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Carbon-trapping ‘sponges’ can cut greenhouse gases

I n the fight against global warming, carbon capture—chemically trapping carbon dioxide before it releases into the atmosphere—is gaining momentum, but standard methods are plagued by toxicity, corrosiveness and inefficiency. Using a bag of chemistry tricks, Cornell materials scientists have invented a low-toxicity, highly effective carbon-trapping “sponge” that could lead to increased use of the technology. A research team led by Emmanuel Giannelis, the Walter R. Read Professor of Engineering in the Department of Materials Science and Engineering, has invented a powder that performs as a better carbon-capture method since about 2010, and they have gone through several iterations. Their latest consists of a silica scaffold, an inorganic material that is the sorbent support, much like a sponge, with many nanoscale pores which provide for maximum surface area. They dip the scaffold into liquid amine (the organic liquid) required to pick up the CO₂, which soaks into the support and partially hardens. The finished product is a stable, dry white powder that captures carbon dioxide even in the presence of moisture. The two materials (scaffold and amine together) provide a tolerance to water in the process, which can reduce capturing carbon in other methods.

For example, solid amine sorbents are used in carbon capture, Giannelis said, but the supports are usually only physically impregnated with the amines. Over time some of the amine is lost, decreasing effectiveness and increasing cost.

The researchers instead grew their amine onto the sorbent surface, which causes the amine to chemically bond to the sorbents, meaning very little amine loss over time, and providing maximum capacity. Qi said the next steps are to optimize the sorbent and to eventually demonstrate it for industry, possibly at Cornell for retrofitting its power plant. He also said the technology could be used on a smaller scale—for example, in greenhouses, where the captured carbon dioxide can be used to enhance plant growth.

KyuJung Whang, Cornell’s vice president for facilities services, heard a presentation by Giannelis on the topic at a board of trustees meeting earlier this year.

“We have made great strides in sustainability, particularly in the energy supply areas of alternative energy sources, and the demand side areas of energy conservation and building design standards,” Whang said. “If we are truly to achieve neutrality (a major goal at Cornell University), though, we also have to consider capturing and offsetting carbon. Emmanuel’s presentation got my attention, and I was hoping to learn more about it and explore ways we might be able to work together.”

The paper is called “Sponges with Covalently Tethered Amines for High-Efficiency Carbon Capture” and was supported by King Abdullah University of Science and Technology (KAUST) and Qatar University. The researchers used the Cornell Center for Materials Research, funded by the National Science Foundation. They performed scaling-up experiments at the prototyping and testing facility of the KAUST-Cornell Center for Energy and Sustainability.

—Anna Fu

Land use looms as large factor in global warming

F or the globe’s warming, don’t blame burning fossil fuels exclusively. Land use and land cover changes contribute about 40 percent to “radiative forcing,” a key metric of global warming, according to Cornell environmental scientists writing in Atmospheric Chemistry and Physics on Dec. 3, 2014.

Radiative forcing measures the change in the balance between the sun’s incoming energy and radiative thermal emissions that act to cool the Earth. Forcing can be used to predict changes in Earth’s surface temperatures. Burning fossil fuel—often considered to be responsible for 80 percent of warming—has been found to account for about 60 percent of forcing.

“Pressure on land resources is expected to increase as global population continues to climb and the world becomes more affluent, swelling the demand for food. We need much more than a global energy policy. We need land policies, as well, to minimize future increases in radiative forcing and associated climate change,” said Dan Ward, Cornell postdoctoral researcher in earth and atmospheric sciences. Policies that encourage switching to conventional biofuels, which might spur deforestation, could also be detrimental to climate, if not correctly designed, he said.

The new research accounts for land-resource pressures and land cover change, from agriculture and deforestation to shopping malls and urban sprawl that contribute about 40 percent of all radiative forcing. For each ton of carbon dioxide emitted from burning fossil fuels, the total radiative forcing is only half that from land use, said co-author Natalie Mahowald, professor of earth and atmospheric sciences and a fellow at Cornell’s Atkinson Center for a Sustainable Future.

Mahowald explains that land use contributes to an increase in other greenhouse gases, like methane and nitrous oxide.

Tata-Cornell Initiative observes first year of research

A scanning electron microscopy image of a pristine silica support, before the amine is added.

and Nutrition Initiative (TICI) brief faculty and students Dec. 5 on drinking-water system projects, studies on iron nutrition for women, agricultural data collection and a food fortification program. Agriculture and nutrition are top political topics in India, explains Prabhu Pingali, director of TICI and a professor in the Charles H. Dyson School of Applied Economics and Management. The initiative, in the College of Agriculture and Life Sciences (CALS), provides financial support for critical field research, as India faces a population burgeoning to

Alexander King

1.6 billion by 2050, surpassing China’s projected population of 1.3 billion at that time.

The initiative features eight Cornell doctoral students, and the program will have 18 in the near future, said Pingali. “Field work is a crucial part of what we think this program is all about.”

Cornell Engineering’s interaction with the TICI program is through our AquaClara program. Monroe Weber-Shirk, director of Cornell’s AquaClara program described the pilot partnership between TCI and AquaClara in the Jharkand villages of Gufa and Rohne. For Indian villagers, the AquaClara filtration system provides reliable operator training and potable water, safe for drinking and cooking.

One of the eight students is an African: Alexander King, 15, who conducted food fortification research in Mumbai. TCI, which aims to solve problems of poverty, malnutrition and rural development in India, is funded by the Tata Trust.

Ratan Tata ’59, B.Arch. ’62 is chairman emeritus of Tata Sons.

—Blane Fristauder

Natalie Mahowald

Dan Ward

Alexander King

Prabhu Pingali

Celebrating its first full year of research projects in India, the Tata-Cornell Agriculture and Nutrition Initiative (TICI) brief faculty and students Dec. 5 on drinking-water system projects, studies on iron nutrition for women, agricultural data collection and a food fortification program. Agriculture and nutrition are top political topics in India, explains Prabhu Pingali, director of TICI and a professor in the Charles H. Dyson School of Applied Economics and Management. The initiative, in the College of Agriculture and Life Sciences (CALS), provides financial support for critical field research, as India faces a population burgeoning to 1.6 billion by 2050, surpassing China’s projected population of 1.3 billion at that time.

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A 70 m deep basin formed near the summit of the Flade Isblink Ice Cap in the fall of 2012 when a lake 540 m beneath the ice surface suddenly emptied. Summer meltwater streams on the ice cap surface enter crevasses near the bottom of the images. Simulated 3-dimensional view from the south made using WorldView-2 Satellite imagery. Scale changes due to perspective, but the basin is about 4 km north-south and 2 km east-west. WorldView-2 Imagery (c) 2014, DigitalGlobe, Inc.

Roller coaster fans form a club and win a prize

Some career counselors say that what you do for fun might be the thing you ought to do for a living. So it shouldn’t be a surprise that a group of students have formed a club dedicated to the engineering side of roller coasters and other amusement rides. The Cornell Theme Park Engineering Group, formed early this semester, got off to a good start by winning a prize in the first annual Ryerson T.H.R.I.L.L. Invitational Design Competitions, Oct. 30-Nov. 1 at Ryerson University in Toronto. Members are not all engineers, according to club president Ronnie Forster, M.E. ’17. There are also students in urban studies and applied economics and management. But all are dedicated riders of roller coasters and other amusement park rides, he said, and some are considering careers in the industry. Forster himself is planning to do a coop program with Premier Rides, a major roller coaster builder.

In the Ryerson competition, sponsored by the Ryerson Thrill Club and judged by industry experts, student groups from Cornell, Drexel University, the Universities of Guelph and Waterloo in Ontario competed in three categories. The first was to design a coaster inspired by the KAF Spitfire fighter plane; the Cornellians designed a coaster whose cars are mounted as “wings” spreading beyond the track so passengers ride with nothing beneath them.

The second challenge was to create a modification to the classic roller. The Cornell proposal was a ride that preserves and greatly increases the up and down and around motion, but with “spaceship” cars instead of horses, and outer space lighting effects. Cornell took third place in the third category, the Academic Curriculum Challenge, which asked students to demonstrate the connections they perceive between what they learn in the classroom and what they’ve experienced in the amusement world. They created a hypothetical curriculum for a college major in theme park engineering, combining existing Cornell courses and new courses they invented. The plan offered concentrations in park management, ride design, design analysis, structural engineering and systems engineering, giving students a solid grounding in engineering that could be applied in many other fields.

The win was a bonus, because the group had little time to prepare. They had only learned about the event about a week before it happened, Forster said. They ended up presenting their entries virtually, via Skype. Meanwhile, the students volunteer with EYES (Encouraging Young Engineers and Scientists), a program of the Cornell Public Service Center, to present lessons on roller coaster physics in Ithaca elementary schools.

—Bill Steele
**Cornell Engineering Diversity Programs Wins Awards**

**W**ho says engineers don’t know how to have fun? More than 30 Cornell Engineers shared their non-engineering skills and talents at the First Annual Engineers Got Talent extravaganza held Saturday, November 22 in the Statler Auditorium. The show, which was the brainchild of mechanical engineering students Mark Flammé ’16, Emma Luengo ’16, and Ruben Ghijen ’16, and electrical engineering student Richard Quan ’15, drew 260 audience members and was a great success. “It was really exciting to see how many people showed up,” said Luengo. Richard Quan added, “We knew from Facebook that about 150 people said they were coming, so we figured we’d really have about 100. But then we got way more. It was great.”

All four of the organizers are part of the Engineering Leadership Certification Program at Cornell and the talent show grew out of a weekend retreat the group took back in the spring semester of 2014. “We each had to identify an extracurricular project we wanted to create and complete in the coming year,” said Flammé. “All four of our proposed projects had the theme of ‘school spirit,’ so we formed a group and started thinking about what we could do to bring some fun to campus.”

The group named themselves the Cornell Engineering Students Activities Committee and worked through several ideas during the spring and summer before settling on Engineers Got Talent. They received funding from the Cornell Student Assembly Finance Commission and the CU Tonight Commission, which found their “pitch” both highly entertaining and persuasive. With $300 of funding in place, they reserved the Statler Auditorium, ordered food from Chipotle, printed flyers and other publicity materials, and entered a large trophy for the winner.

Luengo contacted a friend in the Skits-O-Phrenics sketch comedy group and arranged for them to be the opening act to warm up the audience. The Statler provided a sound-and-light technician to make things feel more professional. But the real highlight of the night was the sheer diversity of talent on display by the eleven acts that performed.

There were singers, dancers, guitarists, a “friendly neighborhood juggler,” and freestyle rappers/beatboxers. And there was Asher Novick. Novick does not sing, dance, beatbox, rap, or play a musical instrument. Novick balance things on his chin. Things like an umbrella, a golf club, a ski, a chair, and a ten-foot long table. Oh, and also a first place trophy. While each of the performers, (who were just about all engineering students,) received loud, sincere, and enthusiastic applause, Novick was the clear favorite and he walked away with the trophy as winner of the first annual Engineers Got Talent contest. “I decided to be in the show because I seem to have a number of unique talents that are only ever relevant in the context of a talent show,” says Novick. “So why not show one of them off?” When asked if this event will become a yearly thing, Flammé, Luengo, and Quan all make it clear that they would very much like for that to happen. “As people were leaving the show that night they were already asking about next year’s show,” said Flammé. “We really hope they will be able to make that happen. As we were getting this show ready we kept half jokingly calling it the ‘first annual’, but now we all hope it really is. We just need someone to step forward and take it on.”

—Chris Dawson

**Cornell engineers join $2M DARPA Robotics Challenge**

C**ornell engineers are adding their expertise in robot autonomy to the DARPA Robotics Challenge (DRC), a multi-year, international prize competition sponsored by the U.S. Defense Advanced Research Projects Agency (DARPA).

Hadas Kress-Gazit, assistant professor of mechanical and aerospace engineering, graduate student Spyros Maniatopoulos; and Roberto Villalba ’15 have joined Team VGIR (Virginia-Germany Interdisciplinary Robotics) to compete for the top prize of $2 million. VGIR made the top 10 teams following a December 2013 trial, earning a spot in the challenge finals in June 2015.

Cornell joined the team in May.

The DRC follows on the Grand Challenge (2005) and Urban Challenge (2007), which featured a Cornell team. Its goal is to develop advanced ground robots capable of complex tasks during natural or man-made disasters, such as the Fukushima Daiichi nuclear power plant disaster in 2011. It’s not quite at the level of Robocup running into burning buildings, but the DRC teams are trying to develop robots capable of assisting humans in responding to such disasters, Maniatopoulos said.

“W”at we want is to create autonomy for the robot by making provably correct robot controllers,” Maniatopoulos said. The Cornell team led by Kress-Gazit is contributing research in bringing full or partial autonomy to the robotic platform, reducing the need for human input to accomplish tasks. Robots that can make decisions and automate tasks without help at every turn could prove invaluable in disaster situations and countless other applications. “Our research is about synthesizing controllers from high-level behavior specifications, to reduce operator overload, and to provide guarantees,” Kress-Gazit said. That includes guarantees of safe behavior and self-monitoring ability of all the robot’s systems, even in the event of human error.

Team VGIR’s principal investigator is David Conner, a senior research scientist at TORC Robotics, a Virginia Tech startup. Team VGIR, which initially included researchers from Virginia Tech Center for Human-Computer Interaction and Germany’s Technical University in Darmstadt, competed in a December trial which found their DARPA Virtual Robotics Challenge in June 2013. Based on their sixth place finish, they were awarded
a humanoid “Atlas” robot developed by Boston Dynamics and a chance to compete in the DRC Trials in December 2013. Their robot is named Floriand, the patron saint of firefighters and rescuers. In addition to Cornell, Team ViGIR has expanded to include researchers from Oregon State University and Germany’s University of Hanover. At the DRC finals in June 2015, to be held in Pomona, California, an untrained Floriant will need to complete a series of about 10 tasks in

Hackathon showcases smart content search engine

A t the Big Red / Hacks event Sept. 26-28, 2014—billed as the first student-run, large-scale hackathon at Cornell University—participants had access to a semantic intelligence application program interface—API, the core technology for a new startup, Speare. Speare founder and CEO Rahul Shah ’16 (a Computer Science major) said his passion for understanding information, coupled with meeting students who shared an interest in entrepreneurship, resulted in the creation of Speare—a startup business that harnesses semantic intelligence to understand the meaning of textual information. “Back when I was in high school I was interested in how computers understand the meaning of content and information,” Shah said. “I started by looking at and working with music, by trying to extract characteristics of songs—e.g., tempo, key, etc.—and to use that data to recommend new music to users.”

“[At Cornell] I started working with a team of people to develop technology that can understand the meaning behind textual data. I had developed some innovative core technology; I was looking for a business problem to solve.” While participating in eLab, the Speare team decided to focus on the publishing industry because it is underserved by effective analytics, and the potential for using Speare technology to connect more effectively with audiences is great. “Media helps ‘hold the world together’ by providing audiences with notices and commentary about political change, technology advancements, social movements, etc.,” Shah said. According to Shah, media has changed significantly in one generation. Audience segmentation has increased and the reach of individual media channels is continually in flux. All of this places a significant strain on the ability of any single publisher to generate new audiences and increase revenue. “Engaging an audience is the key to success in the media space,” Shah said.

By providing newsrooms with a smarter content discovery engine and an analytics portal that allows editors and journalists to make decisions based on insights gleaned from data, Speare’s mission is to take news and media websites to a new level of personalization for their readers. “Current solutions are unable to fully engage readers because they don’t understand why the recommendations were chosen.” Speare is the first personalization engine to fix this, “Shah said.

Following Big Red / Hacks development teams will be granted six months free use of Speare technologies. In return, the Speare engine will become “smarter,” enabling publishers to make better data-driven decisions about the content they provide. —Debra Eichten
GLOBAL REACH
By Chris Dawson

Ithaca is a truly beautiful place. Spring is glorious, summer spectacular, and autumn stupendous. The light on a crisp, clear winter morning would inspire Renaissance masters. At the same time, it must be acknowledged that there are times in an Ithaca winter when the world can feel like it has shrunk down to just the small snowy segment visible as you cross the Pew Engineering Quad with your head down, eyes narrowed, muscles tensed against the windy cold, making your way to a 9 a.m. final exam. At times like these, Cornell can seem isolated up on its hill overlooking Ithaca and the southern end of Cayuga Lake, barely visible through the squall.

But this isolation is an illusion. You can’t see them through the blinding snow, but there are tendrils radiating out from the Quad and connecting Cornell Engineering with people and places all over the world. Some of those links head off to China, others to Spain or Germany or Tanzania. Still others rise up into low-Earth orbit, and beyond. Cornell engineers come from everywhere and they go everywhere.

Long before there even was a College of Engineering at Cornell, students and professors were leaving their native countries to come to Ithaca. In 1868 in the very first undergraduate class at the newly formed Cornell University was one unknown student of “engineering and mechanical arts” who listed his home address as “Italy.” These days, Cornell keeps much better records. More than 2,500 students from countries outside of the United States applied for admission to the class of 2018 and the current undergraduate engineering population has students from 32 foreign countries.

At the graduate level, the number of countries represented is even greater. In fact, more than half of the 2,000 graduate students pursuing engineering degrees come from outside of the United States. These 1,042 foreign-born students represent an astounding 67 countries from six continents. (So far, no Antarcitcans have registered at Cornell.)

By far, the largest contingent of foreign students comes to Cornell from China. Approximately 80 undergraduates and 550 graduate students from China study at Cornell Engineering. Though they might not know it, there is a long tradition of talented Chinese students coming to Cornell. The tradition dates back to 1901, when Alfred Sao-ke Sue travelled to Ithaca from China and enrolled as a freshman. His brother, S.C. Thomas Sze, followed a year or two later and became the first Chinese student to earn an engineering degree from Cornell.

Thomas Sze then returned to China with his newly-awarded degree in mechanical engineering and began his career with the Peking Mukden Railway. He went on to be a driving force in the development of China’s national railway system, as well as playing a key role in the development of China’s banking system and electrical distribution network. Today, the director’s position in Cornell’s Sibley School of Mechanical and Aerospace Engineering is named for S.C. Thomas Sze.

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CORNELL ENGINEERING EMBRACES THE WORLD
Undergraduate chemical engineering students can earn six credits and live in London for a summer. A separate program for M.Eng. students is designed specifically for those whose undergraduate degree is in something other than chemical engineering. Students dive into a four-week crash course that will get them up to speed as they start their M.Eng. program back at Cornell in September.

Caglioni, Caglioni, and Giannelis all agree on the value of studying abroad. “The education you get in the classroom is just a small percentage of a total education,” says Caglioni. “Having international experience shows you there are many ways to put together a society. If you want to have broad impact as an engineer, you need to understand more than just one culture.”

Giannelis adds, “It’s all about challenging yourself and putting yourself in a new context/environment. It makes you grow.” Caglioni agrees. “I would do it again in a heartbeat. My time in Germany changed me in profound ways—I understand myself better.”

The value of studying in a foreign country goes far beyond the technical education students receive. In fact, Cornell places such a high value on study abroad that the university has adopted a goal of increasing the portion of undergraduates who participate in an international experience to 50 percent by the year 2020. Fredrik Logevall, vice provost for International Affairs, says, “This great university aspires to be one of the top ten research universities in the world. To succeed, we must infuse an international perspective into our curriculum, our culture, and all that we do. We need to produce global citizens, and enabling our students to have an educational experience abroad is an excellent way to do that.”

Les Trotter, associate dean of Cornell Engineering and a member of Cornell’s Internationalization Council, can attest personally to the value of working or studying in another country. “I can look at intellectual corners I have turned and new paths of research I have taken and I can trace these directly to time I spent abroad,” he says. “When you are in a new environment, the mind turns on its ‘learning’ button. These sorts of experiences—just being in a new country—you learn from it. You can’t help but learn from it.”

Besides Cantabria University in Spain, Cornell Engineering has formal study abroad exchange programs with the Hong Kong University of Science and Technology, and the Technion-Israel Institute of Technology. Cornell has also approved transfer of technical credits from a long list of institutions, including Ecole Centrale Paris, the Danish Institute for Study Abroad, Queen Mary College in London, the University of Edinburgh in Scotland, and the University of Queensland in Australia.

Back from her year in Spain, Caglioni is more convinced than ever of the value of engineering students studying abroad. “Before I even came to Cornell I knew I wanted to spend a semester in another country,” says Caglioni. “So much learning happens when you are on your feet out in the world. Part of going abroad is an opening of the mind. But another part of it is just learning really valuable life skills, particularly in another language. I had to figure out how to open a bank account and

Investigating a boulder that bounced down the slope during the 2014 Pisagua Mw 8.1 earthquake. Cornell EAS graduate student Chelsea Scott stands next to boulder.
“IT’S ALL ABOUT CHALLENGING YOURSELF AND PUTTING YOURSELF IN A NEW ENVIRONMENT. IT MAKES YOU GROW.”

how to find an apartment and how to get around Europe when we traveled. I grew up so much in so many ways.”

For students who would like an international experience without committing to an entire semester or year abroad, there are other options for spending time overseas. The AguaClara team travels to Honduras each January to work on water treatment plants that provide safe drinking water for more than 30,000 people. AguaClara also has new project sites in India. The Engineers For a Sustainable World team travels to Sabana Grande, Nicaragua to work with two local groups, Las Mujeres Solares and Grupo Fenix, on issues of alternative energy and sustainability. The Engineers Without Borders team has begun a collaboration with a non-profit group called Engineers in Action and meaningful international experiences. We must equip them to live and work in a world whose chief problems transcend national boundaries.”

Trotter argues that engineering students, who are developing the technical skills to have direct and immediate impact on some of the most pressing global problems, are the very students who should be studying abroad and gaining international experience while still in school. “One thing about engineering as a general field is that it is so useful,” says Trotter. “Engineers can have a real impact on real problems right away—even as students. This is why engineering students need to get out in the world as undergrads.”

In order to both recognize and encourage engineering undergraduate students to have international experiences, the college started its Global Fellows program in 2008. Students who are named as Engineering Global Fellows receive a certificate from the dean, have their name and picture displayed in Carpenter Hall, and have the chance to share their experiences with other interested students. The first group of Global Fellows in 2008 numbered 58. In 2013 there were 80 Global Fellows recognized by Lance Collins, the Joseph Silbert Dean of Cornell Engineering.

La Bahía de Santander (the Santander Bay), as well as part of the city of Santander, Spain itself. Santander is home to the University of Cantabria, which hosts engineering exchange students from Cornell every year.

in Califa, Bolivia to improve water quality there. Cornell University Sustainable Design has designed an early childhood education center in Johannesburg, South Africa. Students majoring in Science of Earth Systems have had the chance to attend a summer field course run jointly by EAS professor Suzanne M. Kay and the Universidad de Buenos Aires in the Argentinian Andes.

For engineering undergraduate students, the partial list above makes it clear that the possibilities for having an international experience while at Cornell are wide open. In his 2012 white paper on “internationalizing” Cornell, President David Skorton wrote: “If we are to educate students for global citizenship, we must offer them language study, an understanding of history and of cultures beyond their own, and meaningful international experiences. We must equip them to live and work in a world whose chief problems transcend national boundaries.”

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A nother hugely important aspect of Cornell Engineering’s global reach is the faculty. Many of the more than 250 full-time faculty of the college are from outside of the United States. Just as in the student body, six continents are represented any time the full faculty gathers. Whether from India or Indiana, England or New England, professors are often drawn to Cornell Engineering by the quality of students and faculty, the extensive modern facilities, and the reputation for collaboration across disciplines.

Cornell Engineering has a well-earned and long-held reputation as an institution actively involved in research projects and collaborations around the world. Whether it is a windfarm off the coast of Denmark, a telescope in Chile’s Atacama Desert, a rural health clinic in Kenya, or the Biliu River Basin in China, there are Cornell Engineering professors on-site, doing research that will have a real impact on how people live and interact with the world.

Today’s Cornell Engineering faculty members are following in the footsteps of earlier generations of Cornell researchers, including the group of professors who led one of the first full-scale scientific expeditions to the Brazilian Amazon in the 1870s, and Jack Oliver and Bryan Isacks of the Department of Geological Sciences (now Earth and Atmospheric Sciences), whose use of earthquake seismology in the South Pacific helped bring the theory of plate tectonics into wide acceptance in 1968. Professor Derek Warner of the School of Civil and Environmental Engineering points out one value of international collaborations: “For our research group to be at the forefront of our field, we must collaborate with others to
human activities. “There are lots of reasons to be involved in international scientific collaborations,” says Pritchard. “When doing fieldwork in another country, having local knowledge is key for scientific understanding and working together in the cultural and logistical context. For my projects studying volcanism at the regional or global scale, having international collaborations makes the science better by bringing together research teams with the necessary expertise.”

According to a study published recently in the online journal PLOS ONE, international collaboration between researchers doesn’t just lead to better science; it can also be a good career move. The authors found that international collaboration leads to publication in more highly esteemed journals and a greater number of citations. Matthew Smith of the University of Chicago and his collaborators found that “as the number of countries represented in the author list increases, articles are more likely to be published in journals with higher impact factors and accrue more citations than peer publications which have fewer countries represented.”

While faculty members from all of the schools and departments within Cornell Engineering either do research overseas or collaborate with researchers from other countries, faculty from Earth and Atmospheric Sciences and the School of Civil and Environmental Engineering have the most obvious reasons to leave Ithaca for their work. “The Earth is complex and heterogeneous,” says John Thompson, the Wold Family Professor in Environmental Balance for Human Sustainability in Earth and Atmospheric Sciences. “To understand it, we have to work in diverse areas with different rocks, different processes, and different environments. Simply put, the rocks won’t come to us—we have to go to them and understand them in place.”

Rick Allmendinger says, “Climate change, hazards, and resources don’t recognize human borders so we go to the best place on Earth to study the phenomena or resources in which we are interested.”

Cornell engineers—faculty, students, and alumni—have been “going to where the rocks are” for many generations. Each year, more and more students study abroad or travel with student project teams. Faculty members understand that for Cornell to be a world-class research institution, they need to be out in the world, collaborating with leading scientists and researchers wherever they are. Peter Frazier, assistant professor of operations research and information engineering at Cornell, sums it up nicely when he says, “By opening yourself up to the whole world, rather than just the United States, you allow yourself to work on a greater range of interesting problems.”

Dean Collins is proud of the international reach of Cornell Engineering. “Cornell Engineering has a rich history of successful and important scientific collaborations with researchers all over the world. But to remain a true global leader in engineering education and research, we need to do even better,” says Collins. The problems of the 21st century are global. Knowledge and innovation do not respect national boundaries. “More of our students need to spend time abroad. Our professors need to continue active collaborations with researchers all over the world. And our graduates need to be out in the world, making a difference.”

If you have spent a winter at Cornell, then you have probably also been on campus for spring, summer, and fall. If so, you know how gloriously beautiful this part of the world can be when the sun is shining and the hills are a million shades of green and the lake is sparkling off in the distance. On days like these, you can almost see those filaments spreading out to all the places Cornell engineers live and work and learn. From its perch above Cayuga, Cornell Engineering continues to be a truly international institution.
warms of excited children ran through the Sciencenter, a hands-on science museum in Ithaca, one cold November Saturday afternoon. Along with the usual hands-on exhibits, they and their parents massed around stations stocked with cool new gadgets.

At one table, a mother and son tossed a wiggling ball back and forth, laughing. At another, a brother and sister built a mini-blanket fort with a hinged quilt. Girls tried out a projector that beamed their drawings on the ceiling; boys oohed and ahhed over an interactive gaming system that encourages competitive play using two bicycles and radio signals, and a dad in a baseball cap tried out an electronic kitchen handle with a spatula attachment.

Were these the latest holiday season must-haves from the shelves of a big box retailer? Not quite yet. Each product was a prototype, stemming from an original idea and created from scratch by a team of Cornell Engineering students in “Innovative Product Design via Digital Manufacturing,” a popular upper-level class taught by Rob Shepherd, assistant professor of mechanical and aerospace engineering, and Sirietta Simoncini, a lecturer in systems engineering.

Shepherd, who joined Cornell in 2013, created the course to teach a modern manufacturing process that combines mechanical engineering with design thinking. He and Simoncini call their theory “design and systems thinking.”

Before teaching at Cornell, Shepherd completed a post-doc at Harvard University and started his own company, drawing on his M.B.A. and Ph.D. in materials science. Simoncini is an architect from Italy who, in addition to teaching at Cornell, has taught as a design thinking coach at many universities, including Stanford’s world-renowned Hasso Plattner Institute of Design, better known as the d.school.

“I felt it was important for the College of Engineering to have an open design class,” says Shepherd, “so that instead of being told exactly what they are supposed to build and how to build it, the students are encouraged instead to come up with their own idea, build it, and sharpen it into a realistic product.”

The class began in an untraditional way, with the teachers asking the students to design products using techniques more commonly associated with anthropology or social work than engineering. “The broad challenge for the students was to redesign the family experience,” says Simoncini. “Design thinking starts with empathy.”

Empathy, a word not usually associated with engineers, is at the core of the process Shepherd and Simoncini teach. Rather than beginning with an idea, the teams of students, carefully created with a mix of undergraduate and graduate students (including some distance learners) worked together to embed themselves in families. There, they observed and interacted with the parents and children, using empathy to define problems faced by the families as their first step.

“This is ethnographic fieldwork,” says Simoncini. “We train the students how to ask the right questions. We wanted them to learn to be a kind of anthropologist of the family, to begin without biases. This is often the hardest part of the process for them, because they have never been asked to do this before.”

When the teams returned and “unpacked” their observations, they noted that families needed help keeping their homes neat, engaging their children in chores, putting down devices, and playing together. After pinpointing the problems, the teams move into the middle phase of the process, a lengthy brainstorming phase designed to produce hundreds of ideas. They then winnowed them based on two criteria, desirability and feasibility. “The intersection of something that is desirable and feasible—this is what we call innovation,” says Simoncini.

Visual indicator of gameplay for competitive bicycle racing product from Team Left to Right. They created the L2R Bike System, an interactive gaming system designed to promote outdoor physical activity and actually decrease screen time, promoting a healthier lifestyle.

“The students are encouraged to come up with their own idea, build it, and sharpen it into a realistic product.”

—Rob Shepherd
Chase Gordon, Brian Hoza.

After the teams settled on their final idea, they moved into the last phase, prototyping. First they threw together rapid prototypes using basic materials—tinker toys, pipe cleaners, cardboard—and later, began making computer designs and using the 3D printers and laser cutters.

Continuous feedback from peers, faculty, industry advisers, and end users is a crucial part of this design process, as is prototyping. Shepherd explains that prototypes are essential for communicating the nature of your idea to users, and an important part of the course is mastering the skills required for rapid prototyping. “The closer you can get your prototype to look like the end goal, the higher quality feedback you get, and the better your feedback, the more useful your design iterations are,” he notes.

Shepherd also emphasizes the commercialization of the products, requiring students to investigate if they are modifying existing intellectual property or creating something new. “The goal is for them to develop unique intellectual property,” he says.

A student team from last year’s class has taken a step toward commercialization, incorporating themselves to create and market the “Polar Chiller,” a counter-top personal beverage cooling device using proprietary technology. One fall 2014 class member, Michael G. Walsh ’14 MAE, now a systems engineering graduate student focusing on cooling device using proprietary technology.

From their observation, Walsh’s team created the idea of an “anti-Lego”—a flexible building toy that was all in one piece. Phillips named Lego one of “the five worst toys to step on in the middle of the night” and the Internet abounds with tales of parents needing stitches from late night Lego encounters.

“From their observation, Walsh’s team created the idea of an ‘anti-Lego’—a flexible building toy that was all in one piece.”

“The Cook-E is going to make it easier to get kids into the kitchen. It will have some cool functionalities which we’re still exploring,” she explains. “The handle will have different attachments, such as a spatula, and the spatula might have a temperature sensor that changes color to help children understand when food is cooked to the correct temperature.”

“Coming from a business background, Phillips is excited about the market longevity of the Smart Handle, as the manufacturer could keep producing new attachments for it. More importantly, she is grateful to have learned so much about this design method. “The whole purpose of what we learned is to develop products built around the needs of the person,” she notes.

“Engineers, most of the time they are given a problem to solve, and they start solving the problem,” says Simoncini. “But it is not always clear if that was the right question to answer. We teach them how to start with a completely fresh mind without knowing what the solution is, and then define the problem.”

“My team looked to leverage differences, overcome barriers, and foster closeness,” said Phillips. With those goals in mind, they decided to focus on making cooking an exciting activity for everyone in the family.

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“This course has been the most demanding of all my graduate courses,” says Harolyn, citing the intense time commitment required for the observation and brainstorming portions of the process. “But as I look to advance into program management at Boeing, it probably has been the most relevant.”

Walsh, who will use these techniques again in a spring course focusing on traffic issues, found that the course resonates strongly with his values. “Design thinking matters,” he says. “You can go through a development phase for a product to make it as good as you possibly can but if you don’t do it with the right intention and enough market and design research, you could create an absolutely amazing product that no one will want. This process very efficiently helps you refine and strive towards a product that everyone is going to need and want.”

As the day at the Sciencenter wound down, tired children put on their warm coats and went home for their suppers while the students packed up their prototypes. They also brought home the myriad observations and conversations they had had with children and parents, ready to analyze. They had a few more weeks to work on these projects before the semester ended—products which could eventually end in a patent, commercial licensing, or a Kickstarter campaign—but that was not the final goal for Shepherd and Simoncini.

“What matters,” says Shepherd, “is the process they are learning. They are performing it really well. Next year, we are going to have students work on assisted living devices. I am looking forward to a new set of students with a new set of ideas!”
It was a moment any student team dreads.
Cornell Racing had spent months designing, building, testing and retesting its formula-style racecar in preparation for the Toronto Shootout. But during its timed trial, Cornell’s car stopped dead in its tracks.

Team leader Nina Buchakjian ’15 MAE, engine subteam leader TeAnn Nguyen ’15 MAE, and electrical subteam leader Sarah Behringer ’16 ECE remember that day. “The engine problems that had plagued us earlier that week had followed us to Canada. When we saw the car completely stopped on the track, the three of us, with several other members of the team, rushed out there to figure out what had happened,” says Buchakjian. “Unfortunately, the failure was beyond what we could fix at that moment.”

There as they took this disappointing moment in stride, Rebecca Macdonald, Cornell Engineering’s Swanson Director of Engineering Student Project Teams, couldn’t help but notice something different about the members of Cornell’s team. “As I watched our students fix the car I was struck by the image of three female leaders for the Cornell Racing team working together in the pits,” Macdonald says. “In fact, while we were at the Toronto Shootout I noticed that many of the other racing teams were predominantly male. It was a moment that made me take notice and realize that Cornell Engineering is doing something special.”

Historically, engineering has been a male-dominated profession. According to the latest figures from the National Science Foundation, male students comprise 81.4 percent of all
first-year undergrad students enrolled in engineering programs nationwide.

But Cornell Engineering shatters the national trend. Close to 40 percent of its student body is female. Of the nearly 1,100 students on teams, 37 percent are women. Nearly every single Cornell Engineering student team has female leaders. “The teams are a reflection of our student body,” Macdonald says. “It’s exciting to see Cornell ahead of the trend and being a trailblazer in producing engineering leaders from all backgrounds and genders.”

Overall, the female student leaders for these teams represent a vibrant mix of backgrounds and experience levels, but they all share a passion for engineering, problem solving, and creating smart, innovative design. But in the larger engineering world where women are still a smaller minority, there are moments when being a young female engineer means that they stand out from the crowd. For some, it can be a light-hearted moment.

“Sometimes we make jokes that we should go out for girls’ night. Once we even received a silly award at a competition for having the most girls on the team,” says Tiffany Ly ’15 MSE, team leader for Cornell Engineering’s Concrete Canoe team, which is split evenly among male and female students.

But for some, standing out from the crowd also means having to confront the biases.

“There are moments where I notice that someone sees me as being different because I am a woman or young. What I’ve learned is that I can’t let it bother me and ultimately, I know if I work hard, the results will show for themselves and people will respect that,” says Corinne Lippe ’16 MAE, leader of the Mars Rover’s drive systems subteam. “I do take it as a challenge when someone judges me. I want to prove them wrong.”

Likewise, Brecken Blackburn ’15 ECE, subteam leader for the Engineering World Health team, says that she has noticed the surprised reactions when someone learns she is an engineering student.

“The reactions are never hurtful, but it is obvious that I battle their expectations of what an engineer should look like,” Blackburn says.

Many female students interviewed for this article spoke of the disbelief they have encountered when people learn they are engineering majors. Like Blackburn reported, it is never harmful but the reactions illustrate that there are still people who consider engineering the domain of men.
**Collins reappointed as dean**

Lance Collins, professor of mechanical and aerospace engineering, has been reappointed to a second five-year term as the Joseph Silbert Dean of Engineering, Cornell Provost Kent Fuchs announced Oct. 17. The Cornell Board of Trustees approved the reappointment.

Collins was instrumental in creating, developing and implementing Cornell’s winning bid for Cornell Tech in New York City and remains part of the executive team that oversees programming at the new graduate school. He has focused his efforts on industry ties and connections and keep Cornell engineering working as an active member of the local economies in Ithaca and New York City through its entrepreneurship programming.

— Joe Wilurdy

**Collins/Alabi**

Christopher Alabi, assistant professor of chemical and biomolecular engineering and a Nancy and Peter Meinig Family Investigator in the Life Sciences, has been awarded a Research Starter Grant in Pharmacueticals by the Pharmaceutical Research and Manufacturers of America Foundation (PhRMA). The grant supports scientists in establishing their academic research careers as independent investigators in biopharmaceuticals and pharmaceutical technology. Alabi’s early career support is meant to be a catalyst for young scientists of “exceptional promise” who have contributed to the advancement of physics by independent, original research or who have rendered some other special service to the cause of the sciences.

Escobedo

**Escobedo made APS Fellow**

Fernando Escobedo, the Marjorie L. Hart Professor of Engineering, was elected to fellowship in the American Physical Society. Fellowships are given to fellow scientists who have contributed to the advancement of physics by independent, original research or who have rendered some other special service to the cause of the sciences. Escobedo was cited for elucidation and prediction of complex phases formed by block copolymers, elastomers, and colloidal suspensions of anisotropic particles, and the advancement of novel Monte Carlo simulation methods.

**Hernández**

Sara Xayarath Hernández, MD ‘07, director of Diversity Programs in Engineering at Cornell Engineering since 2009, has been named associate dean for inclusion and student engagement in the Graduate School.

Hernández will lead the Office of Inclusion and Student Engagement, with a central role in Graduate School efforts to recruit, retain and support a diverse community of graduate and professional students and postdoctoral scholars. As one of five University Diversity Officers, she also will help steer Toward New Destinations diversity initiatives in colleges and the university.

“We are very proud of Sara’s accomplishments as director of Diversity Programs in Engineering and as a passionate and effective advocate for the College of Engineering for greater inclusion and diversity,” said Alan Zehnder, Associate Dean for Diversity & Faculty Development. “Although she will be dearly missed in engineering, we are very happy to see that her talents will be applied for the benefit of the Cornell undergraduate and graduate community. We look forward to working closely with her in her new role.”

— Daniel Aloi

**Cosgrove**

Ben Cosgrove, assistant professor of biomedical engineering, was selected to receive a “Rising Star” Award at the 2015 Biomedical Engineering Society—Cellular and Molecular Bioengineering Conference, which was held January 6-10 in St. Thomas, the Virgin Islands. The conference focused on the theme: “From Womb to Tomb: Mechanobiology of Generation, Regeneration, and Degeneration.” Rising Star awardees designate exceptional junior principal investigators and are selected to present a short podium presentation.

**Birman**

Ker Birman, N. Rama Rao Professor of Computer Engineering, was elevated to IEEE Fellow by the IEEE Board of Directors at its November 2014 meeting, effective January 1, with the following citation: for leadership in distributed computing and management of distributed systems.

**Alabi receives PhRMA grant**

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Joachims is cited for his contributions to the theory and practice of machine learning and information retrieval. He focuses on algorithms that can learn from labeled examples and then identify and classify new data, with applications in data mining and robotics.

Joachims was also named a fellow of the Association for the Advancement of Artificial Intelligence. The Fellows Program honours a small percentage of the group’s membership as having unusual distinction in the profession over several years.

The association has recognized 47 of its fellows over the years. It embraces the Departments of Computer Science, Information Science and Statistical Science.

“I am deeply honored to be chosen for the role of CIS dean and thrilled to be back at Cornell,” Morrisett said. “To me, computer science, information science and statistics are central to any modern university, as they touch every field of inquiry. At Harvard since 2004, Morrisett served as director of the Center for Research on Computation and Society. 2012-14, and as associate dean for computer science and engineering, 2007-10. Morrisett’s research focuses on the high-priority field of computer security, especially on developing programming languages that can enforce security in “mobile code” — computer programs that travel across networks to be executed on a recipient’s computer.

He earned his B.S. in mathematics and computer science from the University of Richmond in 1989, and master’s degree and doctorate from Carnegie Mellon in 1991 and 1995, respectively.

Greg Morrisett to return to Cornell as CIS dean
John Gregory “Greg” Morrisett, the Allen B. Cutting Professor of Computer Science at Harvard University, has been named dean of the Faculty of Computing and Information Science (CIS), Interim Provost Harry Katz announced March 17. It will be a homecoming of sorts for Morrisett, who served on Cornell’s computer science faculty from 1996 to 2004. He will assume his new post July 1.

“We are happy to welcome Greg back to Cornell, where he previously distinguished himself as a young researcher,” said Interim Provost Harry Katz. "He is a gifted scholar, teacher and administrator, and his experience will help advance the already great strengths of CIS.

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CIS is a college-level unit created in 1996. It embraces the Departments of Computer Science, Information Science and Statistical Science. Marjolein C. van der Meulen wins ORS Women’s Leadership Award
Marjolein C. van der Meulen, the James M. and Marsha McCormick Chair of Biomedical Engineering and Swanson Professor of Biomedical Engineering, rejoiced the 2015 Women’s Leadership Forum Award from the Orthopaedic Research Society. The Swanson Professor of Biomedical Engineering, and a Marsha McCormick Chair Meulen, the Allen B. Cutting Professor of Computer Science at Harvard University, has been named dean of the Faculty of Computing and Information Science (CIS), Interim Provost Harry Katz announced March 17. It will be a homecoming of sorts for Morrisett, who served on Cornell’s computer science faculty from 1996 to 2004. He will assume his new post July 1.

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Kourkoutis wins Packard Fellowship

Lena Kourkoutis, assistant professor of applied and engineering physics, has received a Packard Fellowship for Science and Engineering from the David and Lucile Packard Foundation. The five-year, $875,000 award has gone to 18 of the nation’s most innovative early-career scientists and engineers, according to the foundation. Established in 1988, the fellowships provide early-career scientists with flexible funding and freedom to take risks and explore new frontiers in their fields.

Kourkoutis, a Rebecca Q. and James C. Morgan Sesquicentennial Faculty Fellow, studies new frontiers in their fields. Her electron microscopy—at the interfaces of materials. Her electron microscopy and research at a national level.

Fuchs named president of University of Florida

Cornell Provost W. Kent Fuchs has been named the 12th president of the University of Florida, the UF board of trustees announced Oct. 15. He began his new position Jan. 1.

Fuchs, who was appointed Cornell’s chief academic officer in 2009, came to Cornell in 2002 as the Joseph Silbert Dean of the College of Engineering. In a statement, Cornell President David Skorton said Fuchs leaves behind a legacy that “will be felt by all Cornellians, and by colleagues at other top research universities, for decades to come.”

Known for his knowledge of Cornell, clarity of purpose, and vision for the future, Fuchs became provost at the onset of the economic recession and helped the university find creative ways to hire and retain diverse, outstanding faculty, develop a new budget model and strategic plan, and establish the Cornell Tech campus on Roosevelt Island, which, Skorton said, may be “Kent’s greatest legacy as provost.”

“Kent will bring to his new position a deep understanding of the issues, constituencies, and avenues for collaborative action that are central to the life of a university,” he said. “We will greatly miss his leadership, intellect, and thoughtful, principled actions.”

“Personally,” Skorton continued, “I am excited for Kent and look forward to our continuing partnership as we each continue to contribute to the advancement of education and research at a national level.”

“I am grateful to have had the opportunity to serve Cornell for the past 12 years,” said Fuchs. “Cornell is a wonderful university with a marvelous history and glorious future.”

Skorton announced an interim provost, ILR Dean Harry Katz who started his position Nov. 14. —Nancy DeSulille

Xu at White House BRAIN conference

Chris Xu, professor of applied and engineering physics, joined other academics and industry leaders at the White House Sept. 30 for a conference celebrating progress on the BRAIN (Brain Research through Advancing Innovative Neurotechnologies) Initiative, a sweeping federal effort to understand everything about the human brain.

Xu is among 58 researchers receiving a share of $46 million in National Institutes of Health funding under the $100 million BRAIN Initiative. The NIH announced this first wave of investments for BRAIN on Sept. 30.

The three-year, $1.73 million grant to Cornell will support Xu’s work in three-photon microscopy, a noninvasive, deep-tissue imaging technique that produces high-resolution, 3D images of living tissue by harnessing the fluorescence of cells.

So far, Xu and collaborators’ three-photon microscope can penetrate a live mouse brain’s hippocampus about 1 millimeter below its surface. Previous work had allowed them to image neurons; now they’re working on imaging neural functioning, Xu said. This optimization has involved an improved femtosecond laser; the use of longer light wavelengths to reduce tissue scattering and expression of new fluorescent protein probes. In particular, they have been using a sensor based on green fluorescent proteins—the subject of the 2008 Nobel Prize in chemistry—as targets for their microscope.

Three-photon microscopy can monitor neural activity in the mouse brain. Every time a neuron fires, an action potential opens a membrane channel that lets calcium ions rush in, and the green fluorescence activity of this function can be detected. By monitoring fluorescence intensity, the researchers can tell whether the neuron is active, Xu said.

The BRAIN Initiative has been compared to the Human Genome Project, which united thousands of scientists in the common goal of sequencing the complete human genetic blueprint.

—Nancy DeSulille
As artist-in-residence, Korean artist Kimsooja, wanted to explore a “shape and perspective that reveals the invisible as visible, physical as immaterial, and vice versa.” for the Cornell Council for the Arts (CCA) 2014 Biennial, she has realized that objective with “A Needle Woman: Galaxy was a Memory, Earth is a Souvenir,” which was installed in September 2014.

Kimsooja’s 46-foot-tall structure features an iridescent polymer film developed at Cornell, reflecting light with structural colors similar to those in a butterfly’s wings. Creating it involved some diligent problem-solving by materials scientists in the lab of Uli Wiesner, the Spencer T. Olin Professor of Engineering. The group, including chemistry Ph.D. student Ferdinand Kohle and postdoctoral researcher Hiroaki Sai, worked out how to create a polymer producing the desired optical effect and how to adhere it to Plexiglas panels on Kimsooja’s structure. Architecture students assisted with materials and fabrication.

“I really love how world-class science has been incorporated in world-class art,” Juan Hinestroza said of the Kimsooja-Wiesner project. “The fundamental science behind the coatings developed by the Wiesner group, the chemistry developed by Hiro, as well as the methods pioneered to coat the films with such nanoscale precision by Ferdinand, are indeed revolutionary – and the use of these materials to assemble a large structure like Kimsooja’s needle is simply breathtaking.”
HOMETOWN HERO

PH.D STUDENT: MALIKA GRAYSON

For Ph.D student Malika Grayson, helping others is as important as her academic work. “You can’t help yourself without helping someone else. We all need each other. I want my students to give back,” says Grayson. “You will be surprised at how much a small gesture can make a difference.”

Grayson was born to a huge extended family on the Caribbean island of Trinidad. Grayson spent much of her childhood with her grandmother. The clan matriarch set an example of constantly giving back to the community. “She was always cooking for people, no matter how many guests showed up,” says Grayson.

Grayson began her own philanthropy after winning the Miss Trinidad and Tobago competition (her talent: playing the steel-pan drum). With her winnings she organized a food drive and donated a thousand dollars each to twenty different needy households.

Grayson says she was drawn to Cornell by the warmth of the people in the Sibley Community Center, a non-profit aimed at needy households. There, Grayson began a mentorship program that allows students to help prepare and serve meals regularly. “The people we serve are so happy to see you come in and help, and even happier when you come in again next week,” says Grayson.

Grayson has also remained dedicated to her love of community leadership and volunteering. She is currently the co-director of the Graduate Society of Women Engineers and on the board of the National Society of Black Engineers. She joined GradSWE to help other women in engineering feel supported. “So many times, you’re the only girl in the lab,” says Grayson, adding that while there are many helpful male colleagues and mentors in the engineering field, subtle issues can still arise for a woman in a male-dominated profession. “Many of us suffer from imposter syndrome,” she says. “When you’re surrounded by men, you may find yourself thinking you can’t do as much as them.”

Other minorities face the same issues in engineering. Having a minority faculty mentor for all new graduate students during their first year would go a long way to help them acclimate, Grayson explains. “I didn’t have that when I came in, and it took me a year to get comfortable at Cornell. Finally a female colleague convinced me to join NSBE, and I was able to get that support.”

Grayson is committed to ensuring that new students get more immediate support as they begin their graduate experience in engineering. “I think faculty support can make a big difference in how a student views their school, how they follow through with a life path, and how they choose to continue,” she says. As NSBE’s community service chair, Grayson has made a point of reaching beyond campus, organizing volunteer work at the local Salvation Army branch in Ithaca, helping to prepare and serve meals regularly. “The people we serve are so happy to see you come in and help, and even happier when you come in again next week,” says Grayson.

Grayson has also expanded the NSBE’s involvement with Ithaca’s Southside Community Center, a non-profit aimed at empowering Ithaca’s African-American citizens. There, Grayson began a weekend program, inviting local kids to spend a month painting murals and being mentored by Cornell students in a relaxed, no-strings-attached atmosphere. She also revitalized the NSBE Jr. Program, where NSBE members mentor kids every week. Finally, Grayson conceived of and hosted an engineering day at the Beverly J. Martin elementary school, with tables of activities and demonstrations for the elementary students to investigate.

The mentorship program is going strong. Through NSBE Jr, we are able to help them prepare for finals, write a resume, prepare for the SATs,” says Grayson. She says that, despite the effort it takes to organize, recruit and manage outreach programs like this, seeing the enthusiasm and interest from those she’s helping makes it all worth it. “I just wanted to create something where the kids feel that we care...I grew up with so many people who acted as mentors, I know how important it is to have someone to look up to. I also want the community to not think that Cornellians just come for a few years and then leave without getting involved or taking an interest. It’s important to show we care enough to get involved.”

—Lauren Cahoon Roberts

PH.D STUDENT: MALIKA GRAYSON

Grayson has also remained dedicated to her love of community leadership and volunteering. She is currently the co-director of the Graduate Society of Women Engineers and on the board of the National Society of Black Engineers. She joined GradSWE to help other women in engineering feel supported. “So many times, you’re the only girl in the lab,” says Grayson, adding that while there are many helpful male colleagues and mentors in the engineering field, subtle issues can still arise for a woman in a male-dominated profession. “Many of us suffer from imposter syndrome,” she says. “When you’re surrounded by men, you may find yourself thinking you can’t do as much as them.”

Other minorities face the same issues in engineering. Having a minority faculty mentor for all new graduate students during their first year would go a long way to help them acclimate, Grayson explains. “I didn’t have that when I came in, and it took me a year to get comfortable at Cornell. Finally a female colleague convinced me to join NSBE, and I was able to get that support.”

Grayson is committed to ensuring that new students get more immediate support as they begin their graduate experience in engineering. “I think faculty support can make a big difference in how a student views their school, how they follow through with a life path, and how they choose to continue,” she says. As NSBE’s community service chair, Grayson has made a point of reaching beyond campus, organizing volunteer work at the local Salvation Army branch in Ithaca, helping to prepare and serve meals regularly. “The people we serve are so happy to see you come in and help, and even happier when you come in again next week,” says Grayson.

Grayson has also expanded the NSBE’s involvement with Ithaca’s Southside Community Center, a non-profit aimed at empowering Ithaca’s African-American citizens. There, Grayson began a weekend program, inviting local kids to spend a month painting murals and being mentored by Cornell students in a relaxed, no-strings-attached atmosphere. She also revitalized the NSBE Jr. Program, where NSBE members mentor kids every week. Finally, Grayson conceived of and hosted an engineering day at the Beverly J. Martin elementary school, with tables of activities and demonstrations for the elementary students to investigate.

The mentorship program is going strong. Through NSBE Jr, we are able to help them prepare for finals, write a resume, prepare for the SATs,” says Grayson. She says that, despite the effort it takes to organize, recruit and manage outreach programs like this, seeing the enthusiasm and interest from those she’s helping makes it all worth it. “I just wanted to create something where the kids feel that we care...I grew up with so many people who acted as mentors, I know how important it is to have someone to look up to. I also want the community to not think that Cornellians just come for a few years and then leave without getting involved or taking an interest. It’s important to show we care enough to get involved.”

—Lauren Cahoon Roberts

For Ph.D student Malika Grayson, helping others is as important as her academic work. “You can’t help yourself without helping someone else. We all need each other. I want my students to give back,” says Grayson. “You will be surprised at how much a small gesture can make a difference.”

Born to a huge extended family on the Caribbean island of Trinidad, Grayson spent much of her childhood with her grandmother. The clan matriarch set an example of constantly giving back to the community. “She was always cooking for people, no matter how many guests showed up,” says Grayson.

Grayson began her own philanthropy after winning the Miss Trinidad and Tobago competition (her talent: playing the steel-pan drum). With her winnings she organized a food drive and donated a thousand dollars each to twenty different needy households.

Grayson says she was drawn to Cornell by the warmth of the people in the Sibley Community Center, a non-profit aimed at needy households. There, Grayson began a mentorship program that allows students to help prepare and serve meals regularly. “The people we serve are so happy to see you come in and help, and even happier when you come in again next week,” says Grayson.

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