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Team TROOPER Opens Door to Elite Eight

In December, Team TROOPER completed the Defense Advanced Research Projects Agency (DARPA) Robotics Challenge trials at the Homestead-Miami Speedway. The Lockheed Martin Advanced Technology Laboratories-led team, which also includes Rensselaer and the University of Pennsylvania, guided an Atlas humanoid robot through a number of tasks designed to simulate disaster response scenarios.

The team is one of eight to move forward onto the next phase of the Challenge. In 2014, the team will continue to refine and expand its robotic system concept in preparation for the DARPA Robotics Challenge finals. The final winner will receive a $2 million prize.

As a top qualifier in DARPA’s Virtual Robotics Challenge held earlier in 2013, Team TROOPER received an Atlas robot to combine with advanced control algorithms and an operator station. The team developed a conceptual system and programmed Atlas to perform a series of disaster relief tasks. Tasks included driving a vehicle, walking over various hazards, climbing a ladder, walking over debris, opening doors, closing various valves, and attaching a hose to a hydrant.

“I am thrilled with the success of Team TROOPER and proud to have participated,” says Jeff Trinkle, professor of computer science, who recently was tapped for a leadership role with President Barack Obama’s National Robotics Initiative.

“I think the Challenge is especially important, because it showed the public that robots will be able to do a lot more than work in factories and vacuum floors,” Trinkle says. “At the same time, it showed how far we still have to go—taking 10 or 15 minutes to open a door is way too long!”
The New Polytechnic in Space

Stretching the boundaries of discovery

Rensselaer alumni express their appreciation for the education they receive here in many different ways, some of them extraordinary. But among the most extraordinary, surely, is taking a Rensselaer banner on board the Soyuz spacecraft to the International Space Station, as astronaut Rick Mastracchio ’87 did last fall. In May, the banner will pass to another alumnus and astronaut, Reid Wiseman ’97, who will return it to Earth in November 2014.

As I see it, the Rensselaer banner on the International Space Station honors more than their pride as graduates of the Institute—and Rensselaer’s long and distinguished history in space. It also honors Rensselaer’s ability to stretch the boundaries of discovery across disciplines, into the thermosphere and beyond.

I have often spoken about “The New Polytechnic,” a vision of what a great research university like Rensselaer must be, in order to enable discovery and innovation, and to educate the next generation of explorers and leaders. A polytechnic institute used to be defined principally as an engineering school. The New Polytechnic recognizes that the great global challenges we face are far too complex to be addressed by any single discipline. It recognizes, also, that the greatest opportunities for transformative discovery lie at the intersections of engineering, the physical sciences, the life sciences, the arts, and the humanities—underpinned by advances in high-performance computing, data analytics, web science, immersive technologies, artificial intelligence, and global interconnectivity.

Within this context, a great university must become a crossroads for collaborations across departments, schools, sectors, and geographies. Rensselaer in space is a sharp illustration of just this. Space exploration requires tremendous feats of aeronautical engineering, computer science, and robotics—yet space is also a laboratory where these disciplines work side by side with the life sciences.

For example, Assistant Professor Cynthia Collins, an expert in microbial communities, has used two missions of the Space Shuttle Atlantis to study microscopic biofilms formed by opportunistic pathogens. Supported by colleagues in nanobiotechnology and chemical and biological engineering, Collins investigated how these microbial communities thrive in a non-terrestrial environment and made a surprising discovery: the bacteria grown in space formed a vigorous “column and canopy” architecture not found on Earth, raising questions about the role of gravity in microbial growth. The resulting insights will help investigators understand biofilm formation on Earth, possibly aiding efforts to curb the spread of dangerous hospital infections.

Rensselaer has addressed even more fundamental questions in space, such as, “Is there life on other planets?” Alumni Michael Meyer ’74, Frederick Serricchio ’94, and Kobie Boykins ’96 worked with Dr. Laurie Leshin, our outgoing Dean of the School of Science and the newly appointed president of Worcester Polytechnic Institute, on NASA’s Curiosity Rover mission on Mars. Their efforts led to the discovery of water on the planet’s surface and ignited possibly the highest level of public interest in space research in over a decade, as we now have the first evidence that other planets, too, can hold the prerequisites for life.

In order to realize our vision of The New Polytechnic, we encourage our students, also, to look outside their own course of study, to be curious about what others are doing, and to engage the world in their interests. When he was just a sophomore, Nathaniel Quillin ’13 used the principles he learned in Introduction to Engineering Analysis, as well as the memory management techniques he learned in his computer science courses, and made important contributions to another crew member on the International Space Station: He helped to write the computer code for the first humanoid robot in space, Robonaut 2 (R2). Intended to undertake dangerous tasks such as spacewalks to make repairs, R2 employs technologies that could transform industries from automobiles to aeronautics, and even lead to robot help in nursing homes.

The members of the club RPI Students for the Exploration and Development of Space embody The New Polytechnic in their ambitions, not merely to engineer and to explore, but also to inspire others to a new kind of sight. After launching their first effort, literally, by designing and sending a weather balloon almost 90,000 feet into the stratosphere to the edge of space, the club’s founder, Orian Breaux ’12, a recent graduate in aeronautical engineering, said his goal was to encourage a new “zeal for the cosmos.”

We are very proud that our faculty, students, and alumni and alumnae persuade the world to look to the stars, and very proud that The New Polytechnic at Rensselaer enables them to explore the entire universe, both for the love of investigation and for the benefit of humankind.
Commending the Rensselaer IDEA!

I just have to commend “The Rensselaer IDEA,” initiated by President Shirley Ann Jackson, guided by Professor James Hendler, and described by Michael Mulaney in the last alumni magazine.

Dr. Jackson: Once again I appreciate your ability to see the big picture at RPI.

Michael Mulaney: Well-written article that must have required a lot of care and thought to be so inclusive.

Prof. Hendler: IDEA is just great! I want to encourage your efforts with this contribution:

Auto-tagging: We know that Google and Yahoo basically are in the business of ID tagging other people’s data for their own enrichment. The operative word here is “tagging”: putting each word or file of data away so that it can be found in almost real time. And it is this tagging technology that is missing today in everyday data.

So, a grand achievement would be an RPI-led standard system of auto-tagging of raw data. I can envision a variable-length digital tag message that accompanies any file, fully IDing all of the parameters of the data acquisition setup and environment. And then fitting all of this tagged data into distribution via a new Internet pipeline. Information retrieval on steroids.

I think you can take it from there, visualizing how various users can achieve different levels of data acquisition, processing, and application, by their depth of searching on the tags. The catch is that the proposed indexing/tagging system must be massively clever. And that would be the proprietary part of RPI’s contribution, perhaps.

And hurry. Data is piling up and overflowing into the void, huh!

John Clother 54
Chino, Calif.

Tubeflight “Interesting Concept”

I enjoyed reading the “Hyperloop, Meet Tubeflight!” article in the latest Rensselaer alumni magazine. In the spring, summer, and fall semesters of 1961, I was a graduate assistant in Dr. Foa’s Aero Department and worked on the Tubeflight and Vacuum Boost research team. The team built a subscale tube in the Ricketts Building Aero Lab using copper pipe from the local hardware store and conducted proof of concept experiments. We did have issues with stopping the vehicle and put a hole in the lab wall on one occasion. At that time, the bladeless propeller was being evaluated by a separate team for the Navy as a low noise propeller.

Now that I have 47 years of aerospace experience, I think there are many practical issues such as human ergonomics and cost that will keep Hyperloop/Tubeflight in the “interesting concept” category.

Peter McGrath 59
Huntington Beach, Calif.

As I remember, Dr. Foa came down to the Wind Tunnel Lab during our Wind Tunnel class in the basement of the Ricketts Building to show us his Tubeflight concept.

He explained his vision of a transportation system. At the time, he had a tube, probably copper, about 20 feet long and the wheel-less car/vehicle was powered by a small model airplane engine. He set the tube on the concrete floor, started the engine, and the car ran the length of the tube and out on the floor.

Lawrence D. Nichols 58
Greenville, N.C.

Annapolis Grad Enjoyed RPI

Responding to Joe Bauman’s letter in the Winter 2013-14 issue (“Go Navy!”), I was one of those “Annapolis grads.” In that era there were always two Navy groups, one studying for B.C.E. and the other (in its second year) studying for M.C.E. Each group usually consisted of about 10 officers and while at RPI each officer transferred into the Navy’s Civil Engineer Corps.

How appropriate that in the same issue of the alumni magazine it is announced that Adm. Lew Combs is being inducted into the Alumni Hall of Fame!

I have very fond memories of my two years at RPI and living in “Renwyck,” which was then a housing development near the north border of the campus.

Carl Otto 48
Palo Alto, Calif.

Memories of Hockey Line

In your Winter 2013-14 edition, you wrote that one of the fraternities camped on Hockey Line after the 1985 national championship to break the then-record of 33 days (“Reinvigorating a Rensselaer Tradition”). Not quite so...

On Hockey Line 1983, I was part of a crew known as the Wilkie Boatworks, the people fully responsible for the short-lived but deservedly famous Polemic (a humorous tabloid), who set the record of 35 days, 20 hours. Back then, Hockey Line stretched well into October. I do recall that a crew camped out after the 1985 NCAA championship for the following year’s tickets, but we’d all graduated, so we don’t know whether they stayed all summer per the official rules.

It matters not; we all had our fun, and on the final morning were treated to another tradition of the day, being served breakfast in bed (donuts) by President George Low.

My daughter is now headed to Rensselaer this fall and I hope she has as much fun as we did!

Gary Cattarin 85
Marlborough, Mass.

We’d love to hear from you! To provide space for as many letters as possible, we often must edit them for length. Contact us at: Rensselaer Magazine, Strategic Communications and External Relations, Rensselaer Polytechnic Institute, Troy, NY 12180; email to alum.mag@rpi.edu; or call (518) 276-6531.
The "ultimate display of science, mathematics, and technology" was in action as 38 teams of high school students from the Northeast and beyond put their robots to the test and competed in the inaugural New York Tech Valley FIRST® (For Inspiration and Recognition of Science and Technology) Robotics Competition March 13-15 at Rensselaer.

More than 1,000 high school students—along with hundreds of teachers, industry and college mentors, and parents—converged on the East Campus Athletic Village for two days of matches.

"At Rensselaer, our goal is to develop well-rounded, engaged, mature thinkers and innovators who are intellectually agile, and who possess the multicultural sophistication to become transformative forces across the globe," says President Shirley Ann Jackson. "The Tech Valley FIRST Robotics Competition brings together high school students from around the world to test themselves and experience the excitement of discovery and innovation—preparing the leaders of tomorrow for the challenges ahead."

During a six-week timeframe, students worked with professional engineering mentors to design a robot that solves a problem using a standard kit of parts and set of rules. Once these young inventors created the robot, their teams participated in competitions that measured the effectiveness of each robot, the power of collaboration, and the determination of students.

"FIRST Robotics Competitions really bring the excitement of a sporting event to science and technology via robotics. Students are engaged, inspired, and excited to participate in science and technology—a mindset that will last long after the competition and put them on a path to a successful career and bright future," says Paul Schoch, associate professor of electrical, computer, and systems engineering and co-chair of the New York Tech Valley competition.
Engineering Graduate Programs Among the Nation’s Best

Rensselaer continues to rank among the nation’s top schools for engineering, according to this year’s list of Best Graduate Engineering Programs by U.S. News & World Report.

The School of Engineering at Rensselaer ranked 38th in the nation, unchanged from last year’s list. Within the school, five graduate programs—aerospace engineering, industrial engineering, materials science engineering, mechanical engineering, and nuclear engineering—were ranked among the top 25 in their field. In total, all 11 engineering graduate programs were ranked within the top 40.

The graduate school ranking is the latest recognition of the Institute’s long-held reputation as one of the nation’s top universities. Last year, U.S. News ranked Rensselaer as 41st in the nation among all national research universities, and its undergraduate engineering program was ranked 26th.

Currently, 3,000 undergraduate students and 700 graduate students are enrolled in the School of Engineering, and 76 percent of incoming first-year engineering students were in the top 10 percent of their high school graduating class. The School of Engineering’s seven academic departments offer 22 different degree programs.

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Research conducted at Rensselaer addresses some of the world’s most pressing technological challenges—from energy security and sustainable development to biotechnology and human health—and the School of Engineering’s 140 research-active faculty members are at the leading edge of their fields.

IN FEBRUARY, PRESIDENT SHIRLEY ANN Jackson hosted Jim McNerney, chairman and chief executive officer of The Boeing Company, the world’s largest aerospace company and a top U.S. exporter, in the EMPAC Theater for an insightful conversation on corporate leadership.

The hour-long conversation in front of a room full of Rensselaer students, faculty, and staff touched upon topics such as the strong relationship between Boeing and Rensselaer, the core attributes of an effective leader, leading in a global economy, and the importance of an institutional commitment to ethics.

Noting that Boeing was the number one reported employer of 2012 and 2013 Rensselaer graduates, that Boeing has been the largest participant in the Rensselaer Career Fair for the last four years, that a significant number of Rensselaer students participate in internships at Boeing, and that many others engage in Boeing-sponsored research and other leadership development activities on campus, President Jackson talked with McNerney about the value of the partnership and what makes Rensselaer students such a good match for Boeing.

McNerney said that “RPI has meant a lot to our company. One of the things we love about Rensselaer graduates is that they share our ‘aspirational’ element. We are both committed to making the world a better place.”

As a leader and in his day-to-day roles, McNerney is focused on helping his people grow and improve because he believes “the best way to grow Boeing is to grow people. People need to feel like they are 15 percent better each year.”

In addressing the topic of how leaders can embed ethical decision-making into the culture, President Jackson said to McNerney, “You speak often about the importance of a strong corporate culture. Clearly the tone is set at the top, and you have talked a lot about One Boeing and the importance of maintaining a consistent standard of business conduct wherever Boeing operates in the world. At Rensselaer, we encourage students to ask, ‘Just because we can, does that mean we should?’ ”

Leading people and enabling this growth in a global economy requires a strategic approach that is tailored to specific countries’ and Boeing’s needs, while balancing innovation and its inherent risks, McNerney said. Under McNerney’s leadership, Boeing is committed at the highest levels to instilling ethical and consistent standards of business conduct throughout its global locations.
When Rensselaer opened its doors to women in September 1942, Lois Graham ’46 wasted no time enrolling. The daughter of popular Rensselaer swim coach “Pop” Graham knew she wanted “a good education and a career in engineering.” She achieved both and in doing so blazed a trail for women in engineering.

Lois Graham, a pioneer and role model to thousands of female mechanical engineers, passed away Nov. 4, 2013. She was 88.

Graham was one of the first two women to earn a degree at Rensselaer and did so in an accelerated schedule brought on by World War II. She joined Carrier Corporation where she worked as a test engineer for 18 months, at which time, when told she was too young for a promotion, she became the first woman to enroll in graduate study at the Illinois Institute of Technology (IIT).

She continued her string of pathbreaking accomplishments by becoming the first woman to earn advanced degrees in engineering at IIT and the first woman in the U.S. to earn a Ph.D. in mechanical engineering. In 1949 she became the first female faculty member of IIT’s Department of Mechanical, Materials, and Aerospace Engineering, and in 1984 she became the first woman to be named a fellow of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, honoring her for contributions as an educator in thermodynamics and cryogenics.

Before she retired in 1985, Graham influenced countless students through her roles as professor, chair, mentor, and director of model programs designed to encourage women and minorities to pursue careers in science and engineering.

Graham was passionate about increasing the number of women in engineering. She founded and directed IIT’s Women in Science and Engineering Program, and exposed women to groups like the Society of Women Engineers, for which she served as president in 1955-56. She also established IIT’s Minorities in Engineering Program.

In recognition of her leadership in engineering education and her lifelong commitment to the advancement of women in the sciences, she was inducted into the Rensselaer Alumni Hall of Fame in 2003.

In 1999, Graham was selected by IIT students as a Person of the Millennium, recognizing her as “a visionary who will make a lasting impression into the next millennium.”

An IIT alumna who had worked with former students of Graham said that, not only were they exceptional engineers, but also “they spoke of Lois Graham with a reverence and respect I’ve never witnessed before or since. She was a tough teacher; she was also fair and ethical. Most importantly, she was an outstanding engineer.”
IN OCTOBER 2013, THE PASSING OF MANUEL CUTILLAS '55 resulted in the loss of a distinguished alumnus and advocate for higher education, particularly for students of Latin American or Caribbean descent. Cutillas, who was born in Cuba in 1932, was the great-great grandson of Don Facundo Bacardi, the founder of the Bacardi company. Cutillas wasn't the first Bacardi family member to attend Rensselaer, nor the last; his distant cousin, Luis Bacardi Gaillard, graduated from Rensselaer in 1918, and his cousin, Adolfo Danguille-court, graduated in 1983.

In 1955, Cutillas received his Rensselaer degree in chemical engineering and moved back to Cuba to begin his 45-year career with Bacardi. As chairman of Bacardi Limited from 1992 to 2000, Cutillas was instrumental in doubling the size of the company and growing Bacardi into the global entity it is today.

Throughout his successful career, Cutillas was mindful of where he came from and how important his Rensselaer education was. In 2007, he made a generous gift to Rensselaer to establish the Manuel J. Cutillas '55 Scholarship for deserving students from the Bahamas, the Caribbean, Latin America, or for students of Cuban descent. His generosity has helped several students thus far, at the same time extending the global reach and impact of the Institute.

Salvador Gavonel ‘13, industrial engineering graduate, and past recipient of the Manuel J. Cutillas ’55 Scholarship, says, “I did not have the opportunity to meet Mr. Cutillas, but through the generosity he extended to young Hispanics from Latin America, I’ve come to realize that he was a gentleman with great pride and vision regarding Hispanic heritage. Thanks to his support, I completed my course of study at Rensselaer and have returned to Peru. I hope that someday I will be able to do what he did for me and others from Latin America and, in particular, to expand the support to university students from Peru.”

Cutillas also was influential in the lives of his fellow Latin American classmates during his undergraduate years as a member of Phi Iota Alpha, the oldest Latino fraternity in existence. He served as president of the fraternity during his junior and senior years, during which time, they acquired a house.

THE VILLAGE OF ALTAMONT Archives and Museum hosted an exhibition titled “Ingenious Minds: Early Altamont Inventors,” showcasing the patented inventions of some of the early residents of the village.

Earlier this year, the museum’s curator, Marijo Dougherty, reached out to Rensselaer to ask for assistance. Dougherty contacted Sam Chiappone, manager of the Manufacturing Innovation Learning Lab (MILL), and asked if he and his students could help. She wondered if it would be possible for the students to re-create one of the objects on a 3-D printer, using the patent drawings she collected for the exhibit. “The interface between 19th-century drawings and 21st-century technology would be an incredible service to historic collections such as ours, when we are lacking the objects connected to our research,” Dougherty says.

Students Veronika Bychkova (civil engineering), who did the CAD work, and Larry Oligny (mechanical engineering), who runs the rapid prototyping machines in the MILL, produced a “Tie for Letter Packages.”

“This project allowed Veronika and Larry to actually see how the entire computer-aided design to 3-D printing process is used to convey a designer’s intent,” says Chiappone. “What made the project interesting, aside from this learning experience, is Veronika and Larry linked an inventor’s idea from the 19th century to one of the most intriguing modern processes of 3-D printing.

“As a freshman, this was a great opportunity to apply something that I learned into modern use,” says Bychkova. “My task was to recreate a patent that John Mersellis designed in 1878. It was a bit difficult in the fact that I had two images to work from, with no dimensions or specifics. If anything, I was making up most of the design and tweaking it until it resembled the shape and the function of the patent.

“This project was especially interesting to me because it had to do with a town’s heritage and I have always enjoyed learning about history,” says Oligny. “I have learned a lot about different machines, how they work, and how to run them.”
BIOTECHNOLOGY

Shedding Light on Familial Alzheimer’s Disease

New research, led by researcher Chunyu Wang, has solved one mystery in the development of Familial Alzheimer’s Disease (FAD), a genetic variant of the disease that affects a small fraction of the Alzheimer’s population. In a paper published in the journal Nature Communications, Wang and his team follow the trail of two genetic mutations—V44M and V44A—known to cause FAD, and show how the mutations lead to biochemical changes long linked to the disease.

The hallmark of FAD is the accumulation of the Amyloid Beta 42 peptide (a short chain of amino acids) in unusually high concentrations within the brain. In a healthy brain, Amyloid Beta-42 (Aβ42) and a similar peptide, Amyloid Beta-40 (Aβ40), are found in a ratio of about 1 to 9. In a brain affected by FAD, this ratio is much higher. The two peptides are nearly identical: Aβ40 is a chain of 40 amino acids in length; Aβ42 is 42 amino acids in length. However, Aβ42 is much more toxic to neurons and plays a critical role in memory failure.

“The mutations that cause FAD lead to an increased ratio of Aβ42 over Aβ40,” says Wang, associate professor of biological sciences. “That’s the biochemistry, and that has been observed by many people. But the question we asked is: How? How do the mutations lead to this increased ratio?”

There are hundreds of known genetic mutations linked to FAD, but they are all related to the processing of a large protein, the amyloid precursor protein (APP), which starts its life partially embedded in the cell membrane of brain cells, and is later cut into several pieces, one of which becomes either Aβ42 or Aβ40.

Wang’s team used nuclear magnetic resonance spectroscopy to study the three-dimensional structure and dynamics of the transmembrane portion of APP affected by the two genetic mutations, and they discovered that the mutations cause a critical change to the T48 amino acid. That change makes it more likely that γ-secretase will prefer a cut at T48, leading to production of Aβ42, and increased concentrations of Aβ42 found in the brains of patients with FAD.

RESEARCH

Rensselaer Partners With Optum Labs Research Collaborative

Rensselaer has joined as a charter partner of Optum Labs, the collaborative research and innovation center founded by Optum and Mayo Clinic committed to improving the quality and value of patient care.

As a partner of Optum Labs, Rensselaer will have access to information resources, proprietary analytical tools, and scientific expertise to help drive the discovery of new applications, testing of new care pathways, and other opportunities to drive innovation in wellness and care delivery.

“As the founding medical partner of Optum Labs, Mayo Clinic is excited to welcome the fresh insights and perspectives that new partners will bring to this collaboration,” says John Noseworthy, M.D., president and CEO of Mayo Clinic. “In addition to having access to large sources of clinical and claims information, all partners will now benefit from the unique viewpoints that others bring as we work to transform health care in the U.S. and truly meet the needs of patients in this country.”

“Rensselaer is globally transforming biomedical research through the intersection of data science/analytics with biological sciences/bioengineering,” says Jonathan Dordick, vice president for research at Rensselaer. “Working with Optum Labs and the other partners, Rensselaer will forge a path from fundamental science to technology development that will result in innovation and discovery. The results of this new partnership will enable health-care organizations to make better decisions, make better products, and ultimately, reduce costs of health-care delivery.”

Optum Labs brings together a community of health-care stakeholders dedicated to improving patient care by sharing information assets, technologies, knowledge, tools, and scientific expertise. Research is linked to the clinical environment through prototyping and testing in Optum and partners’ care settings, with a goal of achieving knowledge that improves health-care delivery and patient outcomes.

Dordick says the partnership with Optum Labs provides a significant opportunity to help advance fundamental and translational research taking place at Rensselaer in the areas of drug discovery, translational research taking place at Rensselaer, etc.

In addition to Rensselaer, Optum Labs announced six additional charter partners, representing a broad cross-section of health-care stakeholders: American Medical Group Association, Boston University School of Public Health, Lehigh Valley Health Network, Pfizer Inc., Tufts Medical Center, and University of Minnesota School of Nursing.
Re-establishing Chinese Language Minor

There are many reasons Rensselaer students want to learn Chinese: to compete in a global job market, to study abroad, to connect with their heritage.

She combines the best traditional classroom teaching with a futuristic, immersive learning experience—students will be even better positioned to become the global, technological leaders of tomorrow.

Leading the re-established Chinese program are two new educators, Assistant Professor Yalun Zhou and Lecturer Jianling Yue, who will oversee the Chinese minor offering within the School of Humanities, Arts, and Social Sciences.

"Language education is a crucial component of the work Rensselaer is doing today to educate the students who will become the global leaders of tomorrow," says Mary Simoni, dean of the School of Humanities, Arts, and Social Sciences. "Yalun and Jianling's shared expertise in developing advanced pedagogies, combined with the innovative work being done elsewhere on campus, will set our students up to successfully master Chinese language within the context of Chinese culture."

Yue and Zhou have taught Chinese in a variety of settings—at high schools and colleges, in traditional classrooms, and in massive online classrooms. Since joining the faculty, both professors are taking what they've learned in a career of teaching Chinese as a foreign language and applying it to create an advanced pedagogy that complements and augments the Rensselaer educational experience.

Yue and Zhou will teach Chinese to students in an immersive classroom environment and their curriculum will also include a virtual reality component—known as the Mandarin Project—that will allow students to use their new language skills within a virtual environment that mimics Beijing. They will interact with synthetic characters speaking Chinese and be tasked with unraveling mysteries that require their knowledge of Chinese language and culture.

Yue and Zhou agree that giving students the opportunity to use a new language in a cultural and conversational context is the best way for them to acquire the new skill. Between the immersive classroom lessons—during which the professors will speak almost entirely in Chinese to the students—and their work in the Mandarin Project, "we're giving students the sense that they're functioning in the language," Yue says. "Without the opportunity to use their knowledge of Chinese culture and language, they won't gain skills," she adds.

"For students learning Chinese through textbooks and maybe some online material with an instructor in a classroom, they don't have a real sense of Chinese society, the culture presence. But with the lab they will have a near-real experience," Zhou says.

Rensselaer Team
HackTECH Finalists

Billed as the largest West Coast hackathon, with more than 1,200 programmes attending from 50 universities, HackTECH 2014 took place in January in Santa Monica, Calif.

"We didn't get much sleep," says Jazmine Olinger, a junior and one of four computer science students who (with sophomores Robert Rouhani and Mike Zemsky, and junior Sebastian Sarbora) represented Rensselaer at the event. Their project, ArtPress, was one of the event's finalists.

There is a growing community building around these high-energy weekends, with new hackathons being announced every month. In this context, "hacking" has no negative connotations of cyberstealing—it just means cranking out code, whether for new ideas or a cause.

For most hackathon events, the fundamentals are the same: Students arrive with little more than a toothbrush and an idea, or hack. HackTECH 2014 had the added incentive of providing a small travel stipend, and all meals and snacks. Students then work furiously as a team, coding, problem solving, developing, testing, and—if they are lucky enough to have something in time—presenting, all within 36 hours or less.

The Rensselaer team did transform their idea into reality, and ArtPress was chosen as one of the event's top 10 projects. A hardware/software hack, ArtPress features a Bluetooth-controlled LED wristband, an Infrared Point Glove, and an infrared detection camera. A virtual combination of music and art, the wristband uses software written in Processing to visualize music based on beat detection. It can also be used in "Paint Brush Mode" as a light-emitting stick to draw the music on live video from a webcam, similar in concept to long exposure light graffiti. There is also a glove with pressure points and infrared technology that, with a camera, allows the user to draw or sculpt a 3-D model of the music with lights.

As finalists, the Rensselaer team presented their project not only to the panel of judges, but also to the other 1,200 hackers gathered around the stage. "An amazing experience," according to Rouhani.
Expanding the Range of Nature’s Catalysts

To make paper, manufacturers must break down cellulose (chunks of wood pulp), a process that currently requires large amounts of energy and toxic chemicals like chlorine. Nature performs the same task using enzymes, non-toxic biodegradable proteins that accelerate chemical reactions using far less energy. The catch is that the enzymes required for the job, in this case xylanases, don’t hold up to the high temperatures of the manufacturing process. This is only one of many examples of how the limitations of enzymes hamper the development of elegant solutions in the manufacture of everything from medicine to detergents.

“So the question is: Can we improve on nature?” says George Makhatadze, a chaired professor in the Biocomputation and Bioinformatics research constellation. “Can we take an existing protein and, using computation, redesign it to withstand higher temperatures?”

Makhatadze designs “custom proteins,” and is an expert in the critical interaction between electrical charges on the surface of proteins. In a 2009 edition of the Proceedings of the National Academy of Sciences, his lab presented a computer model that enhances protein thermostability, while retaining full enzymatic activity. Now, with the support of a five-year, $1.7 million National Science Foundation grant, Makhatadze will investigate the speed of protein folding.

Enzymes are composed of long strings of amino acids. As the string is assembled, electrostatic forces along its length interact, causing it to twist and turn, and ultimately fold into a stable three-dimensional shape. The enzyme functions properly only when folded into this shape, and typically retains its structure within a narrow range of conditions. If subjected to temperature, pH, or pressure outside these tolerances, the enzyme begins to denature, losing its shape and functionality.

Makhatadze seeks to boost the high-temperature tolerances for a given enzyme by adjusting the electrostatic interactions on the protein surface.

In the context of industrial processes like paper manufacturing, the expanded functional range could make an enzymatic approach more attractive and economically feasible.

The Office of the Student Experience (SE), part of the Division of Student Life, aims to ensure that all undergraduate students are successful both in and out of the classroom. This semester, SE and the Archer Center for Student Leadership Development launched a new program, the Sophomore Symposium. The program gives sophomore students the opportunity to garner leadership skills, reflect on their experience, and further their own personal, professional, and leadership development plan.

In facilitating the transition from high school through graduation, a team of class deans associated with each cohort of Rensselaer students, and who follow them from sophomore year to graduation, continually work to provide guidance, support, challenge, and intervention to students.

“The goal of the Sophomore Symposium is for students to begin to think about who do they envision themselves to be and, most importantly, what steps do they need to take to get there,” says Darren Jones, class dean for the Class of 2016, who coordinated the program along with support from Tracy Schierenbeck, associate director/lecturer in the Archer Center.

“The sophomore year is a pivotal point in the collegiate experience in that it is a time where students start to create their identity and find their fit at Rensselaer,” Jones adds. “As students start to find their fit, we want them to think not only about the future, but also the legacy that they want to leave in their community, Rensselaer, and, ultimately, the world. The symposium is also a manifestation of what CLASS (Clustered Learning, Advocacy, and Support for Students) is all about as we work to design time-based programs that provide support and co-curricular opportunities for students throughout their undergraduate time at Rensselaer.”

The event was planned by a team of students enrolled in Emerging Leaders II, a leadership development series coordinated by SE and the Archer Center. The overall symposium and planning was part of a two-phase program. The theme for the Emerging Leaders II program is “Championing an Initiative.” Phase One featured students attending six session classes led by Schierenbeck and Jones. During the sessions, students learned hard skills in leadership, facilitating meetings, and managing people. Phase Two focused on “Leadership in Practice.” During this phase, students worked to plan the symposium.

Event highlights included a keynote address by Lester Gerhardt, longtime professor in Engineering, who spoke about passion and leadership. Timothy Sams, vice president for student life, gave closing remarks.

Jones says that the Sophomore Symposium will become an annual event. This year, additional financial support for the symposium came from Alumni Relations, and plans are underway to encourage more faculty involvement and corporate sponsorships.
The Princeton Review has again named the Games and Simulation Arts and Sciences program (GSAS) as one of the top 20 video game design programs. Rensselaer is No. 18 on the list this year.

The GSAS program at Rensselaer has appeared on this list every year since the list’s inception in 2010. The ranking is based on a survey The Princeton Review conducted of 150 gaming programs throughout the U.S. and Canada.

“The top-notch Games and Simulation Arts and Sciences program continues to produce graduates who are shaping the future of gaming. The unique program combines interdisciplinary courses of study, a diverse faculty made up of leaders in the field, and hands-on experiences for students,” says Mary Simoni, dean of the School of Humanities, Arts, and Social Sciences. “We are pleased to once again be recognized among the top institutions for studying video game design.”

Rensselaer students enrolled in the GSAS program study fields as diverse as electronic arts, artificial intelligence and cognitive science, digital graphics, software development, psychology, and human-computer interaction.

Their diverse course of study positions Rensselaer students to make an impact in the field of gaming as soon as they graduate. In 2013, Zineth, a game developed by a team of Rensselaer students, beat out more than 300 competitors to win first place in the “Best Student Game” category at the Independent Games Festival.

IDEAS DEVELOPED DURING A CONVERSATION SHARED AMONG old friends over beers in Vienna in 2003 grew into a workshop held in 2005 and, in recent months, a new book. Co-edited by Linnda Caporael, professor of science and technology studies, the book investigates how the concept of “scaffolding” is used across different scientific and academic disciplines.

Developing Scaffolds in Evolution, Culture, and Cognition is a study of how organisms, groups, or firms maintain homeostasis or go through change. The book includes papers by researchers in fields as varied as cell biology, economic history, and technological evolution. Scaffolding provides a framework in which complex topics such as those can be considered and re-considered.

The new book, published in late 2013 by MIT Press, is a collaboration between Caporael and two colleagues, James Griesemer, a philosopher of biology at the University of California, Davis, and William Wimsatt, a professor emeritus of philosophy at the University of Chicago.

“Our project is a ‘problem-centered inquiry on biology, cognition, and culture as scaffolded phenomena,’” Caporael says. “We presented the contributors with an integrating framework of our work and asked them to write about scaffolding in their own research. The book is unique as an edited book because the papers are ‘conceptual experiments,’ which we used as data. The section introductions and epilogue serve as an analysis of the data. The papers are so rich, however, we feel that we’ve just scratched the surface.”

Caporael’s work focuses on group structure and the shifting dynamics of coordination, including underlying ideas and beliefs—often invisible because they are so widely shared and taken for granted. Those ideas and beliefs serve as scaffolding, she asserts, and influence the possible outcomes of any line of inquiry. By drilling down to this underlying scaffolding, research can take on new meaning and context, she says.

“Professor Caporael’s latest work embodies the type of interdisciplinary, collaborative projects that strengthen research at Rensselaer,” says Mary Simoni, dean of the School of Humanities, Arts, and Social Sciences.
Burt Swersey Receives Sustainable Practice Impact Award

Burt Swersey, senior lecturer in the Department of Mechanical, Aerospace, and Nuclear Engineering and founder of the Inventor’s Studio course, has received the Sustainable Practice Impact Award given by the National Collegiate Inventors and Innovators Alliance (NCIIA). Swersey was honored at NCIIA’s 18th annual Open Minds showcase of student invention and innovation in Silicon Valley on March 22. NCIIA is an education network that “cultivates revolutionary ideas and life-changing inventions.” The award recognizes companies or an individual demonstrating outstanding achievement in developing clean technologies; implementing sustainable practices in their businesses; or providing exceptional education opportunities to university students.

With support from the Lemelson Foundation, the National Science Foundation, the U.S. Agency for International Development, the Bill and Melinda Gates Foundation, and a membership of nearly 200 colleges and universities from across the United States, the NCIIA engages approximately 5,000 student entrepreneurs each year, leveraging their campuses as working laboratories for invention and innovation and incubators for businesses, and ultimately helping them to bring their ideas to market.

“Our goal is to harness the ingenuity of student inventors and help them turn their ideas into innovations with global impact,” says Phil Weilerstein, executive director at the NCIIA.

“It is imperative to be environmentally conscientious about the new products and businesses we create so that we do not irrevocably damage the planet for the future,” said Carol Dahl, executive director of the Lemelson Foundation, in presenting the award along with a $10,000 prize. “Burt Swersey is a leader in ensuring students ask what impact they will have with the inventions they create, touching not just on the aspect of financial value, but also on how their ideas will have social and environmental impact.”

Swersey has been teaching at Rensselaer for more than 20 years. He founded the course Inventor’s Studio, which is part of the interdisciplinary Design, Innovation, and Society major. He has received many awards and honors, including the Darrin Counseling Award given by Phalanx, Rensselaer’s student leadership honorary society, in 2012; the NCIIA Olympus Lifetime of Education Innovation Award in 2007; and the ASME Design Education Curriculum Innovation Award in 1994. He holds 15 patents.

North American Membrane Society Honors Georges Belfort

World-leading bioseparations expert Georges Belfort, Institute Professor and a member of the Howard P. Isermann Department of Chemical and Biological Engineering, has been awarded the Alan S. Michaels Award for Innovation in Membrane Science and Technology from the North American Membrane Society. The award, given every three years “to recognize individuals who have made outstanding innovations and/or exceptional lifetime contributions to membrane science and technology,” includes a $10,000 prize.

Leo Wan Receives Basil O’Connor Starter Scholar Research Award—March of Dimes

Tissue engineering and stem cell expert Leo Wan, assistant professor in the Department of Biomedical Engineering, has received a prestigious Basil O’Connor Starter Scholar Research Award from the March of Dimes. The Starter Scholar Awards are funded in a program specifically designed to support scientists just embarking on their independent research careers. Wan will use the two-year, $150,000 grant to accelerate research into tissue development and regeneration. Specifically, he is investigating the biomolecular processes of tissues and organs that develop asymmetrically, and the role of this asymmetry in several genetic diseases and birth defects.

Peter Fox Elected President of Earth Science Information Partners

Peter Fox, director of the interdisciplinary Information Technology and Web Science program, chair of the Tetherless World Constellation, and a professor of earth and environmental science and computer science, has been elected president of the Earth Science Information Partners (ESIP) Federation. The ESIP Federation is a consortium of earth science data and technology professionals spanning government (including the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, the United States Geological Survey, and the National Science Foundation), academia, and the private sectors, both commercial and nonprofit. The organization is dedicated to transforming research data and information into useful and usable data and information products for scientists, decision makers, policy makers, and the public.
Synthetic Version of Heparin for Use in Kidney Patients

Researchers at Rensselaer and the University of North Carolina at Chapel Hill (UNC) have created a synthetic form of low-molecular-weight heparin that can be reversed in cases of overdose and would be safer for patients with poor kidney function.

“We took this drug and not only made it cost effectively, but we’ve also improved the properties of the drug,” says Robert Linhardt, the Ann and John H. Broadbent Jr. ‘59 Senior Constellation Professor of Biocatalysis and Metabolic Engineering and one of the inventors of the new drug. “The synthetic version that we’ve made is reversible, it can be used in renal patients, and it doesn’t come from animals, which is a critical advance in safety.”

Heparin is an anticoagulant, and is most commonly extracted from pig intestines in two forms: unfractionated heparin, which is commonly used in procedures such as dialysis, and a more-refined low-molecular-weight (LMW) heparin, which is used around the world for preventing dangerous blood clots. A team led by Linhardt and Jian Liu, a professor in the UNC Eshelman School of Pharmacy, created a synthetic version of LMW heparin for which there is an existing antidote (protamine) available. Protamine is not as effective in reversing naturally derived LMW heparin, so Linhardt and Liu engineered their drug’s molecular structure so that protamine is able to deactivate it.

Naturally produced LMW heparin is cleared from the body by the kidneys, which can make it unsuitable for patients with a weakened renal system, a relatively common condition among patients requiring anticoagulation. Linhardt and Liu made additional changes allowing their drug to bind to receptors that clear it through the liver.

Heparin prevents blood clots from forming and is most often used during and after such procedures as kidney dialysis, heart bypass surgery, stent implantation, and knee and hip replacement.

The natural form of the drug was in the spotlight in spring 2008 when more than 80 people died and hundreds of others suffered adverse reactions to it, leading to recalls of heparin in countries around the world. Authorities linked the problems to a contaminant in raw natural heparin from China.

“Whenever you mix the food chain and the drug chain together, you end up with potential for disaster. This is a drug that millions of people rely upon, and it’s important to develop a safe, synthetic alternative to the current supply chain.”

contamination, adulteration, impurities like viruses or prions—any of those possibilities are much more likely when you make something in an uncontrolled environment,” says Linhardt. “This is a drug that millions of people rely upon, and it’s important to develop a safe, synthetic alternative to the current supply chain.”
 Archive Offers Window Into Students’ Views

The staff of the Rensselaer Archives has digitized more than a century of The Polytechnic student newspaper. The archive offers a window into the way Rensselaer students saw themselves and their Institute through history.

The earliest editions of The Poly include challenging math problems, news from other universities in the Northeast including Harvard, Yale, and Cornell, short fiction, poems, alumni news, athletic scores, and social news. The advertisements offer the finest apothecaries, boot makers, tailors, and hatters.

A 1924 edition describes festivities for the Institute’s centennial, which included a keynote speech from then-Secretary of Commerce Herbert Hoover, five years before he took office as the 31st president of the United States.

The Dec. 13, 1967, edition offers a review of a concert The Doors played on campus as part of Frosh Fling Weekend: “Instead of setting the house on fire, Jim (Morrison) failed to even break the ice. He seemed disgusted with the whole scene at the end and showed how he felt when he cried, ‘If this is Troy, I’m with the Greeks.’ ”

Throughout the years, stories in The Poly touched on historical moments and revealed the way they impacted campus life. Editions published during World War II indicate that degree programs were condensed to allow students to complete them before being called up to war. Those editions also share news of alumni fighting overseas.


The story quotes Institute secretary-treasurer (and future president) Livingston W. Houston, Class of 1913, as saying that it was necessary to admit women “due to the need to train women scientists and technicians to replace men called to war.”

Would-be female applicants waited anxiously as administrators considered whether to admit them. “As RPI administrators were making their decision on the women student question, three women applicants waited outside the door for an answer,” The Poly story continues. Today, nearly 30 percent of all undergraduate and graduate students at Rensselaer are female.

Issues of The Poly from 1885 to 1976 can be searched online by anyone. Because some syndicated content is still protected by copyright, issues of The Poly from 1977 to 2001 can only be accessed on campus or with a current Rensselaer login.

The staff of the Institute Archives is now working to add to the archive recent issues of The Poly—dating from 2002 to today—that were produced digitally.

The digitization is part of an ongoing effort to both preserve and make accessible the newspaper archive. In total, about 2,800 issues and more than 41,000 individual pages were digitized in this process.
DEBORAH MCGUINNESS, Tetherless World Research Constellation Professor and director of the Web Science Research Center, has been selected as a fellow of the American Association for the Advancement of Science (AAAS). In its announcement, the AAAS cited McGuinness’ contributions to the Semantic Web, knowledge representation, and reasoning environments.

JEFF TRINKLE, professor of computer science and director of the Computer Science Department Robotics Lab, has been named to a leadership role with President Obama’s National Robotics Initiative (NRI) by the National Science Foundation (NSF). He will serve as program director for the NSF Directorate for Computer and Information Science and Engineering, Division of Information and Intelligent Systems, responsible for advancing NRI. The multi-agency initiative was launched in 2011 to accelerate the development of the next generation of robots that work beside or in cooperation with people.

SHIRA DENTZ, a poet and the author of two books, has been appointed creative writing lecturer in the School of Humanities, Arts, and Social Sciences. Dentz joins Rensselaer from the University of Iowa and the University of Utah, where she was a creative writing instructor, and the New College of Florida, where she was writer-in-residence. Her work has been honored with awards including an Academy of American Poets’ Prize, and the Poetry Society of America’s Lyric Poetry Award and Cecil Hemley Memorial Award.

JOHN WEN, professor and head of the Department of Industrial and Systems Engineering, was recently honored with the 2013 Transitions to Practice Award from the Institute of Electrical and Electronics Engineers (IEEE). The prize, which honors university-industry collaboration, was given in recognition of Wen’s development of the Adaptive Scanning Optical Microscope (ASOM) and a high-precision laser scanning system for the electronic manufacturing industry. Wen earned his doctoral degree in electrical engineering from Rensselaer in 1985 and joined the faculty in 1988.

KARYN ROGERS has been appointed assistant professor in the Department of Earth and Environmental Sciences. Rogers, a geochemist and geomicrobiologist, joins Rensselaer from the Carnegie Institution for Science in Washington, D.C. Rogers’ research combines fieldwork and lab experiments and seeks to determine the environmental conditions that limit life on Earth, which may aid the search for life elsewhere in the universe.

PATRICK UNDERHILL, assistant professor of chemical and biological engineering, was recently named the recipient of the 2013 Arthur B. Metzner Early Career Award from the Society of Rheology. The award is reserved for researchers 35 or younger who have made contributions to the field of rheology, which combines chemical and mechanical engineering, physics, chemistry, and mathematics to examine how materials flow in response to forces. Underhill joined the Rensselaer faculty in 2008.

HENG JI has been appointed the Edward P. Hamilton Development Chair and tenured associate professor of computer science. Ji, an expert in natural language processing, joins Rensselaer from the City University of New York. Her current research focuses on the design of efficient algorithms that can extract knowledge and information on a massive scale from sources including social media, online news reports, and Wikipedia articles.

GEORGES BELFORT, Institute Professor of chemical and biological engineering, was recently elected a fellow of the American Institute of Chemical Engineers (AIChE). Belfort, a leading expert in bioseparations, has been a member of the Rensselaer faculty for 35 years. The AIChE recognized his contributions in chemical molecular engineering, bioseparations engineering and science, and synthetic membrane technology in its citation. He has published more than 200 peer-reviewed papers and 22 book chapters, edited or co-edited three books, and is the international editor of the Journal of Chemical Engineering of Japan.

STACY PATTERSON has been appointed the Clare Boothe Luce Assistant Professor in Computer Science. Patterson is an expert in dynamic networks, distributed algorithms, and cooperative control. She joins Rensselaer from the Technion-Israel Institute of Technology where she was a postdoctoral fellow. The Clare Boothe Luce Assistant Professorship in Computer Science is supported by a five-year, $499,000 grant awarded to Rensselaer by the Henry Luce Foundation to establish a professorship focused on mobile and distributed computing.

MARIANA FIGUEIRO, associate professor of architecture and light and health program director at the Lighting Research Center, has been elected a fellow of the Illuminating Engineering Society. Figueiro studies light, circadian rhythms, and human performance.

GANPATI RAMANATH, professor of materials science and engineering and a member of the Rensselaer Nanotechnology Center, has been named the John Tod Horton ’52 Professor of Materials. Ramanath is a prolific researcher and has published 150 articles in top journals. His research focuses on nanomaterials and interfaces for applications in electronics and engineering. He is the recipient of numerous professional honors, including the National Science Foundation Faculty Early Career Development Award.

WILLIAM HENSHAW, an expert in the mathematics underpinning computer models of complex processes like turbulence hitting a wind turbine, or the flow of blood over an intravenous clot strainer, has been named the Margaret A. Darrin Distinguished Professor in Applied Mathematics. He joins Rensselaer from the Lawrence Livermore National Laboratory. His research develops efficient parallel algorithms for the accurate solution of partial differential equations in diverse applications. His work has been used to assess flaws in laser optics, to model explosive detonations, and to optimize the location of wind turbines in uneven terrain.
GROWING
GRADUATE
SCHOOL

WITH NEW DEGREE OFFERINGS, EXPANDED SUPPORT SYSTEMS, AND A MORE DIVERSE STUDENT BODY, RENSSELAER IS CHANGING THE FACE OF GRADUATE EDUCATION.

BY JANE GOTTLIEB

ON A FRIDAY AFTERNOON early in the spring semester, Rensselaer Ph.D. candidates wait their turn in the Center for Career and Professional Development to meet with a counselor who will critique their resumes.

Andrew Ellis, 23, explains that he is at least two years from completing his doctorate in electrical engineering, focusing on semiconductors. But he is anxious nonetheless to keep his resume fresh for the day when he will launch his search for a job in renewable energy. Which of the jobs, internships, and community projects from his undergraduate days at Howard University should come off, he wonders, and which should remain on his resume, a document with a decidedly crisp letterhead and meticulous spacing.

“This is one of my first times here. But I’ve attended events on a lot of different topics; professional things and how to balance your lifestyle in graduate school,” says Ellis, who peruses a pamphlet titled A Good Night’s Sleep. “There are a lot of ups and downs in graduate school and it all goes toward your personal growth. The forums have been very helpful.”

In the past, Rensselaer has served the broad needs of its graduate students. But these days, with the extension of Clustered Learning, Advocacy, and Support for Students (CLASS) to graduate students, Rensselaer is intensifying its support as it expands graduate education.

Specifically, graduate enrollment is slated to grow by 1,300, to 2,500 students, by 2024. Among these, the number of Ph.D. candidates is expected to double, to around 1,600. Rensselaer currently has roughly 1,200 graduate students—including 850 doctoral candidates. The school now offers more than 100 graduate degrees, with 10 new graduate programs added in the last decade.

The effort is underway. Graduate enrollment is steadily rising, particularly in master’s programs, which have increased by 12 percent in the past five years. New graduate degrees draw students in mid-career as well as those moving directly from college. Rensselaer offers continuous support beyond the classroom.

Along with resume critiques, a full calendar of professional workshops specifically for graduate students includes such varied offerings as speed interviewing, academic integrity, writing clearly, and becoming a more effective teaching assistant. The workshops, which often fill quickly, address non-academic matters as well, including stress management, tax preparation, and healthy living. “Every time I attend one of these sessions, I learn one valuable piece of information that completely cleans up some problem in my life,” wrote one student after a workshop.

For the first time in several years the Student Senate has a full slate of graduate representatives, who advocate for some of the same programs and activities undergraduates enjoy.

A graduate community, meanwhile, is taking root at College Suites at City Station, the new 400-bed apartment...
community exclusively for Rensselaer graduate students, located on Congress Street midway between campus and downtown. Bearing little resemblance to college dorms, buildings in the complex offer one- through four-bedroom apartments, lounges with pool tables, study rooms with whiteboards, a gym, and private parking.

On Friday nights the lounge fills with students watching sports on large TVs, perhaps after returning home from dinner at a nearby restaurant. The intention is clear: provide a well-appointed off-campus living arrangement that serves as an extension of campus.

Ease of locating housing is one advantage, students say, that the new graduate community offers. “One thing I really appreciate are the new apartments,” says Ellis, who came from Chester, Pa., and has lived at City Station for two years. “Coming to a whole new environment, that really made the difference. It was one less thing to think about.”

Collectively, the effort tells the story of what has become a marriage of recruitment, academics, and community. “We’ve always helped all our students,” explains Dawn Cairns-Weaver, associate director of the Center for Career and Professional Development, as the Friday afternoon Ph.D. resume review sessions wrap up. “But now more of us are coming together around the table for graduate students, rather than a group of individuals working on our own,” she notes.

To those most closely involved, the growth of the graduate school supports a still larger mission: to promote the research at Rensselaer that will provide the next-generation solutions in such areas as health care, environmental protection, and energy security.

“The major companies can no longer afford the research and development opportunities they once did,” notes Stanley Dunn, vice provost and dean of graduate education. “More and more, this has fallen to universities. And our graduate students are a key part of the process. To me, they are the glue that keeps the school operating. Our job is to attract and retain the best graduate students.”
Support for the Students

After graduating from Marist College in 2012, Jennifer Kile came to Rensselaer to pursue a Ph.D. in applied math. She has begun focusing on computational neuroscience, using math to study the brain in order to perhaps shed light on disease.

“’I think it’s fascinating that math can be used to model the exchange of voltage between neurons,’ she explains.

Now in her second year, Kile is pursuing her own research. Recently she applied for a National Science Foundation fellowship. Kile’s academic adviser assisted with the technical aspects. As for the actual writing?

“It was a big, complex application with two required essays,” says Kile, 24. “The night before I submitted it, I emailed it to the graduate education office and the next day they emailed me back a ton of edits. They’ve helped me change my essay for each fellowship I applied for.”

Heather Carbary provided that assistance. A senior program administrator with the graduate education office, she identifies available fellowships and grants, and then often assists the applicants.

“People reviewing research proposals don’t want textbook jargon,” says Carbary, who plans to extend her efforts to advanced Ph.D. students.

More and more students are finding their way to the graduate education office, a white house on Peoples Avenue down the road from the Houston Field House. In addition to assistance with grant applications, staff members provide counsel relative to housing, cultural matters, academic challenges, how to manage difficulties with an adviser and, occasionally, slog through a personal crisis. They also offer these sessions, over pizza, at City Station.

“Graduate students are supposed to be independent and we want to encourage their independence and scholarship,” says Dennis Gornic, associate dean of graduate education. “At the same time we don’t want to throw them into extremely isolating conditions. Why should students go through a challenging graduate education alone?”

Such thinking has not always been the norm. Across the country, graduate students have often endured a boot camp mentality as their academic success was considered in isolation. They needed to find their own housing and handle financial stressors alone, along with interpersonal issues. Their academic advisers, individuals who assess their academic performance, were not necessarily the ideal individuals to share personal problems with.

“Those of us who were in graduate school 25 or 30 years ago were singularly focused on our research,” says Dunn, a professor of biomedical engineering and former associate dean of engineering at Rutgers University. “You didn’t necessarily like it and there wasn’t much emphasis on the experience of being there.”

He says higher education first recognized the importance of meeting the social development of undergraduates. Now, the same process is unfolding with graduate students. “We now know more about human development and growth in general,” Dunn says. “Now what we’re saying is this is a part of their lives and we want people to really connect to being here.”

Doing so means supporting what has to be Rensselaer’s most varied population. Graduate students might be in Troy for an intensive course of study, or for an indefinite period that hinges on funding. They may be master’s students paying tuition or doctoral students working through grants. They may be straight out of college, or mid-career; single or married with children. Some are so focused on their studies that they barely identify with the Rensselaer community. Others are nearly as engaged in campus life as the undergraduates.

“We’ve all gone through our college days,” says Mike Caiola, a third-year Ph.D. math student from Long Island who is a member of the Student Senate, takes part in several intramural sports, and attends Rensselaer hockey games. “I know people who do nothing here but study and there are certainly times when that is all I have time for, but I’ve learned how to balance my time and still have fun.”

During his first year at Rensselaer, Caiola lived at City Station and met the friends with whom he now shares a
house. For many newcomers, the graduate apartment community is an important springboard where residents come together for Super Bowl parties and health screenings and professional development workshops. A designated family housing section, meanwhile, hosts holiday parties, and children play at an on-site playground.

Regardless of the student’s situation, the graduate education office, admissions office, career center, health office, deans, and academic advisers have, together, cast a wide net. And while graduate students may have little in common, the relatively small size of the Institute lends itself to an individualized approach.

Not long ago, a student admitted into a Ph.D. program in architecture was dismayed to learn he would be unable to arrange the financing. “Fortunately, I called him the same afternoon and offered him a fellowship. He couldn’t believe it!” recalls Dunn, who spends a lot of time talking with graduate students, reinforcing their value to the Institute, “so that they get the message that they are important to Rensselaer.”

Among other things, Dunn and co-workers pay attention to the relative youth of graduate students, who are on average 25 to 28 years old but have significantly greater responsibilities than they did as undergraduates. In this digital age, many select a university based on an academic program and might not have visited Rensselaer before arriving as students. And, many come from other parts of the country or world—about half of all graduate students come from overseas.

“For many of our international students, there is a lot of pressure to succeed,” notes Gornic. “If they can’t get their degree, they are seen as failures at home. When they struggle academically, they carry a heavy burden.”

And, studies have shown an inverse relationship between the frequency of social interactions with peers and faculty and the incidence of stressful life events in graduate school. “Students are stressed to begin with, so we provide more

Mike Caiola, a third-year doctoral student, takes part in several intramural sports on campus. “I’ve learned how to balance my time and still have fun,” he says.
opportunities for social interactions,” notes Dunn.

One Ph.D. candidate who came to the graduate education office presented with complex personal and academic issues. Dunn and colleagues from the Student Health Center lined up personal support and helped the student manage his academic load. He has since completed his dissertation and has joined a large Silicon Valley firm.

Getting the word out

Rensselaer graduate programs have long been highly regarded in specific areas, most notably engineering and computer science. But the school’s signature programs remain the bachelor’s degrees that equip students for careers or research straight from graduation.

“It’s always been sufficient for a large share of Rensselaer students to get an undergraduate degree and wind up really well-placed in industry,” notes Dunn. “And for many of our students, that is still true. But there’s much more specialization than there used to be. There are fields that didn’t even exist a few years ago. And there aren’t a lot of schools like ours that have all these specialties.”

Another challenge: graduate students interested in pursuing careers in academia might not immediately think of Rensselaer. Paul Marthers, vice president for enrollment, notes that technological universities like Rensselaer are often known to be either job-oriented or research-oriented.

“We are known more for the first category. We need to transition over to being known for both job preparation and research excellence,” he explains. “We think we have the best of both worlds. A person who graduates from an RPI master’s or doctorate program has a blend of the practical and the theoretical. We feel that we stand in really good stead because of this blend.”

Rensselaer has intensified recruitment by attending more research-oriented conferences and developing relationships with undergraduate feeder schools. Prospective students are also getting to know Rensselaer by participating in

“Students are stressed to begin with, so we provide more opportunities for social interactions.” STANLEY DUNN
summer research programs.

“We can say to liberal arts students majoring in something quantitative like math or physics, ‘You may not be entirely sure what kind of career you want to pursue but you can study here for a year and translate those studies into practical applications,’” says Thomas Begley, dean of the Lally School of Management.

And, growing graduate programs provides another opportunity to diversify technical fields. As a result of targeted recruitment, Rensselaer has begun drawing graduate students from Spelman College and Morehouse College, predominantly black institutions in Atlanta; and from Texas Women's University, which has a significant Hispanic enrollment. The Institute expects to increase graduate enrollment of women as a result of recruitment at the Claremont Consortium in California and Five Colleges Consortium in Massachusetts.

“We are ramping up numbers from those schools and talking about creating some co-terminal relationships with them,” says Christina Murray, director of graduate admissions.

She says it helps that there is more to talk about every year. “We can say we are developing the graduate programs,” she notes. “But we can also say we provide great housing and academic support and support for students through professional and social development workshops.”

A Natural Evolution

Business analytics, supply chain management, geo-futures, architectural acoustics, environmental parametrics, integrated large-circuit design—these fields are quickly taking shape as industry, government, and philanthropic organizations encounter new and more difficult challenges. Rensselaer researchers are helping to shape the agenda.

Expanding graduate education is not just a good recruiting strategy. It is a natural evolution for Rensselaer’s unique specialties. More graduate opportunities mean more opportunities for a robust education that combines theory and practice.

Joe Chow, administrative dean at the School of Engineering, says, for example, that a Rensselaer stand-alone bachelor’s engineering degree remains the gold standard across much of the workforce. However, there are also new areas in which more study is simply essential.

“These are areas in which nobody else measures up,” says Chow, a professor of electrical, computer, and systems engineering. “With our programs, especially master’s programs, you’re not going to just take classes and sit in a classroom. You will work in a real setting and have some real design and manufacturing experience.”

Building on the success of its combined bachelor’s/master’s programs, the engineering school is considering developing a full-time one-year master’s program with an emphasis on design and advanced manufacturing. The School of Engineering and Lally School of Management have already introduced a joint master’s degree in systems engineering and technology, to prepare students for technical management roles.

Lally introduced several new master’s programs last fall. One program is business analytics, which educates managers in using skills in information systems and quantitative analysis to inform decisions across a wide range of business practices. Another is supply chain management, which also looks at quantifiable variables—delivery rates, the availability and cost of raw materials—to manufacture and move products cost-effectively. A third is financial engineering and risk analytics, which provides students with the knowledge and skills to respond to changes and challenges that characterize the fast-moving world of quantitative finance. “Although our M.S. programs are young, they are now a major component of our profile as a business school,” says Begley, Lally dean.

“There are a lot of companies that get great technical employees who don’t understand business or great business folks who don’t understand technology,” says Begley. “An undergraduate degree in a STEM field combined with a master’s in management or business is a very powerful combination in the job market. We are offering something that is really valuable in the marketplace.”

The School of Architecture also has rolled out a series of graduate programs on the cutting edge. One delves into architectural acoustics, an emerging specialty at Rensselaer that ties hard science to the study of how people experience sound in such venues as auditoriums, concert halls, and next-generation operating rooms.

“The value and impact of architectural acoustics today is unlimited,” says Evan Douglis, dean of the School of Architecture. “Whether designing the sound performance associated with public assembly spaces or providing expertise targeted at land-mine detection and noise pollution in large urban centers, the program in its entirety is making great strides in this important area.”

Rensselaer is also stretching the boundaries of building designs with two new post-professional master’s programs. One, in environmental parametrics, looks at new building systems and quantitative analysis to support design and research here at RPI,” says Douglis. “Additionally, with the school’s commitment to the marriage of art and science, we offer a unique curriculum you rarely see anywhere in the world. This is all in favor of responding in new ways to the many challenges of our time and attracting the most selective students available today along the way.”

And if devising programs, recruiting students, supporting them, and identifying grant opportunities to support dozens more doctoral candidates is formidable, those involved believe the resulting success will perpetuate more success.

“We are basically developing a totally new profile where there was no profile,” concludes Begley. “We know we get great students and once they are out in the world, they will make a great impression and essentially get the word out more quickly.”
EVERYBODY WINS

THE CHANGE THE WORLD CHALLENGE COMBINES ENTREPRENEURSHIP AND TECHNOLOGICAL INNOVATION TO IMPROVE QUALITY OF LIFE AND ADDRESS MAJOR SOCIETAL ISSUES.

In fall 2006, at the urging of Professor Burt Swersey, Eben Bayer ’07 submitted an entry to the Rensselaer Change the World Challenge contest. The ripple effect of that decision ultimately would be felt around the globe, from the halls of the World Economic Forum (WEF) Annual Meeting in Davos, Switzerland, to the offices of Dell and Crate & Barrel.
Eben Bayer ’07 and Gavin McIntyre ’07 are the founders of Ecovative, a materials science company that makes natural, renewable, biodegradable packaging and insulation products.
Bayer’s idea—to grow mushroom-based materials for insulation—was one of four Change the World Challenge winners that semester, earning him $1,000 and preliminary patent support. He used the prize money to continue his research and, with classmate Gavin McIntyre ’07, to help jump-start Ecovative Design, a materials science company that makes natural, renewable, biodegradable packaging and insulation products.

Since its founding in 2007, Ecovative has raised more than $30 million in grants and equity investments. The company has over 55 employees and has twice outgrown its production and office facilities. Ecovative’s Mushroom® Materials packaging protects Dell servers, the corners of Crate & Barrel bookcases, PUMA paddleboards, and more.

The materials also have earned Bayer repeat invitations to the WEF forum as well as some of the world’s most coveted environmental business awards, including the first prize of 500,000 euros ($700,000) in the PICNIC Green Challenge 2008. Yet the early recognition of the Change the World Challenge will always matter to Bayer.

“The Change the World Challenge set it all in motion,” he says. “It was the first win. It’s what started all of this.”

The Challenge was created in 2005 with a $1 million gift from Rensselaer alumnus and serial entrepreneur Sean O’Sullivan ’85. Best known as a founder and the first president of software firm MapInfo, O’Sullivan was honored in 2011 as the William F. Glaser ’53 Rensselaer Entrepreneur of the Year. He is co-founder, CEO, and managing director of the global ridesharing technology firm Carma, and founder and managing director of SOSventures, a venture capital and investment management company.

O’Sullivan views the Challenge as a way to support entrepreneurship education and help students “recognize that they have a responsibility to use their talent to create a physical manifestation of their education—to provide new technologies that enhance what it means to be human.

“I am challenging them to follow in the footsteps of some of the other great engineers and scientists who’ve had a huge impact on the world. Look at the Rensselaer Alumni Hall of Fame,” he adds. “It is filled with engineers who have affected every life on the planet.”

O’Sullivan emphasizes the many different ways to “change the world,” from developing products that improve quality of life for individuals to creating inventions that have broad societal applications. And he encourages as many students as possible to enter the twice-yearly Challenge.

According to Thomas Begley, dean of Rensselaer’s Lally School of Management, the emphasis on improving the world through entrepreneurship and technological innovation makes the Change the World Challenge a perfect fit for Rensselaer.

“What every contestant has in common is that they are using an innovative approach based on technological solutions derived directly from their Rensselaer education to contribute to the betterment of the world,” he says. “Most people don’t think of entrepreneurship, technology, and positive societal change in the same sentence, but at Rensselaer they go hand in hand.”

The Challenge draws roughly 100 entries per semester from across the university, and up to 10 winners receive the $1,000 prize. The ideas are notable both for their ingenuity and their variety. Last fall, for example, winners proposed new ways to reduce concussions, improve gun safety, increase lighting efficiency, and monitor glucose levels in those with diabetes.

By recognizing up to 10 ideas at a time, the contest encourages broad participation and mirrors the approach of venture capital firms, which invest in multiple startups. “Venture capitalists know that no one idea is absolutely the best, so they bet on a variety of companies. In a sense, that’s what we’re doing here,” says Rob Chernow, former vice provost for entrepreneurship, who chaired the Change the World Challenge until his retirement last year.

The results bear witness to the wisdom of this approach. Already, the challenge has helped launch potentially game-changing startups, including Ecovative;
Casey Hoffman, Ph.D. ’12, and Jaron Kuppers, Ph.D. ’12, are the founders of Vistex Composites, which has a patented Specialized Elastomeric Tooling (SET™) process for curing advanced composites.
Colleen Costello '12 and James Peterson '12 co-founded Vital Vio, which produces lights that kill bacteria and other microorganisms by emitting continuous, yet safe, disinfecting white light.
Vistex Composites, which uses a faster, cheaper, and greener process to manufacture composite products; and Vital Vio, which has found a way to incorporate around-the-clock disinfection in white lighting. Other winners have not pursued their ideas, but have still benefited considerably.

The contest application alone fosters discipline by requiring students to provide a compelling description of their idea in no more than three pages, just as they would during an elevator pitch or venture capital presentation. In the past, promising ideas were forwarded by Chernow to the Lally School’s Paul J. ’69 and Kathleen M. Severino Center for Technological Entrepreneurship (SCTE). Now, SCTE runs the Challenge, making it even easier for winners, and all contestants, to take advantage of SCTE support.

“One of the biggest benefits of the Change the World Challenge is that it connects promising, young entrepreneurs with the resources available at SCTE—the advisers, advocates, and partners,” says Gina O’Connor, Lally professor and associate dean for academic affairs. “The idea is the very beginning of the entrepreneurial journey. We’re here to help them take that idea and turn it into commercial reality.”

After the challenge

Although every entrepreneurial success story is different, the founders of Ecovative, Vistex, and Vital Vio point to several similar experiences. All three credit the Change the World Challenge with providing early validation and encouragement. After that initial victory, all three went on to win additional contests and government grants. All three have forged essential new partnerships and continue to benefit from their connection with Rensselaer.

Bayer got the idea for his mushroom materials months before he entered the Change the World Challenge. He was working on an assignment to design an energy-efficient building, seeking an environmentally responsible alternative to traditional insulation. Bayer found his solution in his roots, on his family farm. He remembered the way mycelium, or mushroom roots, bonded together and he began experimenting, mixing the mycelium with natural ingredients. The next semester, Bayer mentioned his mushroom insulation idea to Burt Swersey, who developed and teaches Rensselaer’s Inventor’s Studio course. Swersey recognized the idea’s potential immediately. He encouraged Bayer to enter the Challenge and to continue exploring his idea by making it the focus of his capstone project in Swersey’s class.

Bayer and McIntyre teamed up in class and, after graduation in May 2007, took Swersey’s advice and founded Ecovative. Bayer is CEO, and McIntyre is chief scientist. Both hold dual degrees in mechanical engineering and product design innovation. They moved their experiments to Rensselaer’s business incubator and, soon, started attracting accolades, grantors, investors, partners—and customers. By 2009, the Ecovative team was ready to launch its first commercial product: mushroom packaging, grown in the company’s plant in Green Island.

Today, Ecovative has an exclusive licensing agreement with Sealed Air Corporation and, later this year, will open its first out-of-state production center, in the Midwest. Longer-term plans include production facilities in Europe and Asia.

Vistex Composites founders Casey Hoffman, M.S. ’08, Ph.D. ’12, and Jaron Kuppers, M.S. ’09, Ph.D. ’12, won the Change the World Challenge in spring 2012 for their now-patented Specialized Elastomeric Tooling (SET™) process for curing advanced composites. At the time, Hoffman and Kuppers were both pursuing doctoral degrees in mechanical engineering. Today, Hoffman is chief operating officer of Vistex Composites and teaches in Rensselaer’s Department of Mechanical, Aerospace, and Nuclear Engineering. Kuppers is chief technology officer. Their SET process eliminates the most expensive, energy-intensive component of the traditional composite curing process—the autoclave. The SET process also uses significantly less consumable materials.
The energy savings is substantial. “For every 100 square feet of composite that we make,” Kuppers says, “we save the amount of electricity that a typical house would use in a year.”

Hoffman and Kuppers had begun developing their SET process and proprietary modeling software even before they learned of the Change the World Challenge. “We realized that the existing method for manufacturing composites was overcomplicated, so we set out to simplify it,” Hoffman says. “We were working on our process when we heard about the Challenge. To apply, we had to come up with a succinct description of who we are and what we’re doing.”

“The Challenge made us have a conversation that’s invaluable for any company,” Kuppers adds. “As engineers, we might not have had that discussion.”

They combined the $1,000 Challenge award with a Buhrmaster Grant from SCTE and used the funds to attend trade shows and conferences, enter business plan and elevator pitch competitions, and successfully apply for grants from the National Science Foundation and the New York State Energy Research and Development Authority (NYSERDA). Last year, the Vistex SET process won the American Composites Manufacturers Association’s People’s Choice Award for Best Composites Product.

Vistex has entered into a strategic partnership with Kintz Plastics and produces customers’ components at Kintz’s facility in Howes Cave, N.Y. Customers tend to be sports and medical equipment companies. Order sizes range from hundreds to thousands.

A key advantage of the SET process is that it can easily be adapted to mold new, more advanced materials. “Our process can open markets,” Hoffman says. “It’s not just that we can make the same products more efficiently, but that our process can make other products more affordable and, therefore, possible.”

An innovation in illumination

Colleen Costello ’12, co-founder and CEO of Vital Vio, won the Change the World Challenge in fall 2011 for her idea to use light-emitting diode (LED) technology to help sterilize intravenous (IV) blood lines and prevent infection. A biomedical engineering major with a minor in technological entrepreneurship, Costello came to Rensselaer determined to solve a “real-world health-care problem,” in part because her younger brother has type 1 diabetes. A series of news articles on hospital-acquired infections sent Costello “to the engineering drawing board” to find a way to use LED technology to deliver non-ultraviolet spectrum lighting to safely kill bacteria.

Costello used the $1,000 Challenge prize money to conduct market research, develop a business plan, and design a prototype. She also enlisted the help of James Peterson ’12, who was majoring in mechanical engineering. In April 2012, they co-founded Vital Vio. They graduated a month later and hit the ground running. Peterson is Vital Vio’s chief technology officer.

Their original plan was to move forward with the IV prototype. After additional research, “we pivoted and decided to use the same technology on a broader scale,” Costello says. “The transmission of bacteria among hospital staff is a huge problem, so we shifted our focus and engineered something that could be used throughout the hospital environment.”

Vital Vio lights kill bacteria and other microorganisms by emitting continuous, yet safe, disinfecting white light. The lights have applications in health-care settings, clean rooms, fitness and other hospitality centers, and food services and processing facilities. The fixtures can be mounted in any drop ceiling and are slated to be installed starting early this summer in places including Mount Sinai Medical Center in New York City and the Albany Stratton VA Medical Center. Vital Vio’s first sale to a commercial customer was completed in February. Other customers, representing a variety of industries, are currently reviewing proposals.

Investors in Vital Vio include O’Sullivan’s SOSventures and Eastern New York Angels, an early-stage seed
Meghan Olson ’14 has submitted six ideas to the Change the World Challenge, has won three times, and has not yet decided whether to pursue her ideas further. Meanwhile, she is tapping the skills she’s developed to benefit others by advancing entrepreneurship at Rensselaer. Olson will receive a dual degree in mechanical engineering and design, innovation, and society this spring and follow that with a master’s in mechanical engineering. Although she hopes to found her own company some day, initially she would prefer the experience of working for an innovative organization.

For her, the Change the World Challenge was a source of encouragement and an opportunity to strengthen her communication and presentation skills—and to learn from past missteps. In fact, her first winning idea, Ad-mirror-able Recovery to help treat patients with eating disorders, was a revamped submission of a previous entry. The device would combine a mirror and computer interface to create images that counter patients’ distorted body views.

With a subsequent winning idea, Mindfull Dementia Tracking Device, Olson earned “Best Presentation Style” in the 2013 Elevator Pitch Competition, which requires participants to make a compelling argument for their idea during the time it takes to ride an elevator from the bottom to top floors. The Mindfull Dementia invention would integrate a GPS or radio-frequency identification device into eyeglasses, watches, or similar personal possessions to help those with cognitive decline locate misplaced items. The device also would help track the progression of dementia. Olson’s third Change the World Challenge win came as part of a Product Design Innovation Studio team that developed the DU CO Safe Needle System. The system would keep syringes sterile so they can be reused without fear of contamination.

Although Olson might revisit her ideas in the future, right now she’s putting the skills she honed as a Challenge contestant to work in other ways. This year, she helped lead the planning committee for the Elevator Pitch Competition. She also was named Rensselaer’s first University Innovation Fellow. A joint venture of the National Collegiate Inventors and Innovators Alliance and the National Center for Engineering Pathways to Innovation, the fellows program provides training and resources to help student leaders boost entrepreneurship and innovation on campus.

Olson is excited at the prospect of introducing new initiatives, refining existing programs, and continuing to urge her peers to reap the benefits of the Change the World Challenge, win or lose.

“The contest really encourages you to visualize your ideas, get them down on paper, and communicate them well—to show the judges that you’ve thought this through,” Olson says. “Just going through the process teaches you to communicate more effectively.

“And if you win,” she adds, “there’s such encouragement in having others tell you your idea has potential.”

The winners who’ve gone on to launch Ecovative, Vistex Composites, and Vital Vio agree. As Costello says, “The Change the World Challenge was the catalyst, pure and simple.”

Those winners have something else in common: All envision additional, future uses for their technology, accompanied by even more success.

"WE HAVE A LIFESAVING TECHNOLOGY, SO WHY NOT CHANGE THE WORLD?"

COLLEEN COSTELLO

Ecovative continually researches new applications for its Mushroom Materials and has already grown the world’s first mushroom house, with walls made of mushroom insulation. Vistex looks forward to using its SET process to make the first affordable, composite, electric cars. Vital Vio hopes to deploy its technology in third-world countries, where infection often runs rampant.

“We have a lifesaving technology, so why not change the world!” Costello says. “That’s a really great question and a great slogan, and we take it to heart."
1 LINCOLN TUNNEL
2 HOLLAND TUNNEL
3 BROOKLYN BATTERY TUNNEL
4 BROOKLYN BRIDGE
5 MANHATTAN BRIDGE
6 WILLIAMSBURG BRIDGE
7 QUEENS MIDTOWN TUNNEL
8 QUEENSBORO BRIDGE
9 TRIBOROUGH BRIDGE
10 145TH STREET BRIDGE
11 MACOMBS DAM BRIDGE
12 GEORGE WASHINGTON BRIDGE
As New York City rose, so too did the impact of Rensselaer civil engineering graduates who built its bridges and tunnels.

WHEN THE NEW YORK STATE THRUWAY CROSSES THE HUDSON VIA THE TAPPAN ZEE BRIDGE, THE SPAN AFFORDS MAJESTIC VIEWS OF THE RIVER AT ITS WIDEST POINT.

High, steep bluffs rise on either side. The surface of the water reflects the sun and clouds. It inspires a rare feeling of brilliant expanse as you approach the congested New York City metropolitan area. From an engineer’s point of view, it’s not the best place to build a bridge.

Chris Letchford is the head of the Department of Civil and Environmental Engineering at Rensselaer. He describes the bridge as anchored in a “big soup bowl.” “The existing bridge basically floats—it’s not really anchored to rock,” he says. “The caissons are sunk in but the mud is so deep, the bridge basically exists on friction—the sides have enough friction against them to stand up like a straw in a sugar bowl.”

Sinking caissons into mud was the innovation of the Tappan Zee’s original designer, Emil Praeger, Rensselaer Class of 1915. He used a version of the floating caissons he designed during World War II—originally to form a temporary protected harbor for troop landings on the beach.

Praeger was part of a long tradition of Rensselaer alumni who designed, built, and collaborated on the major bridges of New York City—and, in doing so, educated and inspired the generations of engineers who would follow them.

Continuing in that tradition, Letchford will take undergraduates in the department to the construction site as the Tappan Zee is rebuilt. Built in 1955, the bridge was designed to last 50 years and carry 100,000 vehicles a day. Sixty years later, it now carries 138,000 vehicles per day, and has been slated to be replaced.

After years of deliberations, New York state and the federal government will spend $3.9 billion to build the new bridge alongside the old. It will be one of the biggest infrastructure projects in the country. **BY NICOLE ST. CLAIR KNOBLOCH**
A 19th-century landscape painting by George Deegan is striking in its portrayal of the dominance of ship traffic all around lower Manhattan, and the still-large swaths of country green in upper Manhattan and beyond.

Nicknamed the “New NY Bridge” by the New York State Thruway Authority, the new Tappan Zee is designed to last 100 years. The design enables many uses of the bridge, expanding the number of lanes to reduce congestion, adding a commuter bus lane, installing bike and pedestrian paths, and leaving it ready to accommodate future mass transportation projects. More graceful than the first, the new design will make the bridge as beautiful to look at as it is to cross.

Each year for the next five years, students will take site tours and hear presentations by project engineers. They’ll be able to observe the progress in all four areas of a major civil engineering project: geotechnical, transportation, structural, and environmental.

“When I was growing up in Australia, my father used to take me to see these types of projects,” says Letchford. “These days, we don’t have so much free time and tend to rely on virtual, rather than real, tours. But it’s important and a privilege to see the real thing, to see the scale and the complexity of the system.”

The trips to the Tappan Zee construction site will complement annual trips to two other great bridges built by Rensselaer alumni: the George Washington and the iconic Brooklyn Bridge—and will introduce students to the intersecting stories of the building of New York and the rise to prominence of civil engineering at Rensselaer.

GROWING A CITY

ONCE THE THIRD BUSIEST PORT OF THE BRITISH EMPIRE, early American New York City was a thriving hub of commerce with significant geographic challenges—situated on an island and separated from the rest of the United States by two mountain ranges.

In 1803, New York state political scion DeWitt Clinton was appointed mayor at the age of 34 and set about realizing an ambitious vision for the city’s development.

He first commissioned a plan for leveling the topography of the island to lay Manhattan’s famous grid, then proposed the digging of the Erie Canal to connect New York to the Great Lakes, which would be undertaken after he became governor.

No one had done any projects like these. Civil engineering was a nascent profession in the United States. Engineers were self-taught or educated abroad, where three French schools, L’Ecole Centrale des Arts et Manufactures, L’Ecole Polytechnic, and L’Ecole Nationale des Ponts et Chaussees, were dominant in the field.
The early civil engineers learned by doing, as did the 9,000 laborers on the canal. The Erie Canal was completed in 1825, three years early and under budget (a feat almost as impressive to modern project managers as the engineering). The flat streets of Manhattan were laid, inviting the eventual bridges and tunnels that would feed into them.

The projects inspired the founding of Rensselaer. After serving on the commission overseeing the canal construction, Stephen Van Rensselaer began the first U.S. school to train graduates in engineering in 1824, and eventually civil engineering in 1835.

Benjamin Franklin Greene, an 1842 graduate who returned to Rensselaer to teach, proposed its reorganization as a polytechnic, modeled after the French schools, and extended the course of study from one to three years for civil engineering and two years for natural science.

Students began to learn in part from visits to the field, sketching and writing about bridges near Troy—including Squire Whipple’s 147-foot railroad trapezoidal bridge built over the enlarged Erie Canal.

The innovation that would enable the building of the Brooklyn Bridge occurred when John Roebling, a German-born engineer not associated with Rensselaer, began working on other canals in Pennsylvania in the 1830s. He solved the problem of hauling canal boats on rails up steep inclines with the development of wire rope.

The rope would help support suspension bridges across large spans. The lack of piers made suspension bridges—an old form of bridge used over streams and short gaps—useful. But none had succeeded over broad rivers.

Vulnerable to high winds and the weight of loads and snow, suspension bridges had collapsed in Europe and the United States. Roebling solved the stability problem with a wire rope web truss design on either side, trying it over the Ohio River and again near Niagara Falls.

By the late 1850s, Rensselaer was turning out trained civil engineers, among them John Roebling’s son, Washington, who graduated in 1857 as part of what turned out to be the second generation of leadership bridge builders.

Washington came to work for his father at his wire-rope company in New Jersey and on the...
Allegheny River Bridge in Pittsburgh and the Ohio River Bridge at Cincinnati. John Roebling began proposing a bridge across the broad East River to connect the still-separate cities of Manhattan and Brooklyn, as did Alfred Boller, who had graduated from Rensselaer in 1861.

It seemed New York was ready for bridges. The New York and Erie Railroad had been completed in 1851. The flat wide streets of the grid were ready for traffic and by 1854, lower Broadway was the busiest boulevard in the world. In 1855, Walt Whitman’s *Leaves of Grass* extolled, at times racily, the shapes of the modern city. Yet Manhattan was still an island city, its boroughs separated by water. A 19th-century landscape painting by George Deegan is striking in its portrayal of the dominance of ship traffic all around lower Manhattan, and the still-large swaths of country green in upper Manhattan, Brooklyn, and New Jersey.

The design’s tall towers solved the problem of allowing ship traffic up and down the East River, but Roebling had to petition the federal War Department for permits, demonstrating warships could pass unimpeded.

The biggest potential obstacle was the financing. Roebling presented the design to Brooklyn contractor and Brooklyn Eagle publisher William Kingsley, who then proposed it to State Senator Henry C. Murphy, who would push the charter for the New York Bridge Company through the Legislature. Murphy would later bribe Boss Tweed of Tammany Hall, whose ambition for developing New York infrastructure was matched by his corruption, to allow New York aldermen to approve the deal.

“If you wanted to have anything done in New York City, you had to have Boss Tweed say it’s okay,” says Frank Griggs ’56, a graduate in civil engineering who is a restorer of bridges and part-time historian.

The New York Bridge Company awarded the contract to Roebling, who was appointed chief engineer in 1869. He had only done the surveying and begun the preliminary drawings when his foot was crushed by a ferry crashing into a dock where he was standing. He died three weeks later. His son took over as designer and chief engineer.

In many ways, Washington Roebling was prepared. In addition to helping his father with the Allegheny and Ohio River bridges, he had built suspension bridges across the Rappahannock and Shenandoah Rivers while serving in the Union Army during the Civil War, and spent a year in Europe studying caisson foundations and other techniques with an eye toward helping his father with the Brooklyn Bridge.

He began a “cluster” of Rensselaer bridge builders, inviting Rensselaer graduates C.C. Martin, Class of 1856, his second in command, Theodore Cooper, Class of 1858, and Ortheil Nichols and Virgil Bogue, both Class of 1868, to help. For a shorter time he also employed Francis Collingwood, Class of 1855, and Leffert L. Buck, Class of 1868, his future rival and builder of the Williamsburg Bridge.

“Washington wanted the best men, and in his mind, the best men came from RPI,” says Griggs.

**DARING PROJECT**

A 1914 PHOTOGRAPH SHOWS TEN WORKERS sitting or standing in positions of repose on the web truss of the Brooklyn Bridge, balanced on steel wire against the sky, high above the East River. The picture’s attitude of derring-do seems to demonstrate the boldness of the bridge and of everyone who worked on it, elevating even New York’s teeming working class.

What made the Brooklyn Bridge so daring, in part, was the challenge of building it where it was needed, without disrupting traffic along the busiest stretch of river in the world, and sinking caissons into deep tidal currents.

Twenty-six workers were killed during the six years of construction, and Roebling himself was struck with “caisson disease,” an early name for the bends, when he inspected the foundation. He would be impeded for the rest of his life.

Yet Roebling’s illness allowed for an unexpected new development: the introduction of a woman to a major civil engineering project. His wife, Emily Warren Roebling, served as his partner on the project, conveying his wishes to the contractors, builders, and engineers. Unusual for the Victorian era, Emily Roebling had studied mathematics and science, and became a diligent student of technical aspects of the project.

When it was suggested Washington Roebling be replaced as chief engineer, she delivered his argument for being retained before the American Society of Civil Engineers.

When the bridge towers were first erected, they were the tallest structures in North America. Their massive modern scale, incongruous with the four- and five-story cities
When the Brooklyn Bridge was completed, the towers of the bridge were the tallest structures in North America.

of Brooklyn and Manhattan, suggested the skyline that was still to come.

By the time it opened in May 1883, the celebrations were lit at night by electric lamps, Thomas Edison having made his discovery during the years it was built. The bridge’s use of load-bearing steel, when combined with the electricity that could power an elevator to the upper floors, inspired the architects of the skyscraper.

PROFESSIONAL ENGAGEMENT

THE CAREERS OF THE BRIDGE BUILDERS, whose achievements secured many a place in the Rensselaer Alumni Hall of Fame, reflect a culture of intense engagement with each other and with their profession—at home and around the world.

This culture was evident in the third wave of the bridge-building cluster, those who graduated
in the 1870s and ’80s. Some joined Roebling’s generation on projects, others started iron and steel fabrication companies, while others, including Leffert Buck and John A.L. Waddell, Class of 1875, went on to design their own famous bridges.

During the building of the Brooklyn Bridge, Washington Roebling sent Leffert Buck to Niagara to rebuild, in stages, his father’s suspension bridge there. Theodore Cooper’s Sixth Avenue Bridge would replace John and Washington Roebling’s original twin-span suspension bridge built in 1859.

New York City continued to grow at a breakneck pace, with Rensselaer graduates involved in the engineering and fabrication of major projects. Three more bridges were constructed over the East River in a six-year span: The Williamsburg (1903), designed by Leffert Buck in collaboration with Nichols, the Manhattan (1909), designed by Richard S. Buck, Class of 1887, and the Queensboro (1909), designed in collaboration with Leffert Buck.

“It was clearly the ambition of New York to be the longest, the tallest, the whatever,” says Letchford.

The Rensselaer bridge builders associated themselves with that ambition. Their history is one of engineering superlatives and firsts.

The Brooklyn and Williamsburg bridges were the longest suspension bridges in the world when they were built, as were the George Washington and the Verrazano-Narrows bridges later in the 20th century. Waddell alone developed the first modern vertical-lift bridge, used in Chicago for the new elevated train, and built some of the world’s major bridges, including the longest cantilever bridge, the longest simple span, and the longest swing bridge.

Waddell’s bridges were praised for their beauty as much as for their utility. That may have been due, in part, to early civil engineers’ necessary reliance on observation, knowledge, and intuition.

“Starting with Roebling and ending with Praeger—none of them would have used computers,” says Letchford. He explains that computers were developed for structural engineering by the aeronautics industry during World War II.

“Some engineers were almost pre-slide rule,” says Griggs. “They used a lot of intuition, very simple calculations, at least early on. Most of the guys in the mid-19th century were able to analyze the structure.”

He described how making calculations without the aid of a computer can sometimes help an engineer envision his design.

“When you’re doing truss diagrams, you learn, ‘That’s a big load,’ because you see how long the line is,” says Griggs. “When we learned it, as you drew these graphical solutions, you could see the magnitudes of the forces. Now they come out as just a big blob of data. You don’t get the feel, because they don’t go back and say, ‘I wonder if that’s true or not.’ ”

“Like Waddell,” he continues. “When he built the longest cantilever bridge in the world, in the 1880s, he had never built one before. They had that confidence in their ability to visualize structural behavior. I think, with computers, visualization has definitely dropped off.”

Letchford and Griggs acknowledge the need for computers to help modern engineers comply with codes—requirements that didn’t exist in bridges’ early days. Their reliance on others to write the codes echoes a bigger shift: from single designers running small teams to big companies in which there are many contributors to the final design.

“You’d be hard-pressed now to come up with the name of a single individual who designed a project,” says Letchford.

The career of Rensselaer bridge engineer Milton Brumer ’23 experienced this shift when he served as chief engineer in the construction of New York’s largest 20th-century bridges, including the George Washington, the Verrazano-Narrows, and the Throgs Neck. He was partner in a large firm—Ammann & Whitney—and couldn’t take credit as a bridge designer.

The Department of Civil and Environmental Engineering at Rensselaer has evolved to prepare students for modern realities.

Materials is a big component of an education at Rensselaer, says Letchford. “Steel and concrete. Timber and masonry. Seventy percent of bridges in the U.S. are timber, which is more ecologically friendly, and yet there is a lack of knowledge of how to use timber.”

He described the focus on developing “smart” structures—more instrumentation to help engineers monitor existing bridges for wear and tear. The monitors would be especially useful for bridges designed to have an “infinite” life span—meaning they could be maintained but never rebuilt—including the George Washington.

A new focus requirement, Construction Engineering, will train future engineers in all aspects of project management.
DIRECT IMPACT ON SOCIETY

AS LATE AS THE 1960S, life on relatively rural Staten Island was transformed by the building of the Verrazano-Narrows Bridge. Island residents no longer had to rely on a ferry, making Manhattan’s jobs and culture more accessible. But the bridge also brought new development, changing the island from a rural enclave to a developed suburb, with all the resulting pollution and congestion.

Jose Holguin-Veras is a professor in the Department of Civil and Environmental Engineering who specializes in transportation systems and directs the Center for Infrastructure, Transportation, and the Environment. As a member of the board of the New York State Thruway Authority, he has helped oversee the planning decisions for the rebuilding of the Tappan Zee.

“Civil engineers have a direct impact on society,” he says. “We are the ones who make society happen. If you look out your window, everything you see was built by engineers. That is a major responsibility. More often than not, civil engineering projects have great impacts on the environment, on the economy, and on people. We have to ensure we don’t create problems.” He says that today’s students are interested in how engineering design can help.

“Students are inclined to think big,” he says. “There is a growing interest in climate change and environmental sustainability; I believe they are more aware of all these issues than the grown-ups. They are more willing to change and to do new things for the sake of society.”

Drawing on an original feat of Leffert Buck’s when he rebuilt Roebling’s Niagara Bridge without disrupting traffic, the new Tappan Zee will be built alongside the old, with lanes switching from year to year to keep traffic moving.

The visiting Renssealer students will see how the impact on the environment is being minimized through waste containment, choice of building materials, the staging of the project, and even efforts to reduce the impact on fish life by dissipating the noise of hammering with a pumped-air “bubble curtain.”

And they may see there is still romance in big bridge building. In late January of this year, the Left Coast Lifter, dubbed by a New York Times reporter “the Superman of floating cranes,” arrived to help build the “New NY Bridge.” One of the world’s largest, the crane has a hoisting power of 1,750 metric tons (or, as the builders like to say, 12 Statues of Liberty).

Hollywood has found the romance, too. A feature film is in the works about the building of the Brooklyn Bridge, starring Daniel Radcliffe—best known as Harry Potter—as Washington Roebling. It will focus on Roebling’s partnership with his wife in completing the bridge.

The movie should inspire more investment in the nation’s infrastructure, and a new generation of civil engineers to build it.

In the meantime, for new graduates looking for a job: Hardesty and Hanover, J.A.L. Waddell’s firm, is still in business.

Nicknamed the Left Coast Lifter, the crane used to build the new bridge next to the Tappan Zee can hoist 1,750 metric tons (12 Statues of Liberty).

The Tappan Zee Bridge was built to last 50 years with 100k cars a day in traffic. It has lasted 60 years with 138k cars a day.
In 1869, the Association of Rensselaer Graduates met in New York City with a vision to build a vast network of alumni who would find ways to advocate for the Institute, assist their fellow classmates, and inspire current students. Today, the Rensselaer Alumni Association (RAA) maintains a focus-driven effort to strengthen alumni engagement, encourage student and alumni interaction, and communicate the broad-based programs that exist for the benefit of the alumni community. In large measure this is done because we have consistently sought out alumni feedback, and listened to our alumni when implementing new programs.

Expanding Alumni Engagement

In 2012, the RAA commissioned an expansive Alumni Attitude Survey aimed at gauging alumni sentiment toward Rensselaer, the alumni program, and the student experience. The results were discussed at length at the RAA’s fall 2013 meeting and were announced in the Fall 2013 Rensselaer magazine. Key points drawn from the results are that alumni want to be kept informed, and that they would like to see more professional services offered to them. The RAA has announced a multi-faceted approach designed to respond to these points in the coming year, using the survey responses as a guide.

President Roger Mike ’70 and the RAA will be focusing on the concept that the alumni association must support alumni in hiring, training, and assisting in professional development for current and future alumni. Rensselaer alumni work in many varied professions and businesses, and it is essential that the alumni program adapt to help make these connections work no matter what the field.

To that end, the RAA conducted a broad-based benchmarking project led by board members to examine what other universities have done for alumni career and professional development. The plan is to begin to implement new programs and services this coming year. The Office of Alumni Relations will work closely with the RAA as a new position focused on career services and volunteer relations has been posted.

In addition, the RAA will continue to improve our communication and outreach to our alumni population, so everyone knows how they can make a positive difference in the life of the alumni association and the Institute.

Beginning this spring, the RAA and the Office of Alumni Relations have started to address strategic moves relative to our social media outreach, including the further development of the social media website at alumni.rpi.edu/social.

Beyond that, the RAA and the Institute will be key players in the development of the new website for the alumni program. The rebranding of the website, the consolidation and repurposing of social media outlets, and the recalibration of our message will be key initiatives.
Perhaps most importantly, alumni will have a greater sense of how they fit into the RAA plan, how they can benefit from RAA programs and events, and how they can help their alma mater through their alumni association.

**Student Outreach**

Some of the most significant programming from the RAA and the Office of Alumni Relations has been focused on young alumni and our future alumni—our students. Today, more than 3,000 students participate in programs with the RAA. These efforts are done through the Red & White Student Organization and weR: The Spirit of Rensselaer Society.

Programs and events this year included: The award-winning Alum101 program, which enhances the transition from senior to alumnus/a; the Traditions Tour, an interactive on-campus program, part of Navigating Rensselaer & Beyond, that brings alumni and first-year students together to learn about the great traditions of Rensselaer; the Red & White Student Organization, which connects students and alumni through regional and on-campus programs; and working with campus organizations—including Greeks, athletics, and special interest groups—allowing students to utilize the RAA to connect with alumni who are part of their affinity group.

**Expanded Use of Social Media**

Our social media program continues to lead the way in the rapidly changing virtual space. The RAA has a strong presence in most all of the leading social media sites, including Facebook and Twitter, and we recently announced a partnership with LinkedIn as part of their College Pilot Program involving just 14 universities nationwide. The RAA LinkedIn group already tops 14,000 members and this partnership will enable our alumni to connect faster and easier.

The goal today is to use the various media platforms including email, Web, and social media to grow engagement and enhance the alumni network while strengthening the Institute and alumni association’s brand and reach. Nearly 13,000 alumni have used the website to access members-only options including the online directory. A targeted email program, interactive web content, and online giving and event registration help facilitate easy access to information, business contacts, and the Institute. Staying on top of changing technology is crucial to continuing to reach our tech-savvy alumni base. The RAA remains committed to staying at the forefront of the use of communication and social media tools.

**Financial Report**

As of Dec. 31, 2013, the RAA’s new Endowed Fund at Rensselaer stood at $611,000, well ahead of its goal of $500,000. The goal was met due to the generosity of many individuals, and significant leadership gifts by select individuals including Terence Barton ’92, ’01G, Rich Bollam ’66, Nicholas Donofrio ’67, Roger Mike ’70, and Harvey Zeve ’52. Our largest gift came from Vice President Emeritus Glenn Brown ’54, whose generosity put us over the top of our goal. The 57 individuals who have contributed as of Dec. 31, 2013, along with a gift from the Rensselaer Alumni Association Board, allowed the Fund to meet and exceed its goal. A full list of Founder’s Level and leadership giving individuals will be listed in future publications. It is not too late to contribute. Visit alumni.rpi.edu/give and indicate a gift to “The RAA Endowment Fund.”

**Final Words**

The Rensselaer Alumni Association sends its condolences to the family of Lois Graham ’46, a member of the Rensselaer Alumni Hall of Fame and one of the first women to earn a degree from Rensselaer. She was truly a pioneer and role model for thousands of women around the world. Lois Graham will be deeply missed. The RAA also mourns the passing of Robert Resnick, a world-renowned physicist, educator, mentor, and inductee to the Rensselaer Alumni Hall of Fame, who was a beloved member of the Rensselaer community for nearly four decades.

Finally, we send our thoughts and prayers to Florence Zeve and the entire family of Harvey Zeve ’52. Zeve served as RAA President, a member of the Alumni Board of Trustees, and the Institute Board of Trustees. Since 1983, his firm, H.L. Zeve & Associates, has served as the primary money manager for RAA assets. Zeve was a lifelong friend of the RAA and of the Institute and will be remembered fondly.
RPI Day a Success!
Alumni help make history on single largest giving day

On Friday, March 14, a total of 819 donors, 797 of them alumni, made history as they showed their pride in their alma mater by participating in the single largest giving day ever at Rensselaer, in honor of RPI Day.

The traditional celebration of Pi Day takes place on 3/14 because 3, 1, and 4 are the first three digits of pi in the decimal form. Alumni were encouraged to “Complete the Circle” by making gifts to Rensselaer.

The initial goal of RPI Day was to meet the Jeff Kodosky ’70 and Ed Zander ’68 RPI Day Challenge. If 314 alumni gave, Trustees Kodosky ’70 and Zander ’68 would each make a gift of $25,000 to the Annual Fund.

“We are especially grateful to Jeff and Gail Kodosky and Ed and Mona Zander for their exemplary generosity,” says Dawn A.M. Stever, director of annual giving. “Nearly 800 alumni donated to the Institute, helping to raise more than $232,000. This is amazing, but not surprising, as Rensselaer alumni have long been known for stepping up to meet any challenge.”

The first challenge was met by noon, leading to the unlocking of a second challenge: an anonymous donor agreed to make a gift of $25,000 if an additional 159 alumni (the next three digits of pi) made gifts. This goal, too, was met in just a few hours.

Inspired by the ongoing digits of pi, Trustees Kodosky ’70 and Zander ’68 again stepped forward to offer a third and final challenge. When 265 more alumni made donations, they each gave an additional $10,000.

Throughout the day on March 14, emails and social media posts encouraged participation, using #RPI314. Rensselaer alumni demonstrated their enthusiasm with nearly 700 likes, comments, and shares on Facebook, in addition to almost 600 tweets.

RPI Day resonated with a broad range of alumni, with donors representing classes ranging from 1942 through 2016.

More than 190 personalized thank you videos were produced throughout the day with the help of Red & White students, and were shared with alumni donors via social media.

In response to the personal thank you video he received via Twitter, Mike Sinack ’99 tweeted, “Giving back to where I got so much from!” View a selection of videos by visiting www.youtube.com/user/RPIAlumni. In addition, each donor received a handwritten thank you note.

Alumni participation impacts the U.S. News & World Report rankings, and the results from RPI Day are a strong indication of the pride Rensselaer alumni have in their alma mater. Thank you to all who participated!

Read more about RPI Day at rpi.edu/pi.
ALUMNI NEWS

Alumni Working Together

Working Hand-in-Hand with the Rensselaer Center for Career and Professional Development, Kirchhoff-Consigli Construction Management (KCCM) has hired eight Rensselaer graduates to work in its Albany and Pleasant Valley offices over the past three years.

Greg Burns, president of the local firm, says, “We have found that the exceptional knowledge of the latest construction and engineering technologies, as well as the entrepreneurial spirit that Rensselaer graduates bring to the building industry, are a perfect fit for our company culture.”

A recent Rensselaer intern hired full time, Salvatore Palmiero ’12 says that he was given the opportunity to take on responsibilities that were not only important, but imperative to the project work. “At times, it did feel overwhelming. However, the training and guidance I received from KCCM’s project teams helped me learn to handle the work more effectively and grow professionally. There was always a team member willing to offer support, insight, and training to ultimately ensure that I had a smooth transition from intern to full-time employee.”

KCCM’s expansion and recent opening of an Albany office has solidified its partnership with the Institute as an integral part of creating a strong, successful, and growing company.

In order to expand the opportunity for alumni to utilize the powerful alumni network to make connections such as these, the RAA is committed to providing programs to facilitate professional networking, hiring, development, and training for current and future alumni.

REGIONAL ALUMNI CHAPTERS WELCOME THE CLASS OF 2018

In the months of July and August, alumni chapters around the country host a variety of events designed to welcome the incoming class and their families to Rensselaer. New students are able to meet alumni and students in their hometown, and ask any final questions before they begin their journey to Troy. Visit alumni.rpi.edu/summerpicnics to see what is planned in your area.

STAYING CONNECTED ELECTRONICALLY

Most alumni programs and services are advertised via email and social media—including Reunion & Homecoming and regional chapter information. Help us continue to “go green,” and make sure you don’t miss out on the exciting events and benefits offered to Rensselaer alumni. Stay connected—write to alumni_update@rpi.edu, or visit alumni.rpi.edu/gogreen with your email, social media user name, and contact information.

LIBERTY MUTUAL INSURANCE PROGRAM

Liberty Mutual now offers auto, home, condo, and renter’s insurance for Rensselaer alumni. Watch your mailbox for more information, or visit alumni.rpi.edu/service.

RAA ON SOCIAL MEDIA

The Rensselaer Alumni Association (RAA) is on Facebook, LinkedIn, Twitter, Instagram, Google+, and Pinterest. Find Rensselaer on your favorite social media platform and connect with fellow alumni and the Institute. You can also connect using the RAA’s Social Media page—alumni.rpi.edu/social. There you’ll see what other alumni are posting, find links to chapter, class, Greek, athletic, and affinity group accounts, and more.

RAA VISA CREDIT CARD

The RAA Visa card is offered through a partnership with U.S. Bank. The card features no annual fee and your choice of benefits and rewards. A percentage of each purchase goes directly to support the programs and services of the RAA. Visit alumni.rpi.edu/service for details.

RAA WORLDWIDE TRAVEL PROGRAM

Upcoming programs include Morocco, a cruise from Venice to Rome, and a deluxe journey through Europe. Go to alumni.rpi.edu/travel for a complete listing of upcoming trips, or contact program coordinator Michael Wellner ’64 at captmike46@aol.com or (212) 486-3064.

AUGUST

9 Alumni, Student, and Family Picnic at Hyland Lake Park, Minnesota.
Join local alumni to welcome new students and their families to the Rensselaer community. Contact Sara Schiveley ’97 at mortes0504@yahoo.com.

19 Welcome Barbecue for Class of 2018 Students. The Commons, Troy campus. Local alumni volunteers are needed to help greet new Rensselaer students at this annual event. Contact Geoff Seber at seberg@rpi.edu or (518) 276-2324.

20 Traditions Tour. Alumni are invited to volunteer for a daylong program welcoming the Class of 2018 to Rensselaer. Help teach our new students about Rensselaer traditions, and share your experiences. Contact Geoff Seber at seberg@rpi.edu or (518) 276-2324.

OCTOBER

9-12 Reunion & Homecoming. Mark your calendars for another amazing weekend of discovery, excitement, and fun. Classes ending in 4 and 9 will be celebrating milestone Reunions, and Greeks, special interest groups, and former athletes will again plan gatherings for alumni members. Visit the website at alumni.rpi.edu/reunion for more information.
Class Notes

75th Reunion: Oct. 10-12, 2014

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Robert T. Cox, BSE ’41, writes: “I have been a RPI alumnus since my freshman year. As a result, I have had the privilege of meeting many wonderful people in my life. I have been fortunate to have had the opportunity to travel extensively, both in the United States and abroad. I have visited over 30 countries and have had the chance to experience many different cultures. As an engineer, I have been involved in many projects, and I have been able to apply my skills to a variety of different fields. I have been married for over 60 years, and I have three children and five grandchildren. I have been active in my community, serving on several committees and organizations. I have been a member of the Alumni Association for many years, and I have enjoyed being a part of this wonderful organization. I look forward to continuing my involvement with the Alumni Association in the future.”

Sad News: Robert T. Cox (BSE ’41), age 92, died Dec. 15, 2013. Bob was a regular contributor to the column, and we will miss his insight and wisdom. The column will continue, with contributions from other members of the Class of 1941. We thank you for your support and encourage you to continue to send us your news and updates. If you would like to contribute to the column, please send your stories to L. McD. (Mac) Schetzky, 108 Royal Garden Terrace, Madison, MS 39110. We welcome your contributions.

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Click to view Alumni/ae Notes and the complete Class Notes section (log-in required).
Appreciation Day Feb. 15 following the game against Cornell, which was a featured event of Winter Carnival 2014.
The International Connection

Alumni are a valuable resource, whether in the U.S. or overseas | BY PRABHAT HAJELA

A recent trip I took to India on behalf of Rensselaer brought vividly to mind the extraordinary opportunity we have to retain and build relationships with our international alumni.

By numbers alone, we have a significant advantage. Of our current graduate students, nearly 50 percent are international. But numbers do not tell the whole story. These individuals represent a tremendous opportunity for us. They have been hugely successful both in the United States and elsewhere, and represent the finest examples of Rensselaer graduates doing impactful work around the globe.

Some international graduates have chosen to make a life in the United States and have put their talents to work here, like Mukesh Chatter, M.E. ’82, founder of such companies as Axiowave Networks and Nexabit Networks, who was honored as Rensselaer’s Entrepreneur of the Year in 2001.

But an equally large number have gone back to their countries and have set up successful ventures.

Among them are Ranjit Date, M.S. ’89, Ph.D. ’91, president of Precision Automation & Robotics India (PARI), one of the largest global automation companies with nearly 1,000 employees and eight facilities worldwide. PARI develops systems that include robotic system integration, product design and manufacturing, and machine building abilities for a variety of markets, including automotive, home appliance, consumer and engineering goods, and construction. The company has installed more than 600 successful systems, and has experienced an annual growth of 30 percent.

Another successful graduate, Sumant Kumar, M.S. ’90, spent a year developing software tools for Digital Equipment Corp. in the United States before returning to India full of ideas about what India needed to achieve world-class excellence in manufacturing. After his return, he did pioneering work in India to promote the use of CAD/CAM software in the mold and die industry, contributing to wide-scale adoption of CAD/CAM and CNC matching processes by India’s many family-owned mold and die-making shops, improving their quality and delivery to match international standards.

On my visit to Mumbai in January, I met with a group of alumni and alumnae and was taken with how successful these individuals have been. Our alumni in India are resource that we could tap into, for instance, to provide internships in companies run and managed by alumni and alumnae, as we build greater international opportunities for our current students. And, even from afar, they can provide valuable mentorship for our students as they prepare to enter careers in a globally connected world.

They also can be a great asset in spreading the word about Rensselaer to professional colleagues, and to friends and families of prospective students.

I was delighted to see how much our graduates enjoyed their educational experience at Rensselaer, and how deeply they want to keep their connections to the Institute strong. They have great pride in the Institute and their education and they are eager to help in many ways.

What impressed me most was that at least three of the alumni I talked with said they have children whom they would love to see attend Rensselaer. As a parent I can say that this is the strongest endorsement of their individual educational experience and of its lasting impact on their careers.

I know there are many more pockets of graduates around the world who also would like to maintain greater connections with Rensselaer. If you, or friends that you know, feel you are not well-connected with the Institute, I would urge you to send us your contact information so that we can keep you updated on the growth of your alma mater.

I thank the group who met with me in India for their gracious hospitality, and I would commend to all international students to keep in touch with us.

Prabhat Hajela is provost of Rensselaer. He received his undergraduate degree in aeronautical engineering from the Indian Institute of Technology, Kanpur. He received master’s degrees in aerospace engineering from Iowa State University, and in mechanical engineering from Stanford University. He was awarded his Ph.D. in aeronautics and astronautics from Stanford University. Hajela maintains a collaborative role in research, working with graduate students and research colleagues in areas related to complex system analysis and design in the presence of uncertainties.
Join President Jackson as we look towards the future and our continuing journey of transformation under The Rensselaer Plan 2024.

FANFEST
A carnival midway at the East Campus Athletic Village featuring free food, Class Photos, student performances, and more!

IT’S OUT OF THIS WORLD!
REUNION & HOMECOMING
OCTOBER 9–12, 2014

THE AUTO SHOW
Rensselaer Motorsport (RPI Formula SAE) will showcase a variety of collector cars at FanFest. Alumni collectors are welcome!
Visit formulapi.org/car-show.

AN EVENING OF A CAPPELLA WITH VOICEPLAY
The performance also features Rensselaer’s student a cappella groups. Be prepared for a theatrical experience like no other!

WHAT CAN YOU EXPECT WHEN YOU RETURN TO CAMPUS FOR REUNION & HOMECOMING?
These highlights are just a few of the programs offered. You’ll also find Class Dinners, athletic competitions, Greek ChowderFest, Back to Class tours, seminars, a 5K run—we guarantee something for everyone!

Visit alumni.rpi.edu/reunion for details or contact Alumni Relations at (518) 276-6205 or alumni@rpi.edu.
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