VIRGINIA TECH

global

SPRING 2019

HARNESSING THE SUN

Virginia Tech's FutureHAUS takes first place in Solar Decathlon Middle East

POSTCARDS FROM PERU

Students learn hands-on approaches to real-world problems

UT PROSIM IN BOTSWANA

Research center nurtures wildlife and addresses human problems, too

VIRGINIA TECH™

A bug for every pest

While working to improve food security in Niger, a Virginia Tech collaboration is also opening a new income stream for farmers in the West African nation.

Muni Muniappan, director of the Feed the Future Innovation Lab for Integrated Pest Management at Virginia Tech, said a trip to Niger showed evidence of key progress on managing the millet head miner using a parasitic wasp that is the pest's natural enemy. The trip also advanced the use of natural enemies against the fall armyworm, which has damaged numerous plant species in Africa.

READ MORE ON PAGE 30

Muni Muniappan (left) scours crops for signs of pests. Muniappan is an entomologist who has specialized in biological control and integrated pest management research for more than 35 years.

PHOTO BY SARA HENDERY

A globally engaged university

At Virginia Tech, we believe students learn best and society benefits most when our community engages with the world around it. We take seriously our role as a global land-grant university, one that provides students exposure to transformational, even transcendent, international opportunities.

We are home to a vibrant, diverse, and welcoming community of undergraduate and graduate students, as well as renowned scholars and scientists from around the world. We are a hub for international research and worldwide partnerships.

More than ever before, our students and faculty are tackling complex global problems through an approach that is both transdisciplinary and experiential. Our faculty and staff, too, are putting knowledge to work to positively transform lives and communities around the world.

In this inaugural issue of *Virginia Tech Global*, we highlight some of the ways Virginia Tech is interacting with the world through our education, research, and engagement.

Whether it's applying the principles of behavioral economics in the mountains of Peru (Page 32), constructing the home of the future in the deserts of the United Arab Emirates (Page 14), or developing strategies to coexist amicably with animals in the wilds of Botswana (Page 20) — Virginia Tech is making a global impact.

More of our students are discovering new ways of thinking by participating in study abroad opportunities, and we are attracting the world's foremost talent to become students and scholars at Virginia Tech. We are also building resilient and enduring partnerships to encourage more research collaborations, faculty and staff exchanges, and capacity building projects.

Guiding all of this is our commitment to *Ut Prosim* (That I May Serve). This is not only our university motto, but also the way of life at Virginia Tech. We know that to fully realize the *Ut Prosim* imperative and be relevant in today's world, we cannot serve only our students, our region, or even our commonwealth. In the 21st century, we must serve with global reach and distinction.

Guru Ghosh
Vice President for Outreach and International Affairs

VIRGINIA TECH
global
SPRING 2019, VOL. 1, NO. 1

Virginia Tech Global is published by the Virginia Tech Language and Culture Institute, part of Outreach and International Affairs.

EDITOR Rich Mathieson

PUBLISHER Donald Back

VICE PRESIDENT FOR OUTREACH AND INTERNATIONAL AFFAIRS Guru Ghosh

ON THE COVER Rachel Corie, a member of the FutureHAUS student team, plays in the sand near Dubai. Photo by Erica Corder

CONTRIBUTORS Zeke Barlow, Andrea Brunais, Rommelyn Coffren, Erica Corder, Diane Deffenbaugh, Rob Emmett, Cathy Grimes, Lindsey Haugh, Sara Hendery, Sookhan Ho, Leslie Jernegan, April Raphiou, Nicole Sanderlin, Krista Timney, Travis Williams

MAILING ADDRESS
Virginia Tech Global
840 University City Blvd.
Blacksburg, VA 24061
USA

contents

SPRING 2019

FEATURES

14 FUTURE PERFECT
State-of-the-art smart home demonstrates the impact of transdisciplinary collaboration

18 STRONGER TOGETHER
Engineering study abroad programs build on joint research strengths of international partners

20 PROTECT AND SERVE
Research, outreach efforts in Botswana attract presidential attention

30 BIG PROBLEMS, TINY SOLUTIONS
A Virginia Tech team is putting insects, fungi, and other small actors to work to improve food security

32 POSTCARDS FROM PERU
Student exchange program transfers behavioral economics lessons from Blacksburg classrooms to South American villages

41 TAKING ROOT IN SENEGAL
Virginia Tech-led project uses land-grant model to help spread 4-H programs in West Africa

44 EXPANDING HORIZONS
Summer trip lets graduate students explore different approaches to higher education

DEPARTMENTS

2 Snapshot

4 From the VP

6 Dispatches

22 Q&A: *International Support Services*

24 Slideshow: *Study abroad photo contest*

28 On Campus: *Cranwell International Center*

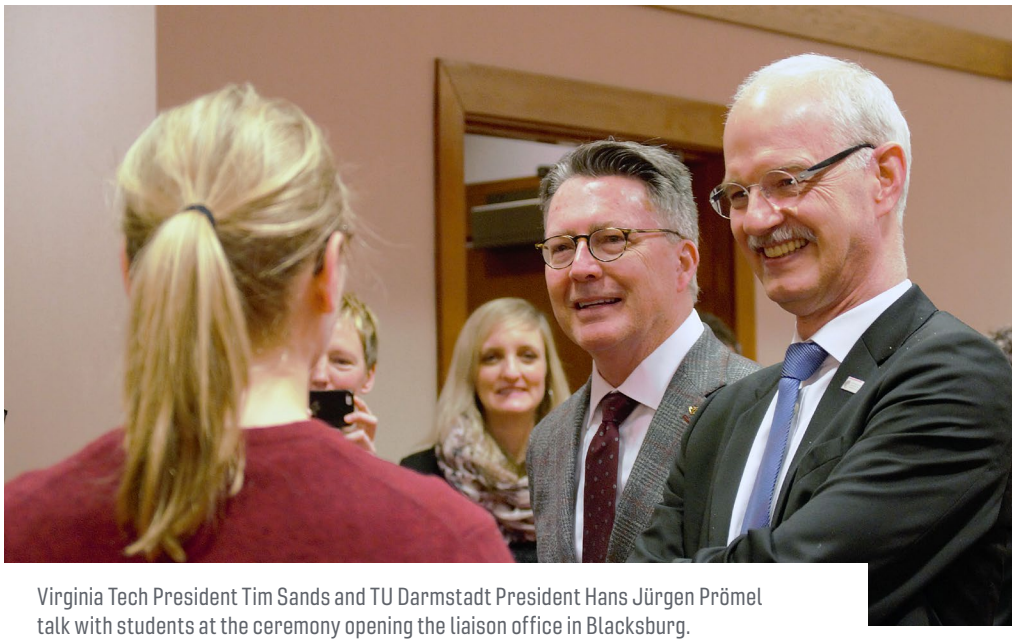
46 Travelogue: *Encouraging global engagement and promoting global understanding*

OFFICE BRINGS GERMANY CLOSER TO BLACKSBURG

For more than two decades, Virginia Tech and the Technical University of Darmstadt in Germany have shared robust study abroad programs, joint research projects, and faculty and staff exchanges. Nearly 400 students have traveled the 4,000 miles between each university to study engineering, political science, German language and literature, and architecture.

Now, the bonds between the two institutions are even stronger. This year, the Virginia Tech-TU Darmstadt Liaison Office opened in Blacksburg with the mission of strengthening collaboration.

Philina Wittke joined Virginia Tech's Global Education Office, part of Outreach and International Affairs, as head of the liaison office. Along with promoting existing programs, advising interested students, and facilitating enrollment, Wittke will explore potential areas for joint research with Virginia Tech colleges.



Virginia Tech President Tim Sands and TU Darmstadt President Hans Jürgen Prömel talk with students at the ceremony opening the liaison office in Blacksburg.

These include refugee integration, smart housing, cybersecurity, and business informatics.

"It is always great when you have a reason to celebrate — and this is a particularly great one," Wittke said. "Two decades of friendship, partnership, and success; two decades of aspiring graduates on two continents; and two decades of world-changing ideas generated by trustful common projects."

Guru Ghosh, vice president for Outreach and International Affairs, said, "Both Virginia Tech and TU Darmstadt have a long history together, and we are keen to deepen this partnership. The liaison office provides VT with the perfect opportunity to promote German higher-education opportunities on our campus and explore new ventures together."

He said the office will support the development of initiatives that expand cooperation between the United States and Germany in the areas of education, research, and corporate engagement. – ROMMELYN COFFREN

Building partnerships

Philina Wittke most recently worked in South Africa as director for the German Academic Exchange Service. In Blacksburg, she is teaching a German language class as well as exploring funding opportunities with organizations such the U.S.-German Chamber of Commerce.

On the web

Learn more about the TU Darmstadt partnership at **germany.globaleducation.vt.edu**.

SIMON AWARD RECOGNIZES ENGINEERING'S RISING SOPHOMORE ABROAD PROGRAM

In Santiago, Chile, Paige Braude learned about devices called isolators, seismic safeguards that basically serve as shock absorbers for buildings in earthquake-prone regions.

In the mountains of Ecuador, the civil and environmental engineering undergraduate watched as engineers tackled the challenges of placing piping among the Andean peaks.

Braude gained these experiences during a two-week trip to South America, part of the College of Engineering's Rising Sophomore Abroad Program, Virginia Tech's largest study abroad program.

Led by the Department of Engineering Education, the Rising Sophomore Abroad Program was awarded the 2019 Senator Paul Simon Spotlight Award by NAFSA: Association of International Educators. Named after the late Sen. Paul Simon of Illinois, the awards recognize outstanding innovation and accomplishment in campus internationalization.

Paige Braude and other engineering students in the Rising Sophomore Abroad Program visit a monument at the equator in Ecuador. Top row: Kathryn Robertson, Sarah Wells, Caroline Kersey, Madeleine Warendorf, and Lauren Hall. Bottom row: Braude, Candice Ferguson, and Elizabeth Benos.

David Knight, the director of the program, said, "Globalization at Virginia Tech means working toward becoming a global land-grant university, where our students and faculty work hand in hand with community stakeholders to brainstorm and develop viable solutions to the world's most pressing, complex challenges."

Geared toward first-year and transfer students, the program integrates a 3-credit on-campus, global engineering course with multiple concurrent tracks of short-term international experiences. It gives students opportunities to expand their global competencies by learning about differences in political, technological, social, cultural, educational, and environmental systems.

By providing students with an international experience and increasing their comfort level with global travel, the program promotes more extended international academic experiences such as internships, study abroad programs, or faculty-led programs.

"The Simon Award recognizes just a handful of universities each year for their internationalization efforts, and it is a tremendous achievement for Virginia Tech to be among them. The program is a strong example of innovation in curriculum development and raises the bar for Virginia Tech's global education portfolio," said Theresa Johansson, director of the Global Education Office.

Last year, the program held concurrent tracks in China; the United Kingdom and Ireland; Ecuador, Peru, and Chile; Italy, Switzerland, and Germany; South Africa; and New Zealand and Australia. – LINDSEY HAUGH

Going global

Including the 2019 cohort, the program has fostered international experiences for

657 undergraduates

24 graduate students

51 faculty members

STUDENT-LED SERVICE GROUP IS MAKING A DIFFERENCE LOCALLY AND GLOBALLY

Three students teamed up in 2014 to create Service Without Borders, seeking to share the spirit of Virginia Tech's motto, *Ut Prosim* (That I May Serve), locally and globally by providing assistance to communities in need.

Today, the collaborative, student-led organization has ongoing projects helping communities in Nepal and Tanzania, as well as ones closer to home in Blacksburg, Virginia. An additional project is being developed in India.

The Nepal project was launched in response to the 2015 earthquake that killed nearly 9,000 people. Students traveled to the village of Dhumba in northern Nepal to collect data and formulate a design for an agricultural irrigation system heavily damaged during the earthquake. A more recent project has focused on developing a warming hut, a passive solar-heated shelter for elders in Dhumba.

Evan Charnoff is a second-year civil engineering student who is co-leading the project in summer 2019.

"I first heard about Service Without Borders during my visit to campus as a prospective student," he said. "It's a smaller group, so you work alongside people and have a bigger part in the projects."

Charnoff said he did not think he would have an opportunity to travel abroad so early in his college career. But, he said, the group's leadership chooses who participates "based on why you want to go and what you can contribute. Everyone who is passionate and committed will travel."

Members of Service Without Borders and local residents mix concrete to build a warming hut in Dhumba, Nepal.

> "Everyone who is passionate and committed will travel."
>
> Evan Charnoff, Service Without Borders

Students and faculty members from across the university participate. Students organize and raise funds in multidisciplinary teams.

"A lot of our fundraising is to move equipment — the cement, rebar, all the tools that they need in the village to repair an irrigation canal damaged in the earthquake," Charnoff said.

In Tanzania, Service Without Borders is working to provide primary school education to Masai youth in the northern Engaruka area. Service Without Borders partnered with a Tanzanian nongovernmental organization to build an elementary school to serve youth from the village of Engaruka and surrounding communities. Virginia Tech students will volunteer at the school as English teachers.

Service Without Borders also engages with service-oriented groups in and around the New River Valley.

Among the local projects the group has been involved with are Parents Night Out, Habitat for Humanity, Rescue Mission of Roanoke, Christiansburg Elementary School, and The Big Event, a student-run day of service that has grown into the second largest event of its kind in the nation. – ROB EMMETT

KEEPING HOKIES CONNECTED

THE ALUMNI RELATIONS TEAM KEEPS HOKIES IN TOUCH WITH EACH OTHER AND VIRGINIA TECH.

Tell others what makes our community special. Visit campus often. Mentor young Hokies. Find your local alumni chapter. Make a gift to the university. Keep in touch.

We want our alumni to stay engaged – and we're here to help.
Learn more at: alumni.vt.edu

ALUMNI
VIRGINIA TECH.

Mercedes Saenz, Agus Figueroa, and Sofía Valentina López Alessandra try on the headgear at the Virginia Tech Helmet Lab.

FULBRIGHT STUDENTS FROM ARGENTINA GET A TASTE OF LIFE AS A HOKIE

For Mercedes Saenz, one of 10 undergraduate students from Argentina who spent seven weeks studying at Virginia Tech, the experience was more than an academic exchange.

The biotechnology student from the National University of Rosario in Santa Fe province said much of her learning came not from the classroom but from the residence hall. "My roommate is Pakistani-American," Saenz said. "We've gotten along great since we met each other. We spend hours talking about our home countries, showing pictures, and comparing our traditions and cultures."

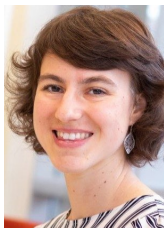
The Friends of Fulbright Argentina Undergraduate Exchange Program is organized and implemented by the Language and Culture Institute. The program enables high-achieving Argentine students to live and learn at a U.S. university. Its goals are to provide a meaningful study abroad experience for participants and to bring diverse perspectives into Virginia Tech's classrooms.

"These young people will be the future leaders of their country, and they really embody the spirit of *Ut Prosim* (That I May Serve)," said academic director Patricia Parera. "When they return home, they will be our best spokespeople, sharing the knowledge and experiences they gained at Virginia Tech."

The Language and Culture Institute, part of Outreach and International Affairs, has hosted 55 Argentine students since the program started in 2017.

Lucas Silva, an electromechanical engineering student from the National University of San Juan, said his time interacting with people in Blacksburg made a lasting impression. "Sharing traditions, food, and laughs with people from all over the world is one of the best things that's ever happened to me. I feel grateful for having the chance to experience this, since it makes me realize how similar and connected we all are," he said. – LESLIE JERNEGAN

STUDENT'S PERSEVERANCE PAYS OFF WITH A COVETED INTERNSHIP IN FRANCE



For many students, an international internship is the culminating experience of their college career. Not only do they learn about other cultures and languages, but they also further their academic ambitions and discover how their skills fit into a global context.

Val Hernley's global odyssey started in 2014 with the College of Engineering's Rising Sophomore Abroad Program in Europe. That fall, the engineering science and mechanics major approached Michelin at the college's on-campus career fair about an internship in France. By the next year, she had completed two rotations of a co-op with Michelin in the U.S. She was determined, though, to work in France.

"That was my dream — to somehow combine my love of French language and culture with my love of engineering," Hernley said.

At the end of her third rotation, in 2016, the tire manufacturer called to ask if she was still interested in going to France. Hernley jumped at the offer, accepting an opportunity to work on a traction design problem at the company's headquarters in Clermont-Ferrand, about 260 miles south of Paris.

The internship came with challenging project tasks and refreshing cultural differences. Highlights included speeding around a wet test track with a professional driver and gathering on Friday mornings for team breakfasts of fresh croissants.

The process of adapting to an independent life in a major French industrial city and working full time was not always easy, though. But Hernley said she learned things from her international internship that maybe she wouldn't have learned otherwise — about intercultural differences in industrial research and her own career goals.

"It's one of the reasons I want to go to grad school now — to pursue solutions to open-ended problems in aerospace engineering," she said. – ROB EMMETT

LINK

Center for Advancing Industry Partnerships

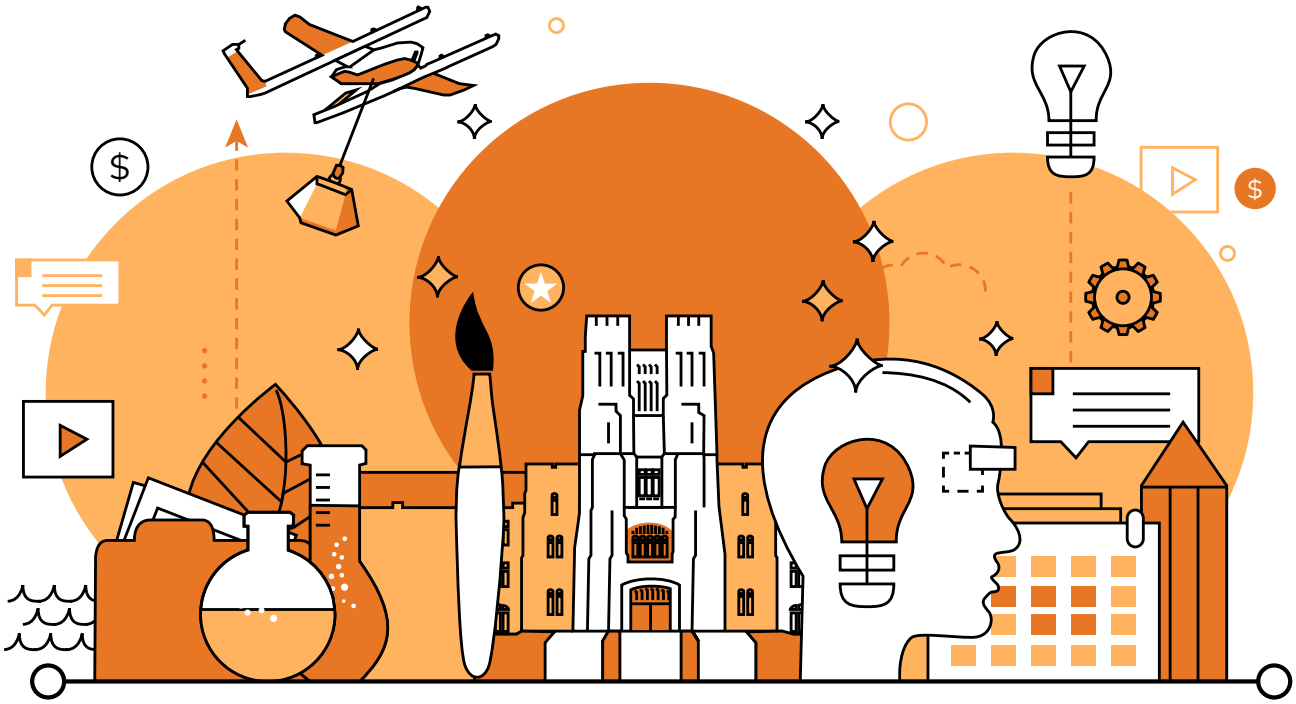
CONNECTING GREAT COMPANIES WITH GREAT OPPORTUNITIES AT VIRGINIA TECH.

Drawing from the university's deep bench of people, research, programs, and infrastructure, LINK streamlines the path to partnership.

As your port of entry, LINK matches your company's needs to Virginia Tech's assets and strengths. We nurture and support the full cycle of innovation, from discovery to market, to ensure partnerships today create impact tomorrow.

Unlock your company's full potential:
Discover the power of a partnership with Virginia Tech.

vt.edu/link



WHERE BREAKTHROUGHS BREAK THROUGH

The GAP Report will be produced under the leadership of Tom Thompson (right), associate dean and director of global programs at the College of Agriculture and Life Sciences.

VIRGINIA TECH TAKES THE REINS OF REPORT DETAILING WORLD'S AGRICULTURAL PRODUCTIVITY

Virginia Tech's College of Agriculture and Life Sciences, long a leader in empowering people around the world to produce sustainable food while increasing productivity, will become an even larger knowledge platform when it presents the Global Agricultural Productivity Report this year.

The renowned report is a call to action, urging world leaders to invest in proven strategies to produce food, feed, fiber, and biofuel in a sustainable manner to meet the demands of a growing world.

The report's findings are presented each year to an international audience in Des Moines, Iowa, at the World Food Prize/Borlaug Dialogue. In previous years, the report was produced by the Global Harvest Initiative.

"The college is well positioned to serve as a host for the report given the breadth of its programs in food, agriculture, and nutrition and its emphasis on addressing global food security issues," Virginia Tech President Tim Sands said. "The college's initiative to grow public-private partnerships, its investment in international programs, and the new Innovation Campus in Alexandria, Virginia, all benefit the GAP Report and its stakeholders."

The report, first published in 2010, tracks agricultural productivity growth, a key indicator of sustainability. The 2018 report reveals a concerning downward trend in productivity growth globally and explores the challenges and opportunities for U.S. producers. – ZEKE BARLOW

CALS Global

The GAP Report aligns with the mission of CALS Global, formed in 2016 to create partnerships and ensure that the college is recognized worldwide as a premier destination for agriculture and life sciences.

On the web

Learn more at **cals.vt.edu/global**.

NEW PROGRAM FOCUSES ON BUSINESS IN EAST ASIA

A $178,000 federal grant is helping Virginia Tech develop an international business education program focused on East Asia.

The new program will integrate the study of Chinese and Korean languages and cultures. Students will have an opportunity to study in Blacksburg or online and abroad, as well as take on internships with Asian-owned companies in the U.S., China, and South Korea.

The proposal was developed by Svetlana Filiatreau, international programs director of the Pamplin College of Business, and Janell Watson, professor of French and chairwoman of the Department of Modern and Classical Languages and Literatures of the College of Liberal Arts and Human Sciences.

The study of international business, Filiatreau said, has typically benefited only business students and primarily focused on European languages, if language study was required at all. "The new East Asia focus will strengthen our international business minor in both scope and access," she said. – SOOKHAN HO

Students in Pamplin's China study program visit the Ruins of St. Paul's in Macao. The grand stone facade is one of the few remaining pieces of a centuries-old complex.

FUTURE PERFECT

Virginia Tech's state-of-the-art smart home demonstrates the impact of transdisciplinary collaboration

BY ERICA CORDER AND TRAVIS WILLIAMS

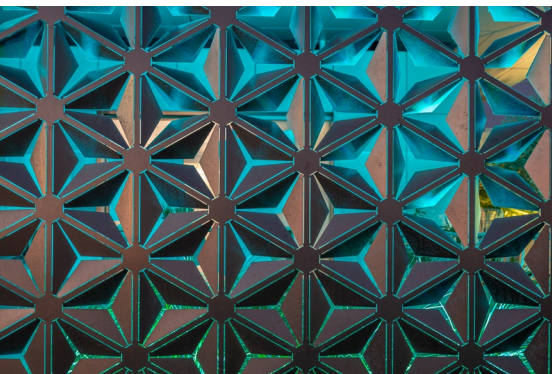
In the deserts of Dubai, Virginia Tech's FutureHAUS rose from the ashes to climb to the pinnacle of design for the world's solar homes. / The task wasn't easy, but the team succeeded by building on the foundation of the university's vision for the future, Beyond Boundaries. / The project unites students and faculty from various colleges and disciplines in building a net-zero energy home incorporating new methods of prefabrication, technology, and sustainability.

"We have the most interdisciplinary team that we've ever had around any research project, and that's what it takes. That's the secret," said Joe Wheeler, architecture professor and lead faculty of FutureHAUS Dubai.

In November 2018, the FutureHAUS Dubai team earned first place in the Solar Decathlon Middle East, a competition to accelerate research on building sustainable, grid-connected solar homes launched by the U.S. Department of Energy and the United Arab Emirates' Dubai Electricity & Water Authority. The lone American entry, the Hokie-built, 900-square-foot home outranked 14 teams selected from a pool of 60 entrants.

The win is the culmination of nearly two decades of research, two years of accelerated development after the previous iteration was destroyed in a 2017 fire, and more than a month spent in a desert near Dubai erecting the structure.

Moving FutureHAUS Dubai from concept to reality was a university-wide effort. Virginia Tech's College of Architecture and Urban Studies, College of Engineering, Myers-Lawson School of Construction, Pamplin College of Business, College of Liberal Arts and Human Sciences, and the College of Science, as well as various centers and labs across campus, contributed to the success of the project.



Architecture student Laurie Booth was part of an interdisciplinary team of about 75 students. Opposite: Project manager Bobby Vance talks to a visitor in the house's living room, where walls could be moved to create more space in the home office or bedroom.

"I have never experienced this much interdisciplinary knowledge going back and forth every single day to get something done," said Michelle Le, who was a student architectural design leader for the team.

The FutureHAUS Dubai team was tasked with creating a home that serves the needs of an aging population, addresses growing environmental concerns, and integrates secure smart systems for an increasingly connected but security-concerned population.

The house was equipped with 67 devices, including touch-screen control panels, automatic sliding doors, a smart mirror to help users find their clothes, and a movable wall to adjust floor plans using what the team calls "flex space."

The cutting-edge innovations extended to the home's garden, but rather than implementing even more technology, the team leaned on its landscape architecture students for a different approach. To adhere to the competition's strict water-usage regulations, students incorporated native plants, including four 35-year-old olive trees, that could withstand the intensity of the desert heat.

The current rendition of FutureHAUS grew from the successes of a previous generation of structures. The first FutureHAUS, unveiled room by room over five years in international trade shows, burned in a fire in February 2017. One of FutureHAUS' predecessors, LumenHAUS, won the international Solar Decathlon

Competition in Madrid, Spain, in 2010 and is currently on display behind Cowgill Hall. For FutureHAUS Dubai, researchers merged the best features of both.

The team's victory in Dubai not only validates their vision for the home of the future, but also their vision for a new way to tackle the housing needs of an increasingly crowded world with finite resources.

"We have always believed in this concept, but now the world believes in this concept as well," said Laurie Booth, a fourth-year architecture student and a student team lead of FutureHAUS Dubai. "[The concepts proposed by FutureHAUS], now that we've built it, seem very real, seem very possible, which excites me the most: that maybe someday, thousands of people could live in a house like this."

Traditionally, building a home requires an on-site construction process, which is subject to uncontrollable factors, such as weather. FutureHAUS, however, was built entirely in a lab as separate but compatible "cartridges" equipped with the walls, floors, ceiling, wiring, plumbing, and finishes.

> "WE HAVE ALWAYS BELIEVED IN THIS CONCEPT, BUT NOW THE WORLD BELIEVES IN THIS CONCEPT AS WELL."
>
> **Laurie Booth, FutureHAUS student team lead**

The all-in-one customizable cartridges can be shipped to a location and easily assembled with a plug-and-play approach.

"Our vision for this house will eventually be to create it on a mass production scale. Just like Henry Ford came and revolutionized the automobile industry by creating assembly lines and mass production techniques, we're hoping that something similar can happen with this house," said Rachel Carie, an industrial and systems engineering graduate.

If implemented, the cartridge method could also reap dividends for the homebuilding industry. Homes could be built in mass quantities for lower costs and with greater energy efficiency. Tradespeople such as inspectors, electricians, and plumbers could work at a single location, converging disciplines constantly throughout the homebuilding process and yielding a better product.

That drive for innovation has led several companies — including such top sponsors as Dupont, Dominion Energy, and Kohler — to partner with Virginia Tech's team, using the house as a test bed for future projects.

With the competition behind them, the team has high hopes for what lies ahead. They've already begun researching methods to scale up production, and a new team of industrial and systems engineering students is exploring a facility concept for manufacturing the houses.

For the immediate future though, members say they're happy to spend a little time reflecting on what they were able to accomplish together.

Dubai networking event proves strength of Hokie connections

Alumna Katherine Lelia Hall has learned that no matter how far from Blacksburg her career takes her, she's never far from a fellow Hokie.

That sense of global community was reaffirmed at the first Hokies in the Middle East alumni networking event in Dubai, United Arab Emirates. An initiative of the Language and Culture Institute, with support from Alumni Relations and the College of Architecture and Urban Studies, the event brought together more than 85 alumni, students, and supporters from the region.

"The connections we made in Blacksburg and continue to make all over the world are the reason that we chose Virginia Tech in the first place," said Hall, who earned a master's degree in English in 1998 and a doctorate in curriculum and instruction in 2001 and now teaches at Khalifa University in Abu Dhabi. "It is very exciting to know that we alumni can still keep our connection with Virginia Tech even when we live far away."

For Mohammed Al Nakhi, who graduated in 2001 with a degree in mechanical engineering and now works for BP in Abu Dhabi, the event brought back vivid memories. "I always enjoy exchanging stories with other Hokies of our time in Blacksburg, whether that's walking through the Drillfield in the middle of winter, enjoying one of the night football games, or describing how beautiful the campus is during autumn. Those moments, frozen in time, are what connect us."

More than 85 alumni, students, and supporters from the region had a chance to meet members of the FutureHAUS team during the first Middle East alumni networking event.

Charles Fox, who received his bachelor's in biology in 1990 and his master's in architecture in 1998, found that someone he had been doing business with for many years was also a Hokie. "I had no idea before the gathering," said Fox, chief operating officer for the Dubai-based architectural firm AE7. "This was a fantastic opportunity to meet people and make some new connections."

Don Back, director of the Language and Culture Institute, said strengthening such connections was a primary reason the event. "Our faculty, students, and alumni who are engaged internationally play a critical role as Virginia Tech grows into a global land-grant university," he said. "Staying connected with alumni in key regions like the Middle East helps advance university goals, such as student recruitment, learning and research experiences, and international partnerships."

In addition to connecting with fellow Hokies in Dubai, Hall appreciated getting an inside look at FutureHAUS. "Being part of a family that continues to innovate, showcase student work, and keep Virginia Tech as a part of the future is something no Hokie takes lightly. We were as proud of the FutureHAUS team as if we ourselves were beside them as they developed the house."

Fahad AlHomaid, a 2014 mechanical engineering graduate who now works in Saudi Arabia for the national oil company, Saudi Aramco, said the gathering helped him expand his network. "It revived the spirit of the Hokies and the real sense of being a part of a larger Virginia Tech community." – RICH MATHIESON

STRONGER TOGETHER

Engineering study abroad programs build on joint research strengths of international partners

BY NICOLE SANDERLIN

For almost 150 years, the Virginia Tech College of Engineering has been educating the leaders of tomorrow and conducting research that is changing lives around the world.

Engineering faculty members coordinate three International Research Experiences for Students (IRES) programs. Funded by grants from the National Science Foundation, these programs support undergraduate and graduate students conducting research overseas.

Virginia Tech offers three IRES programs — in the United Kingdom, China, and Australia. Each builds on joint research strengths with an international partner and offers students the unique value of site-specific topics.

The three programs share a tested program design for deepening participants' global competence. All IRES students participate in preparatory meetings, complete a 10-week research project, and then present their work and reflect on its value upon returning to Virginia Tech.

Past students have co-authored research publications and accelerated their careers through the global connections they've made.

U.K.

Since 2013, Virginia Tech students have traveled to the University of Nottingham for 10 weeks to conduct research on next-generation electrical power systems.

This IRES program is led by Nicole Sanderlin, director of global engagement, and Jack Lesko, associate dean of research and graduate studies. It builds on the two universities' shared research strengths in power electronics, human factors, advanced manufacturing, and materials science.

Missie Smith (left) and Coleman Merenda (right) researched mixed-reality displays in vehicles at the University of Nottingham.

Coleman Merenda researched human factors, dimensions of automatic braking, and crash warning systems during his 10 weeks in central England's Midlands region. "As someone who was accepted into grad school in large part due to my work at Nottingham, I can say that it made a huge difference to me," Merenda said.

With mutual designations as Rolls-Royce University Technology Centers, Virginia Tech and the University of Nottingham share a valuable industry research partner in Rolls-Royce.

As a result, IRES students benefit from unique research opportunities that encompass not only two research universities but also a private-industry partner globally recognized for its engineering leadership.

Since the IRES program started, 30 Virginia Tech students — 19 graduates and 11 undergraduates — have participated. An additional eight graduate students have come to Virginia Tech for reciprocal summer research experiences.

At the Shandong University – Virginia Tech International Laboratory in Shandong, China, researchers work on unraveling the intricacies of bats' remarkable sensing and flight skills.

CHINA

For an engineer inspired by nature, bats are a gold mine, with their acrobatic maneuverability and preternaturally precise sonar systems. China, with its large and diverse bat populations, is an ideal place to study them.

Participants in the China IRES program explore bat biosonar dynamics through behavioral experiments and analysis of flight and sonic recordings and biomimetic robotics.

Dom LoPinto, a senior mechanical engineering student, worked side by side with fellow Hokies and Chinese students at the Shandong University – Virginia Tech International Laboratory in Shandong, China, to better understand bats' sonar systems.

The lab, founded in 2010 by Rolf Mueller, professor of mechanical engineering and director of the Virginia Tech Center for Bioinspired Science and Technology, takes advantage of nearby bat populations to provide a site for collaborative research between the two universities and their collaborators. It also functions as a platform for student and faculty exchange.

When not analyzing sound reception or modeling flight, LoPinto enjoyed the hospitality of local students, who gave their visitors the inside scoop on the best places to taste the delicious Shandong cuisine.

AUSTRALIA

IRES students have been working with faculty at the University of Queensland in Brisbane, Australia, since 2018.

Under the direction of David Knight, associate professor in Virginia Tech's Department of Engineering Education, their research has focused on water and coastal engineering, two topics of increasing relevance for the Commonwealth of Virginia and coastal cities worldwide.

Students conduct research in one of the leading water engineering units in the world and work in some of the finest labs anywhere.

"I was able to observe Australian culture and begin to understand the impact it has on the work environment. And being overseas pushed me to develop a new confidence to work on global engineering projects with a broad range of people from different backgrounds and cultures," said Melissa Joye, a civil engineering student who worked on assessing temperature stratification in water supply reservoirs.

Melissa Joye gathers samples at Amity Point in Queensland, Australia.

She and other student researchers also joined the larger cohort of Hokies who traveled to Australia and New Zealand with Virginia Tech's Rising Sophomore Abroad Program.

PROTECT & SERVE

RESEARCH, OUTREACH EFFORTS IN BOTSWANA ATTRACT PRESIDENTIAL ATTENTION

BY KRISTA TIMNEY

Botswana needs institutions like the Centre for Conservation of African Resources: Animals, Communities, and Land Use (CARACAL) that conduct research on issues that affect the country and its people.

This was the assessment of the nation's president, Mokgweetsi Masisi, after touring the organization's 42-acre site and meeting with its co-founder Kathleen Alexander, a professor of wildlife in Virginia Tech's College of Natural Resources and Environment.

The president and first lady Neo Masisi met with research staff, educators, and animal care personnel to discuss the program's focus on improving health outcomes and livelihoods of communities and sustainably managing the natural ecosystems on which they depend.

Alexander said the president's visit was a special honor, recognizing the research and outreach efforts between Virginia Tech and CARACAL, a partnership focused on contributing to the needs of this country in southern Africa.

"Dr. Masisi is deeply committed to assisting communities and ensuring that wildlife and ecosystems are protected and managed sustainably," Alexander said. "To this end, we discussed our research, outreach, and engagement mission — from understanding water quality and diarrheal disease impacts on children to the sustainable management of wildlife and community engagement in this process."

The nonprofit CARACAL is dedicated to protecting wildlife and improving the livelihoods of communities through outreach projects, animal conservation efforts, and research aimed at securing a sustainable future.

The site, which includes research facilities, student hosing and dining facilities, and a wildlife rescue center, serves as a base for Alexander's extensive work in the country and provides unique opportunities for Virginia Tech students involved in both research projects and outreach efforts.

"Dr. Alexander's research and community engagement work in Botswana exemplifies globalizing the university's motto, *Ut Prosim* (That I May Serve), in the 21st century," said Guru Ghosh, vice president for Outreach and International Affairs. "Her research in the area of One Health in serving the animal and human

kingdoms in southern Africa is second to none. Kathy's scholarship and teaching embrace the aspirations of Virginia Tech as a global land-grant institution that provides powerful and transformational experiential experiences to its students in a global context."

While CARACAL does extensive work in wildlife research and rescue, the president and first lady expressed particular interest in the CARACAL and Virginia Tech projects aimed at addressing rural poverty and the challenges of educational access for young people in Botswana.

One program Alexander discussed was the Women's Craft Center, established so that impoverished women could display and sell handcrafted goods to empower households in the country's Chobe District that are headed by women.

"Female-headed households make up more than half of the households in this district," Alexander said. "It's a significant challenge because these families tend to have less money, cattle, and other resources, and are more susceptible to environmental shocks."

The craft center, built on CARACAL property, provides an important haven for these women. Another project is focused on assisting vulnerable women, as well as the community as a whole, through the sale, repair, and maintenance of bicycles.

On the web

Learn more about CARACAL at **caracal.info**.

President Masisi also met with Botswana youth working as educational interns in the conservation education program, a collaboration between CARACAL, Virginia Tech, and the Chobe Regional Education Office that is supported by awards Alexander received from the National Science Foundation.

Operational in 12 schools across the Chobe District, the program reaches more than 1,000 children a week.

"This program is two-tiered in its educational focus," Alexander said. "Unemployed youth are hired as teacher interns, working with children in their own villages, fostering inspiration for the kids looking up to older youth who are now teachers at their schools. And second, it addresses a problem that is pervasive across many communities in Africa, where students are challenged to learn in languages that aren't their mother tongue.

"This program is an exciting opportunity to contribute positively to the educational system here and help transform it in a way that makes STEM education a possibility in areas where language differences may present a barrier to learning."

Botswana is home to the world's largest population of elephants, with some estimates putting the numbers at more than a third of Africa's total.

Office helps international scholars navigate through the complex immigration system.

Every year, hundreds of visiting scholars come to Virginia Tech to perform research, teach, or engage in other scholarly activity. Nearly all of them get help with visa and immigration issues from International Support Services. Director **Ian Leuschner** talks about the services his office offers and how it promotes internationalization on campus.

On the web

International Support Services maintains a travel website, **vt.edu/immigration**, that was created after President Donald Trump's executive orders on immigration. Leuschner says the site aims to keep the university community up to date on the travel ban and other related topics.

What does your office do?
The Office of International Support Services is primarily involved in supporting the nonstudent visa process at the university. We do all the visas for visiting scholars and work visas for faculty and staff, and we support the permanent residency process for other employees as well.

Are there a lot of people at Virginia Tech who need visas to be here?
For sure, there are several thousand students who are managed by different offices. But we also have probably 400 to 500 J-1 visiting scholars. Anywhere between 150 and 200 people are here on working visas as well.

Why does the university bring in so many foreign nationals?
Virginia Tech is in the business of identifying the most talented people to fill the positions that are open, without regard to a candidate's country of origin. So when the search is conducted and it turns out the person selected is from a country other than the United States, then it's our office's job to assist that person in acquiring the proper immigration status so they can legally work at the university.

What are some of the dramatic problems you've had?
We work hard to avoid dramatic problems; part of our responsibility is to make the process as seamless and easy as possible. But in the past couple of years we've seen significant delays in the processing time for applications and petitions that we file. And folks from certain countries of origin are experiencing very long delays in applying for visas at the U.S. Embassy or consulate in their home country.

Do you deal with people once they're here, or do you just get their paperwork when they come to campus and never see them again?
We tend to work with people for a period of

Ian Leuschner, Belinda Pauley, and Dena Neese of International Support Services.

a year or several years, depending on their country of origin. In the past couple years, we've been seeing people longer than we used to. Typically, people come on a temporary working visa, and for many employees we need to transition them to a "green card" or permanent residency. That process takes anywhere from two to six years, depending on where they are coming from and the category they are applying through.

How important is it for Virginia Tech to have this international talent?
I think it's critical. What is typically happening is the university is running searches and is identifying the most talented people in the pool. And we want to be able to onboard those folks, regardless of where they are from. So when the university identifies the most talented person, and they happen to be a non-U.S. citizen or a national, then it's important for us to be able to have a process in place to ease their transition to Virginia Tech.

What else is part of the onboarding process other than the visa?
We do orient the J visiting scholars, or the person who manages that program does an orientation session to try and acclimate those folks to the university community and the services that are available.

What do you wish the university community knew about your office that they don't seem to know?
Start early. It always takes longer than you think it will take to process these applications. People often come to us very late in the hiring process, almost as an afterthought, and then want somebody to start in what is often an unrealistic time frame because it just takes it longer to prepare the paperwork and get it filed. Often times we're waiting for an approval. People think that happens in a week or two, and that is just not the case. We are dealing with several months at the earliest — often up to six or eight months.

What's the most common question you get asked during the process?
"How long is it going to take?" Always, always that is the most common question we hear. "How much is it going to cost?" and "What do we have to pay?" — those are the questions we get. By far the most frequent is "How long will it take?"

Sounds like you don't like the answer that you have to give ...
We don't, but of course the people who are receiving the answer like it even less.


ANANASSO BAR DAL 1985
PIZZA

All the world's a classroom

Each year, faculty and students who have traveled abroad submit their best photos to a contest sponsored by the Global Education Office. These shots were selected from nearly 1,000 entries submitted this year.

ABOVE: **REID MAURER, *BARANGAROO, NEW SOUTH WALES, AUSTRALIA*:** I saw this awesome composition when I was visiting the Sydney Observatory one night. Cars driving down this particularly well-placed street in the Barangaroo neighborhood of Sydney made for an awesome foreground to this picture of the Sydney Harbor Bridge.

LEFT: **SYDNEY DELBRIDGE, *MANAROLA, CINQUE TERRE, ITALY*:** Kids partake in an intense game of foosball as tourists watch.

TOP: **BRENT MILLER, *TAJ MAHAL MOON GARDEN, INDIA*:** A rare opportunity of an uncrowded wonder of the modern world framed by birds in flight captures the essence of the Taj's marble warmth.

ABOVE: **MADELINE ALTOBELLI, *BEIJING, CHINA*:** At this point in the "Legend of Kung Fu" show at Beijing's Red Theatre, performers were jumping into a pit in the stage.

RIGHT: **LINDSEY HEWTON, *CAPRI, ITALY*:** Capri may be virtually empty during the off-season in November, but its views are just as breathtaking in the cold. After exploring the island's views, food, and people, my group and I took a final adventure to the Gardens of Augustus. Past the greenery and patios of the gardens lies a vast expanse of ocean. A million shades of blue blended into the cliffs as the sun dipped below the horizon. The dwindling number of tourists and I silently took in the scene.

ABOVE: **ERIK HARVEY, *MARRAKESH, MOROCCO*:** Hokies explore the night life in Jemaa el-Fnaa, the central square marketplace.

LEFT: **ALEX BROWN, *CUVERVILLE ISLAND, ANTARCTICA*:** Cuverville is home to a colony of gentoo penguins. If you look carefully, you can see penguins nesting on the outcropping on the slope. Penguins move between outcroppings and the water using "penguin highways," ruts in the snow made by constant use. You can see a number of penguins traversing these highways, including the closest penguin in the lower right corner.

See more photos

Find the Global Education Office on Instagram: @vtabroad

Visitors at the International Street Fair in downtown Blacksburg, Virginia, mark where they are from on a map.

FOSTERING GLOBAL PERSPECTIVES

Virginia Tech is home to more than 4,400 international students — more than any university in Virginia. Students come from more than 110 countries around the world.

"While international students experience our campus they also provide global perspectives to classroom discussions, expand our research connections, create cultural awareness among students, and help engage students to experience other countries and cultures," said David Clubb, director of the Cranwell International Center.

The center provides advocacy and assistance to all international visitors in adjusting to life at Virginia Tech. Among the programs Cranwell organizes are the **International Street Fair**, which displays the diverse cultures represented in the university community, and the monthly **International Cafe Hour**, at which international student groups serve food, set up decorations, and plan special events that showcase their country's culture.

Students try their hands at Chinese calligraphy during the International Cafe Hour.

The annual street fair offers traditional music, dance, food, and martial arts performances.

STUDENT AFFAIRS
CRANWELL INTERNATIONAL CENTER
VIRGINIA TECH™

Cranwell International Center is a catalyst for the comprehensive internationalization of Virginia Tech. We work with campus and community partners to ***articulate***, ***advocate***, and ***act*** in support of international students, amplifying their contributions to the university community and to the advancement of the university as more ***globally oriented*** and ***internationally connected***.

- EDUCATE students, faculty, and staff regarding the development of intercultural competence within the global context.
- ENGAGE the campus and broader community with a wide range of intercultural programs and services (including the Mozaiko Global Living-Learning Community).
- ENHANCE awareness of the unique contributions of international students.
- EQUIP international students for success inside and outside the classroom.
- EXPAND opportunities for meaningful interaction between domestic and international students.
- ENSURE institutional compliance with federal regulations governing the enrollment of international students.
- ENRICH the institutional commitment to diversity and inclusion.

WWW.INTERNATIONAL.VT.EDU **INTERNATIONAL@VT.EDU**

BIG PROBLEMS, TINY SOLUTIONS

Insects, fungi, and other small actors are at the root of many global agricultural issues, but a Virginia Tech team is putting them to work to improve food security. **BY SARA HENDERY**

A global population expected to reach 9 billion by 2050, plus land and food shortages — all call for unconventional methods. Living up to their lab's name, experts in the Feed the Future Innovation Lab for Integrated Pest Management have long employed living organisms as part of their arsenal. Some are no bigger than the head of a pin.

Trichoderma, a beneficial fungus, is one of those miniature, mighty actors. To the naked eye, it's a speck, but when applied to plants, it alters whole communities.

For more than a decade, the Innovation Lab has promoted *Trichoderma* in developing countries, where the team applies ecologically sound solutions to crop problems. The fungus is easy to find and manipulate — inducing resistance, it fights various plant diseases when applied to seedlings and plants.

Increasing crop yields in countries such as Nepal and Kenya, the so-called "fighting fungus" also reduces farmers' reliance on synthetic pesticides, which helps them obtain premium market prices. Its use has also bolstered new industries, such as plant nurseries, where women especially have gained opportunities for economic independence.

Rebaka Sultana is the executive director of Grameen Krishok Sohayok Sangstha in Bangladesh, the first business in the country to sell the fungus in compost form.

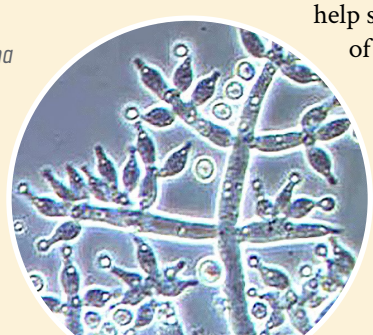
"As a woman in the Bangladesh context, it's really challenging," Sultana said. "But I have been able to prove that this sort of business is possible by a woman." Most of her employees are women; she has also opened an orphanage for girls on the property.

The Innovation Lab, housed at Virginia Tech's Center for International Research, Education, and Development, has a quarter-century-long history of catalyzing natural organisms to improve food security and reduce pesticide use, in addition to enhancing livelihoods and economic autonomy. The team's use of natural enemies to combat the devastating papaya mealybug in India, for example, translated to an economic benefit of more than $1 billion over five years.

The use of natural enemies against pests — "good bugs" versus "bad bugs" — is a hallmark of the Innovation Lab's program.

Take, for example, the leaf-feeding beetle *Zygogramma bicolorata* and the stem-boring weevil *Listronotus setosipennis*.

In Ethiopia, researchers released the two insects to help stop the spread of *Parthenium hysterophorus*, an invasive weed



Under a microscope, *Trichoderma* appears to have limbs like a cherry blossom tree.

Muniappan (left) inspects *Parthenium* plants being grown at a lab in Ethiopia. The leaf-eating *Zygogramma bicolorata* beetle (inset) has been key to keeping the invasive weed in check.

that not only pushes out important native vegetation but also taints livestock milk and irritates human and animal skin.

"We want to see transdisciplinary, holistic approaches that don't just act as quick fixes but also maintain our long-term goals," said Muni Muniappan, director of the Innovation Lab. "It's important to be creative in what resources we employ so that we don't contribute to the already high amounts of global waste, pollution, and damage sometimes unintentionally generated by innovation."

Meanwhile, across East Africa, the Innovation Lab is harnessing natural enemies in another way, through a technique called Push-Pull, a multilevel defense system used against crop threats. Push-Pull starts with intercropping, in which valuable crops such as maize are integrated with plants that push away crop-destroying stemborers. Second, crops are planted around the field to perform the "pull" or trapping duty of attracting the same pest as well as its natural enemies.

The plants employed in the Push-Pull approach contribute a host of benefits beyond natural enemies and increased yields. *Desmodium*, used for intercropping, naturally improves soil fertility but also inhibits growth of the invasive weed *Striga*, whose spread results in complete yield losses. The Push-Pull trap plants conserve soil moisture, improve soil stability, and prevent runoff. They also create fodder for livestock, with farmers reporting a substantial increase in improved milk yields.

"Push-Pull suppresses weed activity, but benefits other living things, too," said Tadele Tefera, head of the East Africa project. "Women and children, for example, benefit significantly from it, as weeding is often left to women and children in Africa. Comparing Push-Pull adopters to nonadopters, you'll see an increase in income and household dietary diversity in Push-Pull adopters, which is a significant win from a nutritional perspective."

POSTCARDS FROM PERU

Student exchange program transfers economics lessons from Blacksburg classrooms to South American villages

BY ANDREA BRUNAIS


MANTEN LIMPIA
TU PLAYA

In Peru, the landscape is older than the sound of bells and snow on mountains, but modern-day life here commands attention. In this vast, knitted-together country of coasts, mountains, and jungles, 14 undergraduates from Virginia Tech and the University of Piura learn to apply the techniques of behavioral economics to resolve a range of problems, from deforestation and accumulating waste piles to child mortality and flagging schools.

In the span of less than two weeks, the students will hear lectures in Lima, fly to Piura, visit a flood-ravaged town, take a four-hour winding bus ride to rural Chalaco, learn about deforestation, conduct a survey in a small village (after walking an hour to get there), and spend a magical hour atop the Andes.

They'll conclude by working in teams to craft a pilot intervention costing a theoretical $100,000. They'll pitch those change-the-world ideas to their two professors, Marcos Agurto of the University of Piura and Sheryl Ball of the Department of Economics in Virginia Tech's College of Science. They'll compete, arguing that their projects are valid and worthy of funding.

Along with three other Virginia Tech students, Sana Ahmad lands in Lima on an overnight flight from Dallas. She's excited to try out her Spanish and is immediately humbled. "I thought I was pretty good, but I was slow," she says, laughing. Both of her parents are from India and exposed her to foreign languages early. "The Peruvians thought I was Peruvian until I started speaking Spanish!" she says.

INTRODUCTION TO LIMA

Peru is the land of Incan gold and cultures even more ancient than the Incas, such as the Nazca, which created stunning innovations in the art world. The Nazca stocked the country's pre-Columbian treasure trove with statues, including an iconic killer whale that brims with attitude and teeth.

In Lima, the students learn that Peru exerts a pull on the senses that can clash with the need to focus on academics. Exquisite food can be had virtually everywhere in a country whose restaurants appear on world top-10 lists.

But — prepped by a week of study at Virginia Tech's campus in Blacksburg and a day in Washington, D.C. — the U.S. and Peruvian students stave off cultural and culinary distractions. Fighting travel fatigue, they dive into what seems like a crash-course pace, beginning each day with language classes, Spanish and English.

At the University of Piura's Lima campus, a diplomat speaks proudly of the nation's indigenous past, pointing out that Peruvian civilization predates ancient Greece and Rome. He details the execution of Francisco Pizarro, Lima's founder, by fellow Spaniards. The former leader's bones are part of a prominent display in the Lima Cathedral.

After the lecture, students spill out into the breezes of the campus courtyard. Here, they take their first break, cracking out their cellphone cameras to record a few minutes of traditional dance demonstrated by a young, costumed couple who leap and duck and flirtatiously weave.



A costumed couple perform a flirtatious traditional dance in the courtyard of the University of Piura's Lima campus.

DIVING DEEP INTO BEHAVIORAL ECONOMICS

From Lima, a two-hour flight north puts the students in Piura. The Virginia Tech students are met at the airport by smiling host families with placards bearing the names Hannah, Hannah (there are two), Jessica, and Sana. To keep them straight, one of the professors confers the nickname "Engineering Hannah" on Hannah Looney, who's majoring in industrial and systems engineering.

Piura (population 400,000 in contrast to Lima's 10 million) is about 45 minutes from the coast. On the university's grassy campus, big iguanas skulk across the lawns or climb trees. Peacocks and small deer roam freely.

As the first morning in Piura unfolds, Agurto, who has taught as an adjunct at Virginia Tech, stresses the concept of listening before designing answers to problems. He also explains the need for control groups and randomization — essential to knowing whether an "intervention" has worked.

The students are asked to consider: Is aid to developing countries good or bad? Does it create dependency? Do policymakers offer expert help and then simply hope the situation gets better? Or do they stand by, do nothing, and watch problems play out? Economists must find ways, as Agurto puts it, "to know what works, and why."

The lecture is an eye-opener. Jose Luis Herrera Hinojosa, one of the University of Piura students, previously doubted whether becoming an economist would enable him to contribute to society. He now understands that even a simple intervention — say, a plan to encourage vaccination in children by giving their parents a reward — can improve lives.

"We can do things — we can propose the right things, things that we are sure are going to be good," he says. Buoyed by Agurto's enthusiasm, he adds: "In the future, I can better participate in my local and central governments. I can propose better policies. What I'm learning has helped me realize how the world can work better."

Hannah Looney says Agurto's quest for discernment planted seeds of healthy skepticism. Now, when making charitable donations, she'll question whether she should "send money to an organization

that's going to give water to the people — but maybe what the people really need is blankets."

Anticipating upcoming fieldwork in the Andes, Looney says, "I like that we are going to be doing interviews with people to find out what they actually need — not what we think they might need."

> "I like that we are going to be doing interviews with people to find out **what they actually need** – not what we think they might need."
>
> HANNAH LOONEY

LESSONS FROM A FLOODED VILLAGE

In spring 2017, a triple whammy of El Niño, climate change, and deforestation nearly destroyed the town of Pedregal, not far from Piura. For Agurto, Pedregal is an object lesson with big takeaways for the students.

They pile into a large van to make their first stop, the Piura River, which breached its banks in 2017 when 10 times the normal amount of rain drenched coastal areas. Standing near the riverbanks, Agurto introduces the idea that even distant deforestation plays a role in magnifying such disasters. Erosion in the Andes, hours away by car, exacerbates floods. Water and sediments flush down from the highlands.

Sana Ahmad, a Virginia Tech economics major, questions experts assembled for the tour about forests and floods, continuing the queries until she better understands why the country still has a long way to go in protecting towns from the effects of El Niño.

As dusk approaches, the van comes to a halt in front of a rebuilt home. Two rebuilding projects are underway, one directed by the government in Lima and one by teams from the University of Piura.

The university is trying to resurrect traditional building techniques, employing artisans who still know the old secrets, Agurto says. They work with bamboo, native woods, cement fashioned into bricks, and other materials.

Construction sounds play out as the students walk through the space. Workers are plastering walls with a mixture of concrete and chalk. Children and elders look on as Agurto explains that the floor plans were designed, cookie-cutter fashion, by government officials in Lima — about 500 miles away. Residents are not universally pleased at being stuffed into one-size-fits-all designs.

How it came about: Programs and partners

Formally known as VT-UDEP Economics Lab: Experiment-Driven Policy Making in Peru, the program offers educational opportunities in behavioral and experimental economics on Virginia Tech's Blacksburg campus as well in Lima and Piura in Peru.

The program was designed to offer students insights from behavioral and experimental economics. Behavioral and experimental economics are strengths at Virginia Tech, while field work in economics is a strength at the University of Piura.

Funding for the venture came from several sources, including Virginia Tech's Center for Instructional Development and Educational Research and the Global Education Office, part of Outreach and International Affairs, as well as a $25,000 grant from the 100,000 Strong in the Americas Innovation Fund, part of the nonprofit Partners of The Americas.

To earn the grant, Virginia Tech and the University of Piura pledged to reach low-income and underserved students from rural communities in the U.S. and Peru and offer not only language and intercultural learning but also exposure to STEM subjects on a global scale. – ANDREA BRUNAIS

Students encounter a herd of alpacas.

This is the students' first look at people who feel they were not asked in advance for their thoughts. But Agurto makes sure the students don't leave with wholly negative impressions. University of Piura researchers were able to introduce a measure of hope. "We realized that the floors were made from dirt, and that's dangerous for the kids at play," he explains. "We looked at interventions from around the world, and we found one called Piso Firme in Mexico — firm floors."

Almost 200 concrete floors have been installed in this and nearby homes, so children now play on hygienic surfaces instead of directly on dirt, which can harbor parasites. Agurto wants the students to understand that, even when cash isn't available to rebuild an entire town, moving ahead on smaller projects can be valuable. Playing on concrete floors makes children healthier by preventing disease: "By a simple intervention, you can save people's lives."

DESTINATION: CHALACO

The next day brings a four-hour bus ride up the winding dirt roads into the Andes.

The driver picks his way around curves, honking to alert any oncoming vehicles. Only one vehicle at a time can maneuver, cliff side.

Almost an hour out from Chalaco, students catch sight of the Andes. Traces of pink, salmon, and fuchsia appear in the sky as dusk creeps over the mountain peaks. The students spill out of the bus to take selfies against the sunset.

Blue-black night falls as the students disembark in Chalaco, elevation 7,000 feet. They claim their assigned rooms in the small, family-run hotel and then assemble in the downstairs dining room for dinner.

Agurto informs them that tomorrow they'll walk for an hour on a dirt mountain road to get to the village where they'll carry out a field survey. Such are the hardships of doing academic research in the developing world.

The professor wants the students to experience life the way the people in the villages do.

A DAY OF FIELDWORK

The students set out shortly after breakfast. The walk is challenging. Chunks of the concrete road leading out of town are steeper than the pitch of an A-frame roof.

Clockwise from top left: The students meet with residents in Chalaco and a nearby village; a vendor sells fresh juice in a picturesque town near Piura called Catacaos; a shop owner in Catacaos, the self-proclaimed capital of *artesanía* (handicrafts) in the region.

The road soon turns to dirt, and the sun brings out beads of perspiration on foreheads. Students share the route with others on foot or on horseback. Some people lead burros.

The village is little more than a few houses on hillsides. Students crowd into a woman's kitchen, sharing space with an ambling chicken. Agurto explains that the homeowner was more than willing to give up cooking over an open wood-fueled fire — a dangerous, polluting practice. She adopted a more modern stove, but the chimney didn't work properly. The flaw is evident in black smoke-smudges that color the walls. She then accepted a government-promoted upgrade to a gas-powered stove. But gas is expensive, so the new stove is used only for quick-cooking foods. She needs help in repairing and maintaining the stove and chimney, she tells the students.

Afterward, Agurto spells it out. "The students are getting an idea of the many problems that we have in the developing world — where small solutions can help," he says of the intended lessons of the kitchen show-and-tell. "But it's not enough to know what to do. It's also important to have people adopting these solutions, adopting them in the long term."

Once again, the students are impressed with the need to listen to people for whom they intend to design products or solutions. A new stove is all but worthless if the chimney doesn't work and smoke billows, filling the kitchen and blackening the walls.

After the tour, the students disperse in teams. Jose Luis Herrara Hinojosa, Hannah Looney, and Alessandra Nicole Hidalgo Arestegui hike up the sloping front yard belonging to Jose Naval Roman Cruz. They gather round his front door to inquire about the costs of drinking water and electricity. They quiz him about how many rooms his home has and their size.

Cruz serves his visitors coffee from beans he grew, dried, and processed, along with homemade tamales fashioned from homegrown corn. He sweetens coffee with sugar cane grown on his family's land.

Sana Ahmad, an economics major at Virginia Tech, reflects on the excitement of meeting people and

entering homes. "When you actually see it, it makes you value what you're doing — more confident." She appreciates learning "that what you're studying will have application in more ways than you think."

The students have been taking notes, planning, researching, and studying almost nonstop for days. What comes next is a brief interlude, a view of how the world looks at 10,000 feet. The big bus won't make it up a mountain road that becomes rockier and narrower even as the air thins, so the group separates into pickup trucks and vans.

After experiencing winding roads and vegetated curves that can impart claustrophobia, everyone catches sight of vistas that spread for miles. The idyll enchants the students. Occasionally a resident of the highlands walks by. The figures recede into the horizon, as if swallowed up by an ocean or the desert. A herd of alpacas heads toward the group, as some of the students draw closer for selfies.

A Peruvian student, Martin Vargas Alvines, from the seaport of Paita, and the first in his family to go to college, looks around at the landscape and says, "I didn't know these places existed."

> "The students are getting an idea of the many problems that we have in the developing world – where **small solutions can help**. But it's not enough to know what to do. It's also important to have people adopting these solutions, adopting them in the long term."
>
> PROFESSOR MARCOS AGURTO, THE UNIVERSITY OF PIURA

PERFECTING THEIR PITCHES

Back at the University of Piura, the students have two days to plan and prepare their talks.

"We are not looking for a perfect presentation, but we want to see whether the intuition is there," Agurto says, assessing what the students have learned and how he thinks they'll apply it. "The small taste that we are giving them about economic policy — that's basically a chain of starting thinking about a problem. Kids have a lot of innovation and creativity, so it's my expectation that they will surprise us."

One team tackling low-performing schools devises ways for teachers to network. Another team looks for ways that seasonal workers can find productive year-round employment.

The team of Hinojosa, Looney, and Arestegui considers a few different subjects, then settles on the problem of litter. For many towns, trash is both a visual blight and a health hazard.

As they evaluate rewards and incentives to change habits, Hinojosa thinks it would be fabulous to offer the villages a grand prize — a children's bicycle — but in the end the team abandons that idea because even $100,000 won't cover the costs. Also, while in the planning stages, they research the feasibility of employing prison labor.

Which ideas make it into their presentation? Enlisting community leaders and residents of 16 villages in a street-cleaning campaign. The incentives are to be bags of rice.

The moment arrives, and the three spend 20 minutes explaining their idea. The crux: A cleanup campaign would be run in all 16 villages, with half receiving the rice reward and half receiving nothing. The bulk of the budget would underwrite rice as well as trash-removal trucks. The expected outcome? Healthier livestock, less trash in the environment, and cleaner villages.

The professors ding them on a couple points. The students overestimated the number of residents who would actually take part in the project. Professor Sheryl Ball also points to the lack of a true control group. Simply withholding incentives from half the villages didn't meet the standard. For accurate evaluation, the students should include a cohort of villages where no campaign is run.

"You always think about what could have been done better," Looney muses later. "I'm thankful for the criticism even if it stung a little in the moment. I mean, we just put so much hard work into it. It felt worth it. I think we did a really great job."

Hannah Looney stops in the village where the survey was taken.

Agurto and Ball agree with her assessment; the team is among the highest-performing groups.

MAGNIFICENT TRANSFORMATIONS

When Martin Vargas Alvines was 2 years old, his mother began teaching him to read and paint shapes like circles and triangles. His father worked in the merchant marines in Paita. Neither parent graduated from high school. His mother vowed that life would be different for her son.

Scholarships allowed him to become the first in his family to go to college and also enabled him — a fourth-year economics student — to participate in the program that joins Virginia Tech and the University of Piura. His visit to the U.S. was "a really beautiful experience," but especially eye-opening was his new view of home.

"I didn't know the situation," he says of his highlands experiences. "I didn't know how they lived here."

Learning more about the behavioral side of economics makes him want to enlarge his career goals. "Now I have more clear ideas. I know how I can apply my knowledge," he says. "I learned a lot about my country, the poverty in my country. I know I have to do things to help my people."

Other students find the experience transformative as well. "At the end of the day, this was an educational experience," Sana Ahmad says. "You just see everything you've been learning. It's not just in a textbook."

Hannah Looney, for her part, can't get enough of travel. She has been to Africa, and she's done study abroad in Ireland. Peru is her new sweet spot. "I love the world!" she says.

She started out looking for friendship and adventure, and she ended up learning to "consider more fields and trying to be open with my education." She marveled at learning "how interconnected so many different fields are." Majoring in industrial and systems engineering, she's become more drawn to research and crafting experiments and interventions, taking a hands-on approach to problem-solving.

Jose Luis Herrara Hinojosa might have registered the biggest leap of all. The youngest of seven children, he developed more faith in his opinions as well as belief that he might become a professional whose ideas have merit. He feels like a different person, he says.

His team's trash-abatement proposal is just one of many ideas with world-changing potential. "These are the kinds of things we can do as policy drivers and policymakers and professionals," he says. "I have more confidence right now. Yes!"

Agurto is satisfied that the students came out of the experience enriched. "They did a good job — everybody did. It was not only about the final report, which is important, but it's also about the full experience. It's been a small exercise of what being a development economist is."

TAKING ROOT IN SENEGAL

Virginia Tech helps grow 4-H programs in West Africa

BY APRIL RAPHIOU

In the small town of Toubacouta in southwest Senegal, 14-year-old Aida Dieng and her father planted seeds in the garden adjoining their home, but this was no ordinary garden. More than just a place to get dirt under the fingernails, this garden was a place to grow a better future.

Each month, dozens of children came together to master steps from planting and watering to weeding and harvesting. In addition to Aida's father, local professors, extension agents, and other volunteers helped the children with activities designed to teach them technical and social skills and produce a new generation of aspiring agriculturalists.

Situated in the western corner of Africa's Sahel region, Senegal relies heavily on the agricultural sector, which employs 75 percent of the country's 14 million people. With 60 percent of the population younger than 25, and food insecurity and malnutrition higher in rural areas, programs that penetrate into the Sahel are essential for feeding people and achieving economic growth.

Senegalese youth in 4-H clubs participate in activities such as learning to compost, planting and selling crops, developing entrepreneurship skills, and playing sports.

In 2015, Virginia Tech heeded the call to train, empower, and serve by introducing the U.S. model of the 4-H program to Senegal via the U.S. Agency for International Development Education and Research in Agriculture project.

The project used the U.S. land-grant model to build human and institutional capacity in agricultural teaching, research, training, and outreach to meet the needs of the Senegalese public and private sectors, including farmers and entrepreneurs.

For more than a century in the U.S., 4-H — that's head, hands, heart, and health — has encouraged youth leadership, entrepreneurship, and agricultural education. In Virginia, there are almost 200,000 members and, in the U.S., almost 6 million.

In 2015, the ERA program, managed by the Center for International Research, Education, and Development at Virginia Tech, launched the 4-H Senegal Positive Youth Development initiative to train community leaders, volunteers, university faculty, and government officials to create programs aimed at helping youth. The program was led by Tom Archibald, assistant professor in Virginia Tech's Department of Agricultural, Leadership, and Community Education; Kathleen Jamison, professor emerita and extension specialist; and Bineta Guisse, ERA's former gender coordinator and outreach officer.

Aida's club was one of three pilot 4-H clubs established in Francophone Africa.

Under ERA, Aida and hundreds of other youth in rural Senegal have been connected to agricultural institutions, grassroots leaders, Peace Corps volunteers, and other partners to foster their development. In addition to opportunities to learn valuable life, leadership, and entrepreneurial skills, the 4-H participants gain experience in science, technology, engineering, and math. And they are encouraged to find ways to make good decisions, manage resources wisely, work with others, and communicate effectively.

In the first year, nearly 600 youth joined. They came from across the country — from Saint-Louis on the northern edge of the country's Atlantic Coast to the lush region of Ziguinchor in the south. Virginia Tech faculty members trained more than 150 community leaders, faculty at Senegalese higher education institutions, and Peace Corps volunteers.

CIRED Executive Director Van Crowder highlighted the university's role in envisioning and launching the 4-H program. "The ERA 4-H program is a great example of how a youth development model that has been very successful in Virginia and the United States can be used in Senegal to equip youth with the knowledge and confidence to create better futures for themselves, their communities, and their country."

The program is equally beneficial for agricultural institutions seeking to implement Senegal's new community service law enacted in 2015. Inspired by ERA, a key component of the law is community outreach and service as part of each university's mission.

Now a college student in Dakar, Aida Dieng (center) finds time to return to Toubacouta to mentor members of her former 4-H club.

Nearly 22,000 youth are expected to enroll in 4-H clubs in Senegal over the next four years.

The 4-H Senegal Positive Youth Development program was so successful that in 2017 CIRED was awarded a second project to redouble its commitment in the country. Also funded by USAID, the five-year, $4 million Senegal Youth in Agriculture (YIA) project carries on the work of ERA by institutionalizing 4-H nationally.

"We have had very high demand for the 4-H clubs since the initial launch," said Guisse, who now serves as the project's national director. "To respond to this demand, we have put in place a train-the-trainer program that prepares our local leaders for setting up and leading effective positive youth development programs. Essentially, local leaders are giving back to their communities for generations to come."

Nearly 22,000 youth are expected to enroll in 4-H clubs in Senegal over the next four years. For them, 4-H could open the door to a wider range of employment opportunities through technical and vocational education and training. Often, youth in Senegal do not possess the job skills that employers seek. Youth in Agriculture is closing this gap by helping participants gain in-demand skills that increase employment and entrepreneurship results.

Four years ago, Aida and her community planted seeds in her garden. Today, those seeds have blossomed into a national program empowering youth throughout Senegal.

Aida continues to reap the rewards of 4-H. She is enrolled in college in Dakar, where she studies transportation logistics.

During vacations, she is still involved in her 4-H club in Toubacouta, where she now mentors the next generation of youth leaders.

EXPANDING HORIZONS

Summer trip lets graduate students explore different approaches to higher education

BY CATHY GRIMES

Each summer for the past 14 years, a group of graduate students has embarked on a global research adventure that alumni have called mind-blowing, challenging, and fun.

The Global Perspectives Program, launched in 2006, is an interdisciplinary program that allows participants to explore differences in academic practices and higher-education issues through collaboration with students, faculty, and administrators at universities and technical institutes in Switzerland, Italy, France, and Germany.

Students must complete two graduate courses — Preparing the Future Professoriate and Pedagogical Practices in Contemporary Contexts — before they can apply for the program, which includes seminars in Blacksburg during the spring and a 10-day trip to Europe in the summer. To help minimize the cost for participants, the Graduate School covers the majority of expenses.

In each country, students visit universities and other higher-education institutions, participate in research discussions and presentations, and develop their own research projects.

"It's not like going to Zurich for a day," said industrial and systems engineering doctoral alumnus Greg Purdy, a member of the 2015 group. "We're going to all different types of universities and institutions."

Vice President and Dean for Graduate Education Karen P. DePauw, who developed the program, said students talk with academic administrators, faculty members, and students at each institution. "We tour the universities and explore labs, classrooms, libraries, and other spaces — especially those that have been adapted for new technologies and ways of teaching," she said.

Students stop for a photo atop the Milan Cathedral.

EXPLORATION AND RESEARCH

Virginia Tech's Steger Center for International Scholarship in Riva San Vitale, Switzerland, serves as a base camp for the students. In addition to the visits to universities, the students explore cities and towns, museums, and castles and learn about the regions' culture, history, and politics.

They keep journals and write about their observations and personal reflections in addition to their group and individual research.

Since 2010, participants have collaborated with students at the University of Basel in Switzerland on research projects exploring higher-education issues with global impact. The students present their work each summer at the Swiss Embassy in Washington.

The Steger Center for International Scholarship in Switzerland is Virginia Tech's European campus center and base for operations and support of its programs in the region.

EXPANDING BEYOND EUROPE

DePauw said the program has attracted the attention of universities across the United States. Several have modeled their own programs on Virginia Tech's.

In 2012, DePauw led a group of students to Chile for a weeklong program visiting three universities. And in 2016, she added a fall experience, with students visiting universities and technical institutions in Ecuador, including a trip to the Galapagos Islands.

Participants spent time with faculty and students at the University of San Francisco, Quito, and talked about how that university serves students living in the Galapagos with both on-site and online classes.

Computer science doctoral alumnus Mohammed Seyam said he was struck by the different focus of education in the Galapagos. "The relationship was not between students and industry — it's the students and their environment, the surroundings, what they get from that and what they put back into it."

Civil and environmental engineering alumna Emily Garner said that perspective extended to faculty, noting how a water quality scientist viewed her work. "Her research was really shaped by finding better ways to address problems with limited resources. She was very aware of how her research could benefit the community and the people."

DePauw developed the Global Perspectives Program in 2005, and it launched a year later.

A LIFE-CHANGING EXPERIENCE

DePauw said the program exemplifies the key aims of a transformative graduate education experience. "The GPP scholars enhance their knowledge and understanding of global higher education, gain a cultural understanding of diverse contexts in the field, engage with new colleagues across academic disciplines, and grow personally and professionally through shared experiences," she said.

Purdy said participants have described it as life-changing. "They all say they learned a lot and they can't really quantify the experience. You learn about culture, society politics — pretty much everything."

On the web

See the program's website at **futureprof.global**.

Encouraging global engagement, promoting global understanding

We at the Language and Culture Institute are pleased to be able to share the rich diversity of our university's international engagement activities through this magazine, *Virginia Tech Global*.

I recently attended a conference at which the plenary speaker, remarking on a completely different topic, said something that struck a chord with me: "You can't go back to a place you haven't been." I've thought about that comment a lot in the contexts of my own work in international affairs and especially of this magazine's contents.

Donald Back

We cannot hope to understand our world unless we explore it.

By bringing the world to Blacksburg in hosting our international students, scholars, and visiting professors, and by encouraging our students and faculty to venture abroad to study, to discover, and to experience, Virginia Tech fulfills its promise as a global land-grant institution.

Witness, for example, the stories of transformation in this issue. Our FutureHAUS team's rich interaction with competitors abroad inspired a cornucopia of ideas for applications of their modular home in other environs. Soaking in the Peruvian countryside triggered a metamorphic intellectual shift in our visiting undergraduates. Graduate students experienced similar enlightenment in their tours of universities across Western Europe.

For international students, Virginia Tech's main campus, our beautiful Appalachian setting, and our welcoming Blacksburg community make for a learning experience far beyond the classroom.

Going abroad or interacting with others from different countries here at home takes students to places they can't experience in a classroom. Through "breathing" and "feeling" other ways of life, students build a greater appreciation for different backgrounds and beliefs — and learn to communicate across perceived barriers.

Each meaningful encounter with someone of another culture promises new and deeper learning.

Indeed, researchers have demonstrated that the abilities to build trust and to empathize with others of different values and beliefs are critical in both interpersonal and geopolitical relationships.

At Virginia Tech, we consider international engagement integral to a university education. By taking students to places they haven't been, figuratively and literally, we instill a global mindset that makes for a better person — in work and in life.

Donald Back is the director of the Virginia Tech Language and Culture Institute.

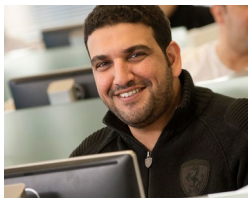
YOUR GATEWAY TO VIRGINIA TECH

The Language and Culture Institute connects the university to the world

We advance Virginia Tech's global engagement efforts by facilitating academic linkages across borders, creating strategic international partnerships, attracting the brightest talent from around the world, and creating meaningful programs that expand students' worldviews.

- EDUCATIONAL LINKAGES IN TEACHING, RESEARCH, AND SERVICE
- STRATEGIC PARTNERSHIPS WITH INSTITUTIONS OF HIGHER LEARNING, GOVERNMENT AGENCIES, INDUSTRY, AND NONGOVERNMENTAL ENTITIES
- INTERNATIONAL UNDERGRADUATE AND GRADUATE RECRUITING
- CERTIFICATE PROGRAMS AND LANGUAGE, LEADERSHIP, AND INTERCULTURAL TRAINING
- ADVANTAGE VT PATHWAY PROGRAM AND INTENSIVE ENGLISH PROGRAM

VIRGINIA TECH™



LCI.VT.EDU

LCI-INFO@VT.EDU

CLAIM YOUR ROLE IN THE WORLD

Bringing a true global perspective to the university experience …
Empowering our graduates to address the world's greatest challenges …
Attracting international talent with the vision to shape the future …

At Virginia Tech, that's our role.

We enhance the impact of our research by supporting scholarship, promoting collaboration across disciplines, and lowering the barriers to global partnerships.

Our role is to make education and research portable, so that our students and faculty can work and learn anywhere in the world.

Your role in how Virginia Tech engages the world awaits.
Claim it.

See the video

More photos from this year's Global Education Office photo contest, Page 24

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY