U.S. utility patents in 2014, according to the National Academy of Inventors and the Intellectual Property Owners Association. The university ranks No. 93 with 23 patents.

### Dining Services sustainability garners award

The National Association of College and University Food Services (NACUFS) selects Virginia Tech Dining Services as the 2015 Sustainability Awards silver award winner in the Outreach and Education category. The award recognizes a member organization that provides useful information regarding sustainability and the sustainable business practices of dining services.

# University Highlights

	2010-11	2011-12	2012-13	2013-14	2014-15	
Student Admissions	<b>Total Applications Received (Includes Transfers)</b>					
	Undergraduate	22,942	23,736	23,101	21,738	23,504
	Graduate	9,190	9,465	9,544	9,622	9,474
	<b>Offers as a Percentage of Applications</b>					
	Undergraduate (freshmen only)	65.1	64.8	69.0	69.6	70.2
	Graduate	33.4	33.3	31.2	31.1	29.4
	<b>New Enrollment as a Percentage of Offers</b>					
	Undergraduate (freshmen only)	41.6	40.1	40.7	42.0	39.1
	Graduate	60.9	61.1	62.5	60.9	60.3
	Total Student Enrollment (head count)	<b>Enrollment by Classification</b>				
Undergraduate		23,690	23,700	23,859	24,034	24,247
Graduate and first professional		7,316	7,236	7,228	7,171	6,977
<b>Enrollment by Campus</b>						
Blacksburg campus		28,687	28,650	28,836	29,071	29,173
Northern Virginia Center		1,078	1,040	1,018	925	884
Other off-campus locations		1,241	1,246	1,233	1,209	1,167
<b>Enrollment by Residence</b>						
Virginia		21,475	21,371	21,478	21,319	21,145
Other states		7,198	7,198	6,975	7,038	7,066
Other countries		2,333	2,367	2,634	2,848	3,013
<b>Degrees Conferred</b>						
Undergraduate		5,705	5,825	5,604	5,722	5,890
Graduate and first professional		2,045	2,163	2,041	2,163	2,021
Faculty and Staff	Full-time instructional faculty	1,306	1,368	1,422	1,427	1,443
	Other faculty and research associates	1,826	1,954	2,083	2,263	2,418
	Part-time, temporary faculty (P14 faculty)	273	264	249	238	218
	Support staff	3,461	3,449	3,509	3,519	3,467
	Total faculty and support staff	6,866	7,035	7,263	7,448	7,556
	Percent of instructional faculty tenured	61.9	61.7	61.1	62.0	60.9

# University Financial Highlights

For the years ended June 30, 2011—2015 (all dollars are in millions; square feet in thousands)

	2010-11	2011-12	2012-13	2013-14	2014-15	
Revenues, Expenses, and Changes in Net Position	Operating revenues	\$ 780.7	\$ 832.4	\$ 900.0	\$ 937.5	\$ 965.0
	Operating expenses	1,025.5	1,076.3	1,157.6	1,227.2	1,259.5
	<b>Operating loss <sup>(1)</sup></b>	<b>\$ (244.8)</b>	<b>\$ (243.9)</b>	<b>\$ (257.6)</b>	<b>\$ (289.7)</b>	<b>\$ (294.5)</b>
	Non-operating revenues and expenses <sup>(1)</sup>	324.2	279.3	296.0	318.4	316.0
	Other revenues, expenses, gains, or losses	48.8	76.6	105.8	74.3	51.8
	<b>Increase in net position</b>	<b>\$ 128.2</b>	<b>\$ 112.0</b>	<b>\$ 144.2</b>	<b>\$ 103.0</b>	<b>\$ 73.3</b>
University Net Position	Net investment in capital assets	\$ 794.6	\$ 867.3	\$ 992.2	\$ 1,056.9	\$ 1,112.1
	Restricted	\$ 137.0	\$ 156.0	\$ 158.3	\$ 164.9	\$ 178.9
	Unrestricted <sup>(4)</sup>	\$ 245.3	\$ 265.6	\$ 282.6	\$ 314.3	\$ (74.3)
Assets and Facilities	Total university assets	\$ 1,844.3	\$ 2,046.0	\$ 2,209.1	\$ 2,284.1	\$ 2,369.2
	Capital assets, net of accumulated depreciation	\$ 1,196.6	\$ 1,339.5	\$ 1,517.0	\$ 1,559.3	\$ 1,625.1
	Facilities-owned gross square feet	9,166	9,276	10,078	11,139	11,209
	Facilities-leased square feet	913	871	1,183	1,805	1,913
Sponsored Programs	Number of awards received	2,400	2,589	2,272	2,443	2,189
	Value of awards received	\$ 274.0	\$ 294.1	\$ 271.1	\$ 303.6	\$ 296.6
	Research expenditures reported to NSF <sup>(2)</sup>	\$ 450.1	\$ 454.4	\$ 496.2	\$ 513.1	N/A
Virginia Tech Foundation	Gifts and bequests received	\$ 98.5	\$ 67.9	\$ 77.0	\$ 81.1	\$ 98.5
	Expended in support of the university	\$ 124.4	\$ 135.5	\$ 146.0	\$ 155.9	\$ 166.5
	Total assets and managed funds	\$ 1,155.1	\$ 1,210.7	\$ 1,302.7	\$ 1,488.7	\$ 1,508.0
Endowments (At Market Value)	Owned by Virginia Tech Foundation (VTF)	\$ 541.0	\$ 536.7	\$ 594.1	\$ 692.0	\$ 713.7
	Owned by Virginia Tech	52.7	51.6	59.6	96.8	96.5
	Managed by VTF under agency agreements	7.0	6.5	7.0	8.0	7.9
	<b>Total endowments supporting the university</b>	<b>\$ 600.7</b>	<b>\$ 594.8</b>	<b>\$ 660.7</b>	<b>\$ 796.8</b>	<b>\$ 818.1</b>
Student Financial Aid	<b>Number of students receiving selected types of financial aid</b>					
	Loans	13,133	13,081	12,506	12,279	12,253
	Grants, scholarships, and waivers <sup>(3)</sup> <sup>(5)</sup>	27,469	18,115	18,353	18,305	18,242
	Employment opportunities	9,007	9,331	9,935	10,329	10,437
	<b>Total amounts by major category</b>					
	Loans	\$ 147.0	\$ 157.2	\$ 154.5	\$ 155.5	\$ 161.5
	Grants, scholarships, and waivers <sup>(5)</sup>	155.2	163.2	168.7	177.4	182.0
	Employment opportunities	69.5	71.2	76.7	80.3	81.3
	<b>Total financial aid</b>	<b>\$ 371.7</b>	<b>\$ 391.6</b>	<b>\$ 399.9</b>	<b>\$ 413.2</b>	<b>\$ 424.8</b>

(1) The university will always be expected to show an operating loss since significant recurring revenues are shown as non-operating. Major revenue sources reported as non-operating include state appropriations, gifts, and investment income. These revenue sources are used for general operations in support of the learning, discovery, and engagement missions of the university.

(2) Total research expenditures reported to the National Science Foundation for the current year were not available at publication date.

(3) Grants, scholarships and waivers for fiscal year 2011 includes undergraduate Virginia residents who received ARRA tuition mitigation grants.

(4) Unrestricted Net Position is negative for 2014-15 due to the implementation of GASB 68.

(5) Prior period totals have been restated to remove prepaid awards from the scholarships total.

# PHILANTHROPY

The generosity of Virginia Tech’s alumni and friends makes numerous achievements possible by supporting students, faculty, outreach, and capital projects across the university and beyond.

University Development raised more than \$89.7 million, a 12 percent increase over fiscal year 2013-14, with a majority of units increasing the amounts they raised.

“Our donors set such an inspiring example with their giving each year,” said Elizabeth “Betsy” Flanagan, who stepped down as vice president for development and university relations effective June 30. “It was a joy to work with such an amazing community of donors and colleagues to advance Virginia Tech in so many ways over 15 years.”

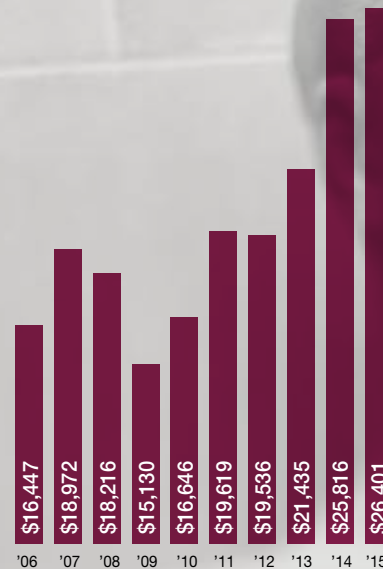
The College of Engineering raised nearly \$24.8 million, which was the most of any unit and a 57 percent increase from 2013-14. Athletics raised the next highest amount, nearly \$22.5 million, which was up 14 percent.

Several units more than doubled their gift income, including the Graduate School, the Virginia Bioinformatics Institute, and the Virginia Tech Carilion Research Institute. The Pamplin College of Business raised nearly 65 percent more, and also recorded a pledge of \$5 million, second highest in its history.

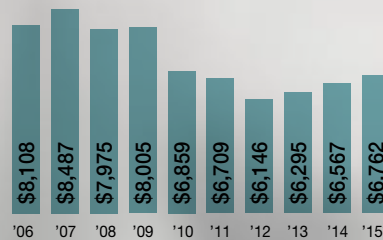
Other units that recorded double-digit percentage increases in gift income were the W.E. Skelton 4-H Educational Conference Center at Smith Mountain Lake (94 percent), the College of Architecture and Urban Studies (49 percent), the Virginia-Maryland College of Veterinary Medicine (45 percent), the Virginia Tech Carilion School of Medicine (38 percent), the College of Natural Resources and Environment (23 percent), the College of Agriculture and Life Sciences (19 percent), and the College of Science (12 percent).

Although individuals remained the primary source of gift income to the university, accounting for more than \$63.1 million, strategic relationships with businesses were bolstered. Corporate giving totaled more than \$17.4 million, a 20 percent increase over 2013-14.

The percentage of gift income that was endowed increased significantly, from 22 percent in fiscal year 2014 to 31 percent in fiscal year 2015, and Annual Giving generated a record \$6.69 million. ■



Endowment per full-time student



State funding per full-time in-state student

**NOTE:** Figures in the state funding chart for all years will differ slightly from numbers in annual reports before 2008-09 because past figures have reflected a method that used fall registration to calculate the full-time equivalent headcount. The numbers in this year’s report instead of reflect an annualized head count. Figures are not adjusted for inflation.

**Source:** Virginia Tech Office of Budget and Financial Planning

\* Fiscal years

**\$26,401**

Endowment per full-time student

## 2014-15 Virginia Tech Board of Visitors

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## Senior Administrative Personnel (as of June 30, 2015)

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<b>Mark G. McNamee</b>	Senior Vice President and Provost
<b>Sherwood G. Wilson</b>	Vice President for Administration
<b>Thomas C. Tillar</b>	Vice President for Alumni Relations
<b>Elizabeth A. Flanagan</b>	Vice President for Development and University Relations
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<b>Guru Ghosh</b>	Vice President for Outreach and International Affairs
<b>Robert Walters</b>	Vice President for Research
<b>Patricia A. Perillo</b>	Vice President for Student Affairs

## Virginia Tech Foundation

<b>John E. Dooley</b>	Chief Executive Officer
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## Deans

<b>Alan Grant</b>	College of Agriculture and Life Sciences
<b>A. Jack Davis</b>	College of Architecture and Urban Studies
<b>Richard Benson</b>	College of Engineering
<b>Elizabeth Spiller</b>	College of Liberal Arts and Human Sciences
<b>Paul Winistorfer</b>	College of Natural Resources and Environment
<b>Robert T. Sumichrast</b>	Pamplin College of Business
<b>Lay Nam Chang</b>	College of Science
<b>Cyril R. Clarke</b>	Virginia-Maryland College of Veterinary Medicine
<b>Cynda Ann Johnson</b>	Virginia Tech Carilion School of Medicine
<b>Tyler Walters</b>	University Libraries

*Prepared by the*  
**Office of University Relations**  
Division of Advancement  
Virginia Tech, Blacksburg, VA 24061

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“There are very few universities in the world where young people link together these concepts –  
*academic excellence, strength of community, and commitment to service*  
– to describe their educational experience, as we do at Virginia Tech.”

**President Timothy D. Sands**



“Today,

it is impossible to view our mission in anything less than a comprehensive global context. Our students are global citizens. They expect to be prepared to compete globally, and we need to do everything we can to provide those opportunities.”

**President Timothy D. Sands**

