UNION STRONG

THE RENSSELAER UNION CELEBRATES 125 YEARS OF EXCELLENCE, LEADERSHIP, AND COMMUNITY
Sunny skies and a crisp breeze greeted alumni who returned to campus for Reunion & Homecoming Weekend in October. In addition to the football game against St. Lawrence University, visitors could take part in more than 190 events, dinners, and activities.
Moving?

Update your address via email at alum.mag@rpi.edu, or write to: Rensselaer Magazine, Office of Strategic Communications and External Relations, Rensselaer Polytechnic Institute, Troy, NY 12180, or fax to (518) 276-3715.
Family Weekend

Students and families took to the dance floor during Family Weekend in October. Sponsored by the RPI Jazz Ensemble and Ballroom Dance clubs, “Jump, Jive, Jazz & Salsa” offered dance lessons by Ballroom Dance club members, and then participants had the chance to try out their new steps with music by the Rensselaer Repertory Jazz Orchestra, 8th Street Swing Band, and Afro-Cuban Jazz Orchestra.

More than 4,000 people visited campus for Family Weekend to get a taste of life at Rensselaer through a variety of cultural offerings, student performances and exhibitions, academic and center open houses, and many on- and off-campus events.

In addition, families had an opportunity to attend the annual Fall Fest Celebration. The free communiversity event featured student demonstrations, entertainment, and hands-on activities for individuals of all ages. Overall, more than 80 events over the weekend highlighted the many facets of Rensselaer.

“Autumn is a wonderful time to be in Troy,” said Shanté Brown, assistant dean in the Office of the First-Year Experience. “This year, faculty members graciously opened the doors to their classrooms to allow parents and families a glimpse into the true student experience at Rensselaer. The annual Family Weekend event has always served as a great way to ensure that everyone finds a way to share and enjoy the culture and rich traditions of Rensselaer.”
Bridge to the Bicentennial

Institute marks important milestones on the way to 2024

We are in the midst of celebrating a number of important anniversaries at Rensselaer Polytechnic Institute, all of which anticipate the celebration of the bicentennial of our founding in 2024. Our longevity is due largely to the fact that our founding mission, “the application of science to the common purposes of life,” remains more relevant than ever. At the same time, each particular milestone is a reminder that we continuously have rethought the fulfillment of that mission, changing pre-emptively to prepare our students to lead in the future.

The anniversaries we celebrated this fall included the centennial of our chemical engineering degree program, which was germinated by a student petition. In 1914, a revolutionary expansion of fundamental knowledge was underway in both physical and biological chemistry. Young Rensselaer engineering students saw that there were enormous opportunities to apply this knowledge in novel ways—and wished for a course of study focused on chemical engineering, and named for it.

The influence of Trustee Emeritus Howard P. Isermann ’42, the inventor of a key ingredient used in sunscreen, moved Rensselaer into biochemical engineering in the late 1980s. In 2003, we renamed the program decisively: It became the Center for Biotechnology and Interdisciplinary Studies (CBIS), whose 10th anniversary we also celebrated this fall. In my inaugural address as the 18th president of Rensselaer 15 years ago, I posed this question: “Are there areas that are so vital that we must create a presence in them—in order to stand in the community of world-class universities?” Then I suggested a field in which Rensselaer was relatively unknown, but one that held such promise for humanity, that we were compelled to address it: biotechnology.

The Board of Trustees agreed, and The Rensselaer Plan, approved in May of 2000, promised that we would make “dramatic investments” at the nexus of the life sciences and engineering. In 2004, we opened CBIS, one of the most advanced centers for biotechnology research in the world. Since then, resident faculty and their students have published more than 2,000 peer-reviewed papers, cited in the scientific literature nearly 30,000 times. That research is pointing the way toward new classes of therapeutics to address threats to human health that include Alzheimer’s disease, osteoporosis, antibiotic-resistant bacteria, and spinal cord injury.

We also celebrated the 50th anniversary of the Lally School of Management in October, with a daylong showcase titled “Investing in Entrepreneurship” that was capped off by an informative conversation with Internet pioneer and America Online co-founder Steve Case. The Rensselaer business school was founded half a century ago at a moment when increasing rigor in research was turning the study of business from a vocational subject into a true academic discipline. The focus of the Lally School on the strategic management of technology has complemented the traditional strengths of Rensselaer in science and engineering, and many innovative companies have emerged with the assistance of the Lally School.

The last anniversary we celebrated this past fall was mine: my 15 years as president of Rensselaer. It has been a privilege and a pleasure to ready the Institute to begin its third century. Now, we are re-envisioning Rensselaer as what I call “The New Polytechnic”: a great collaborative endeavor across disciplines, sectors, and global regions, animated by new technologies, particularly in the areas of computation and data science, to address complex and interconnected global challenges.

Rensselaer long has valued such cross-disciplinarity in education and research. In the mid-19th century, Benjamin Franklin Greene, our third senior professor, broadened as well as deepened the curriculum—believing that Rensselaer students should experience “a system of general disciplinary culture—scientific, literary, philosophic, artistic—prior to entrance upon any form of applied science or art.” His expansive view of a scientific and technological education was so vital to our identity that, in 1861, the Rensselaer Institute was renamed Rensselaer Polytechnic Institute.

Today, we once again are emphasizing our nature as a polytechnic—a university that embraces many disciplines—in order to be even more transformative in the global impact of our research, in our innovative pedagogy, and in the lives of our students. As The New Polytechnic, the best, for Rensselaer, is yet to come.
Anniversaries Inspire Action

Throughout 2014, many milestones were marked on campus, and two have generated impressive alumni contributions to Rensselaer.

Two of our fraternities, Theta Xi and Delta Phi, recently celebrated their 150th anniversaries here at RPI. Each drew hundreds of alumni back to campus for ceremonies and activities recognizing this great longevity. Importantly, the alumni of each chose to honor their special occasions by raising money to do something significant for RPI.

Theta Xi, the founding (or “Alpha”) chapter of the fraternity, was established on April 29, 1864. One of its notable alumni was Palmer C. Ricketts—Class of 1875, beloved professor, and Rensselaer president from 1901 until his death in 1934. The Ricketts Building is named for him, and the alumni and undergraduates of Theta Xi raised money to renovate the facade of the Ricketts Building as a gift to RPI. The result they achieved is absolutely beautiful.

The Lambda Chapter of Delta Phi became part of the Rensselaer landscape on June 28, 1864, the 11th chapter of the fraternity to be established since its founding at Union College in 1827. One of its notable alumni was George Low—Class of 1948, iconic NASA legend, and 14th Rensselaer president. Delta Phi chose as its gift to provide for the restoration and renovation of the worn space housing the George M. Low Gallery, an irreplaceable collection of memorabilia from his incredible career and located on the fourth floor of the George M. Low Center for Industrial Innovation (see page 12 for more).

These projects, undertaken separately by two fraternities but with the common passion to honor one of their respective own, have been

Thank You for Your Input

During the summer we sent out a survey asking for feedback about the alumni magazine. The online survey, sent to a random sample of Rensselaer magazine recipients, was prepared by the Council for the Advancement and Support of Education (CASE), and sponsored by the survey firm Qualtrics. Using this particular survey enabled us to benchmark our results against those of 250 other institutions of higher education who also participated in the survey.

I want to thank those of you who took the time to respond. We learned that 88 percent of you read all or most issues of the magazine, and 58 percent acquire all or most of the information you receive about the Institute from the magazine. In addition, 85 percent of you agree or strongly agree that the magazine strengthens your personal connection to the Institute, and 60 percent say the magazine helps you feel more in touch with your graduating class, which is 14 points higher than the CASE aggregate result for all magazines surveyed.

Your top choices for content are science, technology, and engineering (76 percent), class notes (76 percent), institutional history and traditions (72 percent), and campus facilities and growth (62 percent).

As a result of your stated interest in reading about Rensselaer history and campus traditions, we are reinstating a “From the Archives” section in each issue that will feature programs and student activities from the past. We also will be highlighting Institute anniversaries as part of our Bridge to the Bicentennial series.

While many of you said you enjoy the broad coverage of the Institute and wide range of topics covered in the magazine, we know that you look in particular for news about your school or major. We will continue to strive to include stories about the research advancements, pedagogical innovations, and transformative student programs and events taking place throughout the university in each issue.

We are pleased to learn that as a result of reading Rensselaer magazine, many of you have recommended the Institute to a potential student or family member, contacted a classmate or friend, attended an event, submitted a class note, made a financial donation, or visited our website. I also urge you to visit Rensselaer to see firsthand the progress taking place at your alma mater. And I encourage you to continue sending us your comments and ideas for future issues.

Again, I thank you for your response to the survey and your continued interest in Rensselaer magazine.

David Brond
Vice President for Strategic Communications and External Relations
Until recently, roadway lighting technologies changed very slowly. Technologies like high-pressure sodium (HPS) and other high-intensity discharge lamps used in cobra head-style fixtures were state-of-the-art for decades. The best practices for roadway lighting design had remained largely unchanged since the 1970s and 1980s.

Fast forward to 2014, and the roadway lighting landscape is changing rapidly. Agencies responsible for designing and maintaining safe roadways have a bewildering array of options including not only HPS systems that still make up the majority of roadway illumination systems on roads, but also light-emitting diode (LED) technologies, new forms of ceramic metal halide lamps, fluorescent induction lamps, and plasma light sources. Controls for these lighting systems are making dimming and switching easier as well, so street lights don’t need to burn continuously from dusk to dawn as they have for decades. Unfortunately, there has been a lack of objective information available regarding current options for sustainable roadway lighting.

In collaboration with the New York State Energy Research and Development Authority and the New York State Department of Transportation (NYSDOT), the Rensselaer Lighting Research Center conducted three “Sustainable Roadway Lighting” seminars across New York state for engineers, local municipalities, electric utilities, and lighting specifiers.

Instructors shared the basics of roadway lighting, techniques for evaluating different lighting technologies, new ways to quantify the efficiency and effectiveness of roadway lighting, and upcoming concepts that may transform how roadway lighting is practiced.
Rensselaer Among America’s Best Architecture & Design Schools

The School of Architecture has been ranked the 14th best undergraduate program in the nation by the journal DesignIntelligence. In addition, Dean of Architecture Evan Douglis was named among the 30 most admired educators in the field of architecture education.

Rankings for DesignIntelligence’s “America’s Best Architecture & Design Schools 2015” list were based on surveys of architecture and design professionals, which asked several questions including: “In your firm’s hiring experience in the past five years, which schools are best preparing students for success in the profession?”

“At Rensselaer, we take pride in preparing our architecture students to become future leaders in the profession. Our graduates, who leave our school as seasoned thinkers practiced in innovative design, building technology, sustainability, and architecture as a social project, continue to prove and grow this reputation,” Douglis says. “Being ranked by DesignIntelligence as among the top programs in the nation is another recognition that Rensselaer-educated architects are advancing their field, transforming their profession, and answering our university’s call of ‘Why not change the world?’”

DesignIntelligence also ranked the School of Architecture as the 9th best undergraduate program nationwide for educating students about construction methods and materials. In naming Douglis among the 30 most admired educators in the field of architecture education, the journal praised him for his simultaneous focus on advancing students’ careers and studies. “A personable, design-oriented dean, Evan Douglis is an inspirational leader, pushing for the advancement of the school,” DesignIntelligence wrote.

The School of Architecture offers two undergraduate programs, the five-year Bachelor of Architecture degree and the four-year Bachelor of Science in Building Sciences degree. The school also offers several graduate degrees in architecture including: a three-and-a-half-year Master of Architecture (professional) degree, and a one-year Master in Architecture II (post-professional) degree.

“Evan Douglis is an inspirational leader, pushing for the advancement of the school,” DesignIntelligence wrote.

“The partnership between Rensselaer and The FUND for Lake George continues, with the addition of IBM as a third partner, in the Jefferson Project at Lake George, that began in 2013. The project combines advanced data analytics, computing and data visualization techniques, new scientific and experimental methods, 3-D computer modeling and simulation, and historical data to gain an unprecedented scientific understanding of Lake George.

The full report can be downloaded at fundforlakegeorge.org/StateoftheLake.
Mary Simoni Named Semi-Finalist for American Prize

Mary Simoni, dean of the School of Humanities, Arts, and Social Sciences (HASS), has been named a semi-finalist for the prestigious American Prize in Chamber Music for her composition Piano Trio scored for violin, cello, and piano with electronics.

Simoni, an accomplished pianist and expert in algorithmic composition, adapted a new piece of technology—the Hot Hand—for her winning composition. The technology, originally designed as a ring and adapted by Simoni into a bracelet, tracks the movement of the violinist’s and cellist’s bow arm and wirelessly transmits the motion data to a computer. Computer programs analyze the data and synthesize a sonic signature that corresponds to the speed and angle of the wrist as the musician moves the bow across the strings.

“Bow movement plays a critical role in shaping the timbre of a string instrument,” Simoni says. “By capturing the subtle artistry of a performer’s bow, I am able to magnify the bow movement and stretch the listener’s sonic experience of these instruments.”

Simoni placed small microphones on each of the instruments’ strings. Each microphone’s output was sent to its own computer so that the analysis of the bow trajectory could synthesize new sounds in near real-time. The computer program mixes the altered and synthesized sounds resulting in music that is at once familiar and ethereal. “Using the technology in this way allows one violinist to sound like a violin section from another world,” she says.

The Hot Hands technology was invented by one of Simoni’s former students; Simoni used just the second and third such devices ever created when composing the Piano Trio.

Piano Trio’s three movements play on the expressivity of the human hand and the Hot Hands technology by juxtaposing rhythmic groupings of four and five with quartal and quintal harmonies.

The American Prize, founded in 2009, is a series of nonprofit national competitions designed to recognize and reward the very best in the performing arts in the United States at amateur and professional levels.

Gifts of Time, Talent, Resources

DEDICATED VOLUNTEER. DEVOTED ALUMNUS. SUCCESSFUL BUSINESSMAN. LOYAL DONOR. THESE ARE ALL TITLES THAT ARE BEFITTING OF ROGER ORLOFF ’60 WHEN IT COMES TO DESCRIBING HIS LIFELONG CONNECTION TO RENSSELAER.

In the more than 50 years since he graduated from Rensselaer, Orloff has served in a variety of volunteer roles. He has held positions in the Rensselaer Annual Fund, serving as a member of the Annual Giving Leadership Council and chairing the Patroon Society of Volunteers since their inception. He has also served as vice president, director, and chair of the Marketing Committee of the Rensselaer Alumni Association (RAA), which launched the RAA Visa card, and as a member of highly successful Reunion gift committees.

Through these various positions, Orloff has inspired fellow alumni by encouraging them to consider the role Rensselaer played in their success and the importance of giving back to their alma mater.

“Giving back to Rensselaer as a volunteer has made a big impact on my life,” Orloff says. “One of my boyhood heroes, Benjamin Franklin, whose birthday I share, wanted to feel useful in everything he did. I very much share that passion. Volunteering with Rensselaer has been exceptionally rewarding.”

In addition to volunteer duties for Rensselaer, Orloff manages to find time for his lifelong career in investment banking. In 1992, he founded The Acquisition Search Corporation (TASC) in Atlanta to help provide entrepreneurs with knowledgeable investment banking advice during the purchase or sale of a business. The success of TASC over the years has also enabled Orloff to support Rensselaer as a donor, giving to the Annual Fund each year for more than 30 years, and generously establishing the Barbara D. and Roger B. Orloff ’60 Fund for the Lally School of Management and the Barbara D. and Roger B. Orloff ’60 Fellowship, through a $1.25 million bequest.

“Rensselaer made a tremendous difference in my life. I believe I’ve had a successful professional career, in large part because of the skills and foundation I developed as an undergraduate. With the benefits Rensselaer provided also comes an obligation to do what I can to ensure that future generations of students can benefit in the same way that I have,” Orloff shared.

In recognition of his service to Rensselaer over the years, Orloff has been awarded the Albert Fox Demers Medal, the Alumni Key Award, and the Director’s Award. He was most recently presented with the RAA’s highest honor, the Distinguished Service Award, during Reunion & Homecoming weekend in October.
LALLY SCHOOL OF MANAGEMENT

Celebrating 50 Years of Business

In October, the Lally School of Management hosted a series of special events to celebrate its 50th anniversary. Program highlights included the annual William F. Glaser '53 Rensselaer Entrepreneurs of the Year celebration, a visit from the president and chief executive officer of the Federal Reserve Bank of New York, and the daylong “Investing in Entrepreneurship” showcase that featured entrepreneur, philanthropist, and Internet pioneer Steve Case.

“The celebration of the 50th anniversary of the Lally School is part of an ongoing effort to highlight milestones of how the world has been transformed by the achievements of the Rensselaer community—past and present—as a bridge to the bicentennial of Rensselaer Polytechnic Institute in 2024,” says Thomas Begley, dean of the Lally School.

John Delbridge ’91, Jeffrey Stewart ’91, and David Uyttendaele ’91 were recognized as the 2014 William F. Glaser ’53 Rensselaer Entrepreneurs of the Year during an event held on Oct. 3 (see page 10).

On Oct. 7, William Dudley, president and chief executive officer of the Federal Reserve Bank of New York, gave a talk titled “The National and Regional Economy” to students, faculty, and staff. The talk included a discussion of the national and regional economies, opportunities for growth, and the bank’s recent research on higher education.

The anniversary celebration concluded on Oct. 21, as the Lally School hosted a daylong showcase titled “Investing in Entrepreneurship,” that featured conversations, startup pitches, and educational sessions designed to increase the pool of angel investors and entrepreneurial talent.

Program highlights included a panel discussion and workshop titled “Angel Investors and Entrepreneurs—How To Speak the Same Language,” which was part of the Jerome S. Reinert ’56 Visiting Executive Series Forum; and a pitch session featuring several local startup companies led by students from Rensselaer and area colleges, Rensselaer alumni and alumnae, and community members in search of venture capital.

Case participated in the concluding session of the daylong showcase. President Jackson led a conversation with Case, titled “Cultivating Data-Driven Entrepreneurship.”

“Rensselaer people always have been discoverers and innovators,” President Jackson said. “Importantly, they always have been entrepreneurs—launching enterprises from Texas Instruments, National Instruments, and NVIDIA to the data-driven companies of today. An enormous amount of data is being generated by us, for us, and around us from multiple sources.”

Steve Case, who was co-founder, chairman, and CEO of America Online Inc., spoke with President Jackson about “Cultivating Data-Driven Entrepreneurship.”

BIOLOGY

NIH Funds Heart Muscle Exploration

A RENSSELAER BIOLOGIST IS WORKING TO UNRAVEL SOME of the biggest mysteries of the human heart with help from an unexpected source—the tiny Drosophila, commonly known as the fruit fly.

Douglas Swank, associate professor of biology, recently received funding from the National Institutes of Health (NIH) for two separate grant proposals. One, a five-year, $2.4 million grant, is a collaboration between Swank and researchers at Johns Hopkins University and San Diego State University to seek molecular causes of hypertrophic cardiomyopathy, or enlarged heart disease. The other, a five-year, $1.3 million grant, will allow Swank to study stretch activation, a unique physiological characteristic shared by the muscles that cause Drosophila wings and human hearts to beat efficiently.

Hypertrophic cardiomyopathy causes enlarged hearts and can be fatal, particularly in people in their teens and twenties. Often, cardiac arrest is the first indication that there is anything wrong with a sufferer’s heart. The disease is the leading cause of sudden heart death in young athletes, which is one reason Swank was interested in studying its root cause.

“Our goal for the grant is to try to understand the molecular mechanism behind this disease so that we can help develop better treatments,” Swank says. Methods for screening for the disease continue to improve, but as yet there are very few treatment options and no cure.

More than 200 inherited point mutations have so far been identified as leading to hypertrophic cardiomyopathy. Swank and his team will introduce single mutations into Drosophila flight muscles—which function in a very similar way to heart muscle—and study how the mutations change the muscle’s mechanical performance.

Muscle Exploration

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NIH Funds Heart Muscle Exploration
Alumni and Pi Kappa Alpha brothers John Delbridge ’91, Jeffrey Stewart ’91, and David Uyttendaele ’91 have been selected as the 2014 William F. Glaser ’53 Rensselaer Entrepreneurs of the Year. Established in 1990, the award brings the world of entrepreneurship into Rensselaer classrooms by recognizing successful entrepreneurs and role models who share their wisdom and experiences with students.

The Entrepreneur of the Year program is sponsored by the Paul J. ’69 and Kathleen M. Severino Center for Technological Entrepreneurship and the Lally School of Management. While attending Rensselaer, the fraternity brothers first started collaborating on projects, and this continued even after graduation. In early 1993, en route to a ski trip in Vermont, the trio stopped off at Rensselaer to discuss the latest business idea that was keeping Stewart up at night—a business-to-business online printing solution. Founded in 1998 and headquartered in New York City, Mimeo.com now employs more than 850 people globally with operations in North America, Europe, and Asia.

With a global footprint and cloud-based platform, Mimeo provides customers with a simple way to create, manage, and distribute content and materials. As an innovator of online managed content distribution, the private company has provided solutions to over 50,000 organizations in over 140 countries over the past 15 years. “Rensselaer students and graduates are known as creative problem-solvers prepared to tackle 21st-century challenges. This year, we celebrate the Mimeo founders, who like past winners of the award, are business leaders who have a passion for innovation,” says Thomas Begley, dean of the Lally School.

Delbridge is a founding team member and serves as chief executive officer of Mimeo. Prior to becoming CEO, Delbridge had served in various roles, including CFO, and was instrumental in raising more than $80 million in capital from both financial and strategic investors.

Stewart is a serial entrepreneur and co-founder of Mimeo. Over the last 15 years, he has started more than a half-dozen technology companies that span four continents and employ over 1,000 people. Presently, Stewart serves as chief executive officer of Lenddo, an online community that helps members use their social network to build their creditworthiness and gain access to local financial services.

Uyttendaele is co-founder and chief technology officer at Mimeo. As CTO, he leads product vision, invention, and technology architecture.
Making Old Bones New Again

As we age, our bones grow more brittle and more susceptible to fracture. Individuals with diabetes or with certain types of osteoporosis often are similarly afflicted with brittle bones.

A new study from biomedical engineers at Rensselaer demonstrates how the compound N-phenacylthiazolium bromide, or PTB, dissolves the sugary impurities within bone tissue that cause our femurs, fibulas, and other bones to become more fragile.

Using PTB to reduce bone fragility and boost bone flexibility could lead to new strategies for preventing bone fractures in elderly individuals, as well as accelerated bone healing in patients with diabetes or osteoporosis. “This study opens the door to new ways of thinking about the well-established, highly serious problem of brittle bones,” says Deepak Vashishth, professor of biomedical engineering and director of the Center for Biotechnology and Interdisciplinary Studies, who led the study. “These research findings are an important milestone on the path to our long-term goal of realizing a drug-based intervention for reducing age-related changes in bone tissue.”

Biomedical engineering graduate Brian Bradke ’03, who received his undergraduate degree in 2003 and his doctoral degree earlier this year, was co-author of the paper with Vashishth.

Bones are constantly being remodeled within the human body. Cells produce acids and proteases to break down minerals and proteins in the bone, which are then resorbed into the body. At the same time, to compensate for the resorbed tissue, bones are fortified through chemical deposition and mineralization. This ongoing remodeling process slows down as cells are unable to fully remove bone containing sugary impurities called advanced glycation end-products, or AGEs, which form naturally in proteins.

Bone remodeling slows with age, meaning AGEs accumulate at a great rate as we grow older. Individuals with diabetes, certain types of osteoporosis, or metabolic bone diseases are also known to have above-average AGE content. Higher concentrations of AGEs make these groups more susceptible to bone fracture and longer healing time for bone injuries.

The chemical PTB has previously been shown to be effective for dissolving AGEs and reducing stiffness in blood vessels for cardiovascular applications. Vashishth said his new study is the first to investigate the effect of PTB on bones.

He and Bradke applied PTB using different methods to multiple samples of human bones, taken from nine male donors between the ages of 19 and 80. The researchers tested the strength of the bones and used fluorescence to measure the amount of AGEs in the bones.

Compared to the control groups, bones treated with PTB showed a significant decrease in AGE content, as well as a significant increase in flexibility, without losing calcium. The data suggests that treatment with PTB could be an effective means to reduce AGE content and decrease bone fragility caused by the modification, or cross-linking, of bone protein, Vashishth says.
At Rensselaer campus is a permanent exhibit of National Aeronautics and Space Administration (NASA) memorabilia and other materials that honor the life of former Rensselaer President George M. Low '48. The George M. Low Gallery, open daily to the public, is located on the fourth floor of the Low Center for Industrial Innovation.

Walking into the gallery, visitors are easily taken back in time. The gallery, which is reminiscent of the inside of a space shuttle, includes items of personal and professional significance, such as historic NASA memorabilia, autographed pictures of astronauts, Low’s Presidential Medal of Freedom, and more. The collection of space memorabilia was donated to Rensselaer by the family.

Low earned bachelor’s and master’s degrees in aeronautical engineering from Rensselaer in 1948 and 1950. A Delta Phi fraternity member, Low led the Apollo Spacecraft Program that successfully landed Americans on the moon in 1969. He became the university’s 14th president in 1976, and passed away in 1984.

The Class of 1985 gift furnished the George M. Low Lounge. In 2002, the lounge was converted into the George M. Low Gallery. Rensselaer celebrated the grand opening of the gallery on Sept. 27, 2002. Low’s family toured the facility before a formal dedication ceremony for the campus community.

During a visit to the gallery, Roger Mike ’70, Delta Phi chapter adviser, noticed worn areas of the gallery in need of attention. At the same time, as the fraternity looked forward to celebrating its 150th anniversary, the alumni brothers of Delta Phi were in search of a long-term campus project that they could support as a way of giving back to Rensselaer. The George M. Low Gallery was the perfect fit.

Fraternity members raised more than $45,000 to cover the cost of the renovation project, which included new lighting fixtures for the space and also for the enclosed displays, new carpet, paint work, replacement of existing graphics, and editing of the Gallery video, among other improvements.

On June 28, in honor of the fraternity’s founding date, more than 180 Delta Phi members and their families returned to campus for a series of anniversary events, and to participate in the gallery rededication ceremony.

There are many tributes to Low in the gallery. “[Low]” challenged our country to seek out the ultimate reaches of the unknown,” said former Governor of New York Hugh Carey, as quoted in a gallery display. “Like Magellan, Columbus, and Henry Hudson, he sought through discovery to teach us the wonders of our own planet.”
MECHANICAL, AEROSPACE, AND NUCLEAR ENGINEERING

Engineering Longer-Lived Batteries

Lithium-ion batteries power our phones, laptops, and many other portable electronic devices. There are limitations inherent in current lithium-ion technology, however, that prevent the batteries from being used more widely in electric vehicles and other high-power applications.

A team of researchers, led by Jie Lian, associate professor of mechanical, aerospace, and nuclear engineering, has developed a new material that addresses two of these limitations.

One limitation is mechanical in nature. As the battery charges, lithium ions diffuse into the anode structure and cause it to physically expand. When discharging, as the battery is being used, lithium ions depart the anode structure and cause it to revert to its original size. The stress from these volume changes can result in damage to the battery, which generally leads to a significant loss in the amount of energy it can hold.

Another limitation is chemical. As the liquid electrolyte molecules in lithium-ion batteries react with the electrons and lithium ions, the molecules decompose and form a solid-electrolyte interface (SEI) layer on the negative electrode surface. The SEI consumes lithium ions and impedes their ability to move through the battery. To make matters more challenging, the SEI layer is known to crack as the battery’s anode grows and shrinks, and then re-forms. This repetition can result in the formation of ever-thicker, increasingly prohibitive SEI layers, which negatively impacts the performance and shortens the lifespan of the battery.

The use of nanomaterials can help alleviate the mechanical limitation of lithium-ion technology in several ways; for example, by providing a thick forest of nanowires or nanorods in which the lithium ions can diffuse. But because of their larger surface area, these nanomaterials are more susceptible to SEI formation.

To attack the problem of both mechanical and chemical degradation, Lian and the researchers designed and developed an electrode from cobalt oxide mesoporous hollow nanospheres. Shaped like tiny soccer balls with holes scattered across their surface, the hollow spheres suffer severe mechanical and chemical degradation and lose most of their energy storage capability. However, Lian and the research team discovered that, after many charge-discharge cycles, the hollow nanospheres are refined, reactivated, and eventually demonstrate unprecedented performance for a battery.

How did this transformation happen? The expansion and retraction of the nanospheres causes their pores to become larger over time. The refined structure of the nanospheres enabled the creation of a thin, stable SEI on their surfaces. Instead of cracking and re-forming, the SEI simply expands and contracts in concert with the sphere. The perpetually thin SEI ensures lithium ions can quickly and efficiently diffuse in the electrode, and the reactivated electrode does not lose capacity even after thousands of charge-discharge cycles at a high charge rate.

The electrodes developed by Lian and the research team showed no loss in capacity after 7,000 cycles at a high charge/discharge rate of more than 5C.

HUMANITIES, ARTS, AND SOCIAL SCIENCES

Meet Her at the Fair

Since the first World’s Fair was held in London in 1851, the international events have served as a venue for host countries to showcase their technological innovation, political might, and best designers, architecture, art, and food—a diverse representation of how the countries saw themselves. World’s fairs have changed in their focus since the 19th century—a fair scheduled to be held in Milan in 2015 will focus on sustainability—but their inherent diversity remains a constant.

Rebecca Rouse, an assistant professor of communication and media in the School of Humanities, Arts, and Social Sciences, found that the available scholarship on world’s fairs was much less diverse than the fairs themselves.

“World’s fairs are a huge spectacle and a fascinating microcosm—they have technology, design, architecture, politics, culinary delights, theme park rides—they’re interdisciplinary. The scholarship on fairs didn’t reflect that interdisciplinary tradition, however,” Rouse says. “Most of the scholarship has been straight-up history, architecture, or cultural studies perspectives on topics like colonialism and imperialism.”

Rouse, who joined the Rensselaer faculty in 2013, gave a talk on world’s fairs while teaching at Georgia Institute of Technology. Three of her colleagues there decided to work with her to produce an anthology of interdisciplinary research on world’s fairs, reflecting the interdisciplinary form of the fair.

The book they ended up with, Meet Me At The Fair: A World’s Fair Reader, is a diverse collection of essays by more than 40 authors that cut across fields including academia, museums, design, anthropology, entertainment, and architecture.

Rouse and her co-editors—Laura Hollengreen, an associate professor of architecture at Georgia Institute of Technology, Bobby Schweizer, a visiting assistant professor of digital media at Georgia Institute of Technology, and Celia Pearce, an associate professor of game design at Northeastern University—published the book through the Carnegie Mellon University ETC Press. In keeping with the publisher’s ethos of making scholarship available to a wide audience, a PDF version of the book is available as a free download.
MAKING A DIFFERENCE

Data Visualization Laboratory Opens

IN OCTOBER, RENSSELAER ANNOUNCED A major gift from trustee John Kelly III ’78 and his wife, Helen-Jo. The leadership gift will create an endowed fund to support ongoing research at the Helen-Jo and John E. Kelly III ’78 Data Visualization Laboratory, located at the Margaret A. and David M. Darrin ’40 Fresh Water Institute (DFWI) in Lake George.

The Data Visualization Laboratory was built to support the Jefferson Project at Lake George—a groundbreaking collaboration between Rensselaer, IBM, and The FUND for Lake George that is bringing together ecologists, hydrologists, computer scientists, environmental advocates, and experts in cyberinfrastructure and other fields to gain an unprecedented understanding of the complex systems that operate within and around Lake George.

Advanced sensors are being placed throughout the lake that will collect massive amounts of data about the lake, the way water flows into and circulates throughout it, and the plants and animals that live in it. That data will be streamed into the new Data Visualization Laboratory in real-time for analysis. The 2,000-square-foot laboratory features advanced computing and graphics systems to display massive data on a high-resolution display “wall.”

“Future generations, who share our love of Lake George and its surrounds, will look back on this day as a turning point, when, as a result of the generosity and vision of the Kelly family and the support of IBM, we are enabled to develop a new scientific model for environmental stewardship through collaborative research using leading-edge technologies,” said President Shirley Ann Jackson in announcing the gift. “This transformative gift reflects John’s dedication as a Rensselaer trustee, his commitment as a research partner, and the passion that he and Helen-Jo share for preserving that which makes Lake George so special.”

“RPI and Lake George have been important parts of my—and my family’s—life,” says John Kelly. “We are pleased to be able to endow such a technologically advanced laboratory in support of the Jefferson Project, thereby helping to preserve Lake George for future generations.”

Kelly serves as senior vice president and director of research for IBM. In this role, he is responsible for leading IBM’s most advanced research into areas such as big data computation and analytics, to solve the world’s most complex problems.

Throughout Kelly’s more than 30-year career with IBM, he has been instrumental in forging a strong corporate partnership between IBM and Rensselaer. IBM has supported Rensselaer in a number of key projects including the establishment of the Center for Computational Innovations, the partnership on the IBM Watson system, and most recently the Jefferson Project at Lake George.
BIOLOGICAL SCIENCES

Summer at Mount Sinai

THREE RENSSLEAER UNDERGRADUATE students—Mohsin Jawed ’16, Mattie Rosi-Schumacher ’15, and Dongbo “Peter” Yang ’16—spent their summer vacation participating in cutting-edge research as part of the prestigious Summer Undergraduate Research Program (SURP) at the Icahn School of Medicine at Mount Sinai.

The partnership between Rensselaer and Mount Sinai creates an alliance that combines Rensselaer’s strength in engineering, data science, high performance computing, and technological entrepreneurship with Mount Sinai’s expertise in biomedical research and clinical care.

Jawed, Rosi-Schumacher, and Yang were among 22 SURP fellows selected in 2014. SURP fellows were matched with a Mount Sinai faculty mentor and were given access to state-of-the-art biomedical research laboratories. Fellows also attended weekly seminars, participated in department and work-in-progress meetings, and presented their research during the SURP Fellows’ Research Day.

The highly competitive program is reserved for outstanding undergraduates who plan to pursue an M.D./Ph.D. or Ph.D. and attracts students from the nation’s top research institutions. Because of the affiliation with Mount Sinai, some SURP slots are designated specifically for Rensselaer students. All three Rensselaer SURP fellows are majoring in biology and have taken advantage of undergraduate research opportunities at the Institute.

At Mount Sinai, Yang worked in Dr. James Manfredi’s lab and his mentor was Dr. Lois Resnick-Silverman in the Department of Oncological Sciences. “It was a great experience to do serious cutting-edge cancer research in a world-leading medical institute. The research environment at Mount Sinai is great, and it further strengthened my will to study oncology for the rest of my life,” he says. “I also learned several valuable techniques that will benefit my research project in the Cancer Cell Biology group at RPI.” Rosi-Schumacher worked in biomedical informatics and was mentored by Brian Kidd, a senior biomedical informatics research scientist in the Dudley Lab.

“The program was really great,” she says. “The Dudley Lab was very welcoming and accommodating, and my mentor was especially helpful. I really learned a lot. I am also very pleased with the project I worked on and the results I was able to find.”

“My research project in the Dudley Lab was very helpful. I really was able to find the results I was able to find. The experience has sparked my interest in the field of bioinformatics and the way that big data can be used in translational research and medicine.”

“IT was a great experience to do serious cutting-edge cancer research in a world-leading medical institute. The research environment at Mount Sinai is great, and it further strengthened my will to study oncology for the rest of my life.”

Jawed, who is pursuing a joint B.S.-M.D. through the accelerated physician-scientist program, joined a bioengineering lab at Mount Sinai and worked on cardiac tissue engineering.

PIPELINE

Supporting High School STEM

NEW YORK STATE STEM CELL SCIENCE (NYSTEM) has awarded a four-year $498,000 grant to Rensselaer to support science, technology, engineering, and mathematics (STEM) training for high school students. The program is intended to introduce stem cell research fundamentals to pre-college students, generating a pipeline of future researchers in the field.

The grant will focus on human stem cell biology and developing effective stem cell research teaching modules for area high schools, especially those within diverse and disadvantaged school systems, says Glenn Monastersky, associate director of the Center for Biotechnology and Interdisciplinary Studies (CBIS) and principal investigator of the grant. Colleagues Deanna Thompson, associate professor of biomedical engineering, and Kelly Grindstaff, project manager for the Center for Initiatives in Pre-College Education, are co-investigators.

The program is made possible through the Rensselaer Center for Stem Cell Research, founded in 2012 with a $2.45 million NYSTEM award to Monastersky. The program also will build on the Biotech High School Scholars Program Monastersky launched in 2008. More than 50 high school students from area systems have participated in the year-long program—including 19 students in the 2014-2015 academic year—learning laboratory bio-safety, and taking part in weekly faculty-mentored, peer-reviewed research in chemical engineering, biomedical engineering, biology, and chemistry laboratories in CBIS.

Monastersky says the new program will provide a strong foundation of basic knowledge and practical research laboratory methodology in cell and developmental biology and stem cell science. “The diverse research community within CBIS therefore is perfectly prepared to drive stem cell and regenerative medicine research and to reach out and excite the stem cell researchers of tomorrow,” he says.
A CENTURY AGO, FACULTY, STUDENTS, AND alumni of Rensselaer helped shape the nascent field of chemical engineering. They applied their talent and ingenuity to advance technologies critical to the era, seeking new ways to use, manufacture, and refine a range of chemicals.

Today, faculty and students in the Howard P. Isermann Department of Chemical and Biological Engineering (CBE) remain at the leading edge of their field. They employ many of the same fundamental techniques as their forebears, but apply powerful new tools to address the grand engineering challenges that are poised to dominate the 21st century: clean water for everyone, personalized health care, energy security, space travel, sustainability, and climate change.

The first chemical engineering course at Rensselaer was offered in 1914, and a year later the university awarded its first chemical engineering degree. Chemical engineering was the fourth engineering course to be added to the curriculum, in 1914, following civil, mechanical, and electrical. “The object was to give a course which would better prepare a young graduate to take up work leading to the management of industrial plants than would any of the engineering courses or the course in science already established,” according to History of Rensselaer Polytechnic Institute, 1824-1914, written by President Palmer C. Ricketts.

To celebrate a century of impact and accomplishments in chemical engineering, and to look ahead at the challenges on the horizon, CBE is hosting a series of events, meetings, and seminars.

“The transformation of chemical engineering at Rensselaer is a major success story. From its roots in applied chemistry, it has evolved to become an exciting place for multidisciplinary research in key areas from bio- and nanotechnologies, to energy, advanced materials, and high performance computing to solve grand challenges of today,” says Shekhar Garde, dean of the School of Engineering, who was department head of CBE from 2007 to June 2014.

“With dynamic faculty, a growing body of undergraduate and graduate students, and world-class facilities supporting new areas of research, we expect a bright future for chemical and biological engineering in the next century.”

The department’s graduate program has flourished over the past quarter century thanks to support by Howard P. Isermann ’42, an emeritus member of the Board of Trustees, and a celebrated chemical engineer who developed a key ingredient used in sunscreen.

The centennial events began during the 2014 Rensselaer Reunion & Homecoming weekend in October. During the fall 2014 and spring 2015 semesters, CBE is hosting a series of seminars featuring leading chemical engineers from around the world who will speak about their research and reflect on the current state and future of the field.

For a full schedule of CBE centennial events, see cbe.rpi.edu/centennial.
RICK RELYEA, a world-renowned aquatic ecologist, has been named the director of the Jefferson Project at Lake George. Relyea has also been appointed the David M. Darrin ’40 Senior Endowed Chair in the Department of Biological Sciences. The Jefferson Project is a partnership between Rensselaer, IBM, and The FUND for Lake George. Relyea will lead a team of Rensselaer scientists, engineers, computer scientists, and other experts as they work with technology IBM is adapting and inventing for the project and the resources of the FUND, a nonprofit advocacy group, to embark on an intensive study of Lake George. Relyea joins Rensselaer from the University of Pittsburgh, where he worked for 15 years as a professor and for the past seven as the director of an ecological research center. His research focuses on asking broad questions about how aquatic food webs function and how they are impacted by contaminants like pesticides.

ROBERT HULL, the Henry Burlage Jr. Professor of Engineering and head of the Department of Materials Science and Engineering, has been named the first director of the new Center for Materials, Devices, and Integrated Systems (cMDIS). Hull will help lead the Institute’s strategic basic and applied research efforts across the broad spectrum of fields in engineering and the physical sciences, in areas such as lightweight composite materials, nanostructured materials, sensors and sensor networks, power electronics, and wide bandgap semiconductors, as well as the integration of these technologies into complex systems. The cMDIS will continue and expand upon the work conducted in the long-lived and successful Center for Integrated Electronics.

SANDRA NIERZWICKI-BAUER, professor of biology and director of the Darrin Fresh Water Institute, has been honored by The FUND for Lake George with the James D. Corbett award for her work on a committee tasked with preventing the introduction of invasive plant and animal species into Lake George. She was one of 10 founding members of the Stop Aquatic Invasives from Entering Lake George Partnership.

JOSE HOLGUÍN-VERAS, the William Howard Hart Professor, was recently named a fellow of the American Society of Civil Engineers (ASCE). Holguín-Veras is director of the Institute’s Center for Infrastructure, Transportation, and the Environment and Center of Excellence for Sustainable Urban Freight Systems. He is known as a global leader in the areas of freight demand modeling, transportation economics, and humanitarian logistics.

GUOHAO DAI, assistant professor in the Department of Biomedical Engineering, recently won a prestigious Faculty Early Career Development Award (CAREER) from the National Science Foundation. Dai will use the five-year, $440,000 grant to advance his research into bio-fabricating human tissues with 3-D cell printing technology.

X. GEORGE XU has been named the Edward E. Hood Jr. Endowed Chair of Engineering. An endowed professorship is among the highest honors bestowed on a Rensselaer faculty member. Xu is an internationally recognized authority in computational modeling and simulation of radiation dose in humans for the purposes of radiation protection, imaging, and radiation treatment of cancer patients.

TOMIE HAHN, associate professor of arts, has been appointed director of the new Center for Deep Listening. Hahn will steer the new center as it assumes leadership of the Deep Listening Institute, an organization dedicated to the study and practice of Deep Listening that was founded by Rensselaer professor Pauline Oliveros in 1985. Deep Listening is a creative, contemplative practice used by artists, educators, performers, and others to support improvisation and achieve heightened awareness of their surroundings, in particular the sounds surrounding them.

PETER TESSIER, an associate professor of chemical and biological engineering, has been named the Richard Baruch M.D. Career Development Professor. An endowed professorship is among the highest honors bestowed on a Rensselaer faculty member.

ROBERT CARNEY, project manager and designer in Campus Planning and Facilities Design, has received the 2014 Pillar of Rensselaer Award, the highest honor Rensselaer gives to a staff member. The award is presented annually to a staff member who understands the Institute’s mission and history, has been a role model for other employees, has shown concern for students and their welfare, has added to the human dimension of the school, and who has played an active role in his or her home community.

GRAIG EASTIN, former vice president of the CHOC Children’s Hospital Foundation, has been named vice president for institute advancement. He will be responsible for designing, cultivating, coordinating, and executing all central advancement programs including leadership and major gift fundraising, corporate/foundation gifts and sponsorship, planned giving, prospect research, prospect and donor communications, advancement events, advancement information systems, and alumni relations.

MARIANA FIGUEIRO, professor and Lighting Research Center light and health program director, gave an invited talk at TEDMED at the Kennedy Center in Washington, D.C. The three-day TEDMED event brought together a series of speakers from diverse backgrounds to inspire new possibilities for the future of health and medicine. Figueiro’s talk was on the effect of light on human health and well-being.

RAVI KANE, the P.K. Lashmet Professor and former vice president of the Howard P. Isernmann Department of Chemical and Biological Engineering, home to more than 350 undergraduate and nearly 100 doctoral students and postdoctoral fellows. Kane joined the faculty in 2001, following a postdoctoral fellowship at Harvard University. He was promoted to associate professor in 2006, full professor in 2007, and named the P.K. Lashmet Professor in 2008.
Union Strong

President of the Union
Erin Amarello '15 and Grand Marshal Kyle Keraga '15
The rescue workers, many of them certified EMTs, can size up and treat diabetic shock, stabilize sports injuries, and get the afflicted to the hospital emergency room safely in minutes. However, when it came to looking at a budget, making the case to tap the organization’s reserve, and putting out a request for proposals for a new car, they were in the dark—not a surprise given that most are just a few years out of high school.

But this is Rensselaer, where students break from classes to answer on-campus medical calls. Clubs and other auxiliary services are run not by administrators in far-flung offices but by the student-led Rensselaer Union. Procuring a first-response vehicle, introducing car sharing, rolling out better pizza, and pursuing equity in campus policies are the jobs of students, with support from professional staff.

“The purpose of RPI, of course, is education, and this model is the best experiential model for students I have seen,” says Joe Cassidy, director of the Union since 2011, who has an extensive background in student life. “We highly respect the Union and know that it’s unique. And our students are so good at it.”

Marking its 125th anniversary in 2015, the Rensselaer Union gives students a significant role in decisions as immediate
as when to replace lounge furniture and as long-range as when to build a new library or beef up academic offerings.

And the organization strengthens the institution’s broad philosophies. Union activities, for instance, are integral to CLASS—Clustered Learning, Advocacy, and Support for Students—which creates interdisciplinary collaborations to guide students through their undergraduate years. Cassidy notes that more than $5 million of the Union’s $8.6 million budget supports the six CLASS themes, which include personal and professional development, cultural engagement, and community involvement.

Students involved in the Union operate the Student Union building—Rensselaer’s central hub—and oversee the services within, including two dining rooms, a convenience store, a Ben & Jerry’s, a bank, college bookstore, hair salon, recreation space, and meeting rooms. The Union founded and collaborates with the Archer Center for Student Leadership Development, where students receive professional training, and runs the Mueller Center, which houses exercise facilities and offers fitness classes.

A 16-student Executive Board approves and funds Rensselaer’s 200 clubs, organizations, and club sports, and sets their respective budgets. To pay for these groups, the E-board collects a share of the revenue generated by the food service and other contractors in the Union building. With this in mind, the board members help decide such matters as when to discontinue fried chicken and introduce sushi, or when to seek a hairdresser who specializes in a current style.

Funding student activities also entails handling a less pleasant task: recommending to the Board of Trustees the annual activity fee that nearly every undergraduate and graduate student pays—a figure now in the $600 range and which never goes down.

“It’s a careful balance to make sure we can provide opportunities for students to explore their passions and have access to the services within the Union without placing too much of a financial burden on the individual student,” says Erin Amarello ’15, the elected President of the Union (PU), who heads the E-board.

The Union’s legislative body, the Student Senate, must ratify the fee. Made up of 26 voting members, the Senate sets policies and proposes changes to the constitution while responding to students’ complaints and carrying forth their ideas. It is headed by a Grand Marshal, Rensselaer’s pre-eminent student representative, and a symbol of the Union’s founding in 1890.

The Grand Marshal and PU, like all students involved in Union governance, find themselves in the unique position of overseeing adults.

“They are responsible for a multimillion-dollar budget and a staff of 20 and 200 student employees,” says Cameron McLean, director of student activities. “When I interviewed here, I went before 25 students and just six administrators. We are in students’ lives and we should be supporting them.”

So when it was time to replace the first-response vehicle, the ambulance squad members worked closely with staff to review the organization’s budget, determine how much to spend on a car, find the right dealer, and get it included on the list of approved vendors. They went before the Executive Board seeking approval to tap their reserve fund.

“It was an interesting experience. At first we were watching them with a little hesitancy because we couldn’t tell if they understood what we do and what we were using this car for,” says Morgan, the club president, a pre-medical student majoring in biology and science and technology studies. “By the end we felt they were very receptive.”

By fall, Rensselaer had a new first-response vehicle, a 2007 Ford Explorer that will have no trouble starting in the cold weather.
The Rensselaer Union offices are spread across the top floor of the Student Union building, along with large wood tables where students work on their laptops and lounge chairs where they chat. Various clubs, including The Polytechnic student newspaper, the Union Performances and Activities Committee (UPAC), and the Alpha Phi Omega service fraternity, have offices here. One corner houses offices for the campus chaplains, whose history is intertwined with the Union. Professional staff and the student government also occupy corner suites.

And the Union maintains a series of meeting rooms, which it has outfitted with built-in LCD projectors in place of those students once signed in and out. “Having these mounted gives a more professional, polished look to the rooms,” notes Amarello. “It also means they are always available to students for last-minute meetings or practicing presentations late at night. This is especially awesome.”

On a Friday afternoon, she and Kyle Keraga ’15, the Grand Marshal (GM), were meeting in their shared office to mull where they stood on a variety of fronts and what events were coming up. Their space, crammed with files, displayed a white board with a calendar on one wall and a series of hats on another. Following tradition, the GM wears a top hat, while the PU wears a derby, to campus celebrations and other events.

But neither officer stood out visibly from other college students. Amarello, a mechanical and nuclear engineering double major who helps oversee the Union’s $8.6 million budget, was dressed in sweatpants and backward ball cap befitting yet another role, as goalie and co-captain of the Rensselaer women’s lacrosse team.

Keraga, an enthusiastic senior majoring in computer science, was printing out materials that might have been a research paper...
for a class. Instead he produced a copy of a report titled “Campus Car Share Initiative for Rensselaer Polytechnic Institute,” a proposal that originated with students and awaits administrative approval.

“What I love about working with the Senate is really being able to make a change,” Keraga says. “Real politics is pretty hateful these days.”

On their agenda were a few trouble spots involving food. One came up when Sodexo, the food service contractor, began limiting the number of times students could use a paid meal card to cover guests. At Keraga’s request, Sodexo halted the practice so the matter could be studied.

“They know to work with us,” he says. “The role of the Senate is to find a compromise.”

“They are in a vulnerable spot. They need to have students on the meal plan,” adds Amarello.

“But students pay for their meals and should be able to have guests come.”

A second food problem centered on how student clubs use the money in their budgets provided for food. The allocation, $2.50 per club member per semester, Amarello explains, is intended to go for recruitment events or parties.

“But some of the clubs are just buying themselves pizza for individual meetings,” she says. “It might not sound like a lot but it’s thousands of dollars and all students are paying for it”—through the activity fee.

The PU and the GM considered the angles. A multicultural club should be able to buy food for meetings since socializing is the principal function. A person running a UPAC movie on a Friday night needs to eat. Likewise, volunteers who help RPI Players construct sets. “The people who join a work party should be fed,” Amarello says.

The E-board was also busy fielding requests from clubs wishing for recognition and those taking the next step by requesting $250 startup funds. Some did not yet qualify.

One that did was RPIgnite, Rensselaer’s new drumline. The highly theatrical troupe, which uses trash cans and other found objects as instruments, was making a hit at campus events and had many bookings lined up.

RPIgnite was the inspiration of Trent DeVerter, a junior who has played percussion since high school. He formed the drumline to bring percussion into the open. It has quickly grown from five to 20 members, whose highly interactive performances are reminiscent of Stomp and Blue Man Group. “It’s something you rarely see at a college level and I thought it would be cool,” DeVerter says.

Last spring, he secured official club recognition. In September, after going before the E-board a second time, and describing RPIgnite’s progress, the club was granted startup funds.

“It’s surreal to me,” says DeVerter, already busy working on a succession plan to keep the group strong. “Right after we walked out of the meeting where we were recognized, I said, ‘We’re starting to make a difference to Rensselaer!’”

Anyone who has paid close attention can see the Rensselaer Union as something of a time capsule of evolving priorities and needs. But the focus has remained consistent.

“Coordinating student organizations. Bringing people together and being a place where students can express their opinions. Those are as relevant now as they have been in the past,” notes Rick Hartt ’70, who is something of a human history book of the Union, which he was closely involved in as a student and served as director for 28 years.

“This was always a place to make decisions and understand that one could succeed or one could fail,” he adds. “It was a safe place to do it.”

Rensselaer operates one of a handful of unions in the United States, though the model is common in universities in Europe. The first college union was founded in 1815 at Cambridge University in England, where three debating societies came together to assess themselves a fee.

“Student activities existed in the 1700s, but clubs tended to parallel the classroom experience. It was things like debate and chess club,” says McLean, the activities director. “Around the Civil War, college students became more interested in current affairs and that led to hobbies. They began to see college as existing for the whole person.”

Harvard founded the first student union in the United States in 1830. Student union buildings followed decades later, often established to give war veterans a gathering place.

The Rensselaer Union was formed some years after the title of Grand Marshal was established. That happened in 1865 when Albert Harper left school as a sophomore to fight in the Civil War. He was severely wounded. After the war ended Harper returned, years older than his classmates. Fellow students chose to honor him by creating the Office of Grand Marshal and giving him the title.

A successor, Independence Grove, led a parade of students through Troy in 1881 and stopped at Boughton’s hat store, where he was presented with a silk top hat—which has stuck as the Grand Marshal’s symbolic headgear. (The story behind the derby, hat of the PU, is not so clear.)

In November 1890, students formed the RPI Union to enhance athletics and clubs. The student association followed and the organizations combined in 1908 as the Rensselaer Union. The same year, trustees and a graduate committee financed the first Union building, a colonial house at the west end of ’86 Field. A second clubhouse followed in 1932.

In 1956, students voted to charge themselves $5 a semester to
build a new student union—the current building, which opened in 1969. Students have pitched in several times since to fund upgrades.

The range of the Rensselaer Union’s projects and the issues it has faced provide a snapshot of recent history. Back in the 1950s and early 1960s, when Helen Liddle Warren was director of social activities of the practically all-male institution, her responsibilities included dispensing advice on social etiquette, sewing buttons if asked, and helping students choose a wedding present.

Later, social protest set the tone.

One week after Mark Rice ’71 was elected Grand Marshal in the spring of 1970, the U.S. invaded Cambodia, triggering student protests nationwide. Rensselaer students occupied the Student Affairs building. Rice called an emergency meeting of the Student Senate, which, following a heated debate, passed two resolutions. The first proclaimed support for the demonstrators. The second resolution urged them to end their occupation before the standoff escalated and police were called in. A few days later the students triumphantly left the building. Faculty allowed them to retain their grades.

Rice then joined administrators in New York City to assure alumni that the quality of the education was not compromised by the response to the student protest. And, Rice recalls, President Richard Folsom called an all-campus meeting in the RPI Field House, where he surprised many people by expressing the empathy members of the administration had for the students’ reaction to the invasion of Cambodia.

“Coming of age during these challenging times has inspired me to do what I can to make the world a better place,” says Rice, vice provost for innovation and entrepreneurship at Worcester Polytechnic Institute.

The spirit of activism fanned out. Rick Hartt, who served on both the Executive Board and Student Senate, recalled students advocating for a more robust school of humanities, course evaluations, and a better library.

“When the Folsom Library was built, students were an integral part,” he says.

Later, the Union’s focus turned back to recreation and restoring school spirit. The Big Red Freakout was born and Grand Marshal Week regained its importance.

As much as anything else, Hartt says, the Union cultivates
leaders. He remembers decisions and events by recalling the students involved. Among them was an eloquent, and successful, argument by the 1985 PU, Tim Frosell ’85, who is now vice president of manufacturing for the Asia Pacific division of the Goodyear Tire & Rubber Company. Frosell advocated charging graduate students a lower activity fee than undergraduates.

“He used the analogy about the power supply,” recalls Hartt. “He says that they pay for the basic infrastructure but they don’t have the same participation because they’re focused on their research.”

When AnneMarie Ferraro ’90 became President of the Union in 1990, the campus was dry but there was momentum for a space to drink responsibly. The E-board was able to get approval for the pub that is located on the third floor of the Union building, but it was not easy. There was no appropriate (isolated) space available. So the student board had to do the legwork to build an enclosure—which entailed getting estimates on heating and water—before going to the Board of Trustees. The pub opened at the start of the school year in 1991.

During her tenure, the Union also put up flags representing different countries in the McNeil Room. The proposal met with concern that light would be blocked, and questions about which flags to include. In the end, the decision was made to choose flags representing the countries Rensselaer students come from.

“There were about 75 countries and about 40 spots for the flags,” says Hartt. “So they had to be rotated every two months.”

Even after completing her term, Ferraro worked another five years to take women’s ice hockey from a club to Division III.
When the squad ultimately took to the ice as a varsity team, she was assistant coach. Several years and many debates later, the team was elevated to Division I.

“I learned that as chair of the Executive Board, it was not my job to voice my opinion,” says Ferraro, who earned her bachelor’s, master’s, and Ph.D. in computer science at Rensselaer and is director of network operations for Alarm.com, which develops software for home security.

She also learned humility.

“I didn’t win the first time I ran for PU,” she says. “That also helped me realize that to succeed I had to separate me as a person from me as a candidate. It was a tough lesson to learn that not everyone is going to like you or what you have to say.”

It would not be easy to deny funds to a group of students anxious to highlight the proliferation of slavery and human trafficking around the world. So the E-board did not do so, instead letting the new organization know that it was not yet ready to be funded and that it had other options in the meantime for promoting its agenda.

“The anti-slavery campaign did not yet get funding—they have just started and so far only had six members,” explains Amarello. “Instead of saying no, we didn’t vote—so we couldn’t vote no. We said, ‘here is how we can help,’ and please contact us when you have events planned and we’ll help you get to the next step.”

Others who have worn the derby or top hat have learned that peer-on-peer governance is powerful, and sensitive. The E-board and Senate may hear from fellow students who are unhappy with the many steps they need to take to secure funding or set up an event. They may reject an applicant to an E-Board or Senate seat whom they will sit with in class. A thorny issue might come before them involving a close friend.

This happened to Amarello.

“Last year one of the rugby players backed into someone else’s car, in a Union rental car,” says Amarello. “She told the insurance representative but forgot to tell her [Union rep] and the rugby team was suspended from playing a tournament. It turned out to be my roommate! The rest of the board voted to let them play in the tournament. Because it was my roommate, I recused myself.”

Keeping matters businesslike is made somewhat simpler because the policies and rules are carefully drawn so officers don’t have a lot of personal discretion. Still, things can get tense when people are excited about their projects and ideas.

“Sometimes, people come in and they are really passionate that they have a chance to be a leader and make decisions. But they might not like a policy, and want to exercise their right to speak out,” notes Keraga, who remains calm.

“When they complain about the policies and defend their rights, I say, ‘guys, students created these policies—if you don’t like it, get involved and change it!’”
There is a strong movement in architecture toward sustainability in design, though what that means can vary from firm to firm and project to project. The industry sustainability standard, LEED, has fostered creativity in areas such as using sustainable materials, improving energy efficiency, and reducing waste. Yet few firms can combine design with science to radically change the way buildings behave.

That is the goal of the Rensselaer Center for Architecture, Science, and Ecology (CASE), based both in New York City and across multiple labs on the Troy campus. Director Anna Dyson, professor of architecture, explains that the problem of buildings’ environmental impact lies with the earliest concepts of shelter. “The birth of architecture coincided with the birth of fire-burning societies,” she says. “We began with shelters and enclosures around a hearth.”

Though they have evolved into complex structures with myriad functions, buildings have retained this basic arrangement. The “fire” has been centralized as a furnace, powered by burning (and polluting) fuel; impermeable walls protect against the elements. As a result, the built environment is an energy- and water-intensive hardscape imposed on the natural world.

At CASE, researchers and architects pose questions that upend historical expectations of buildings, all around how they can better interact with their environment. Students studying for their master’s of science and Ph.D. degrees in built ecologies consider these questions in real time, drawing from unprecedented access to industry leaders, big data, fabrication, technology demonstration projects, government research grants, and scientists and engineers at Rensselaer and around the world. In the process, they may address some of the world’s most pressing problems.

The CASE address in New York City—14 Wall Street—comes as something of a surprise. It is located in concrete- and stone-heavy lower Manhattan, where the only trace of modern design thinking is in the colorful Fermob tables and chairs scattered around the corner on Broad Street, inviting tourists and traders to lounge and catch lunch.

The address is actually that of Skidmore, Owings, & Merrill (SOM)—one of the largest and most prestigious architecture firms in the world. Eight years ago, SOM became partner to CASE, opening a
The Active Modular Phytoremediation System (AMPS) produces “fresh air” from within buildings by amplifying the air cleaning capacity of plants, reducing energy consumption and the size and cost of mechanical systems. Rendering shows AMPS system within a design for the DMC Tower, Seoul, Korea.
whole new world of industry- and data-access to Rensselaer while bringing strong new research capacity to SOM.

“Skidmore, Owings, & Merrill prides itself on a long tradition of innovation, originally in structures,” says Berardo Matalucci, a graduate student at CASE. “About 15 years ago, they expanded the innovation tradition to focus on sustainable technology and to become pioneers in both structure and sustainability.”

The elevator opens onto a sleek lobby with white leather Barcelona chairs grouped around a white marble coffee table. One side of the floor is dedicated to SOM architects, the other to CASE offices and studios. Tall windows capture what natural daylight filters down between the buildings. Sharply dressed men and women exit the elevator from time to time, or hurry past carrying rolled-up blueprints.

It looks like an architecture firm, but there are indications throughout that this is just as much a laboratory. Charts on the wall describe air flow around buildings, illustrate angles of sun radiation, and describe the rhizosphere—the microbial world of the root systems of plants. Installations of modular concentrating photovoltaic (CPV) structures are set up in hallways and in windows, looking like glassy honeycombs. On the floor next to one of them stands a Plexiglas cube, sealed with big red clips, that holds what looks like a houseplant, though its roots are exposed at the back. In another room, plants cascade out of openings in a white ceramic “wall.”

One sign lists the partners—the Department of Education, the U.S. Environmental Protection Agency, the U.S. Green Building Council, NYSTAR, New York State Energy Research and Development Authority, the American Institute of Architects, and the National Science Foundation—that indicate the level of investment in the task.

The research focus brings CASE to the first disruption of the traditional design process: Start with a sophisticated data analysis of environmental conditions. SOM and CASE recently put the philosophy to work to design P.S. 62, an elementary school on Staten Island. SOM and CASE architects won the competition by proposing a zero net energy building with a photovoltaic roof designed with the benefit of extensive data. It will be a first for an institutional building in New York, and a prototype for the U.S. Department of Energy.

A flat PV roof would not provide enough energy for the school—for one thing, it would capture the most sunlight in the summer, when school is out. The architects analyzed how the panels could be sized and organized to match what the data revealed about solar radiation throughout the day and across the seasons at the site. The resulting project will feature a sloping roof with many-sized panels adjustable to changing angles.

Evan Douglis, dean of the Rensselaer School of Architecture, explains that even this process, using existing technology, is transformative to architecture. “The old silo model of you design a building, then figure out performance as a post-critique is just antiquated,” he says. “This takes place in the genesis of the work.”

"THE OLD SILO MODEL OF YOU DESIGN A BUILDING, THEN FIGURE OUT PERFORMANCE AS A POST-CRITIQUE IS JUST ANTIQUATED. THIS TAKES PLACE IN THE GENESIS OF THE WORK." EVAN DOUGLIS

P.S. 62, an elementary school on Staten Island, will be the first on-site net-zero energy school in the Northeast. Shown above is the winning competition proposal and at right is the design after CASE did the calculations to see what it would take to make an institutional building of that size supply all of its energy needs directly from the available solar energy. It will serve as a prototype for future New York City Department of Education facilities.
CASE goes much further into developing technology and materials, leaning deep into the basic research being conducted every day at Rensselaer.

The CPV prototypes around the CASE offices are used to experiment with capturing solar radiation and converting it into heat, while also transforming it into thermal energy that can be used for cooling. Students and faculty analyze levels of thermal energy being received, indicated in part by the pressure through receiving pipes, according to the angles and shapes of the CPV cells. Stacked and modular, the prototypes are currently designed to be placed on a building’s façade or even, as in the CASE studio, installed in windows. There, they let the full sunlight in while capturing the solar radiation.

Yet these modules are not being developed as a final product. “They’re being developed as ‘evolutionary systems,’ ” says Dyson. “That is, they can evolve to accept new technologies such as more efficient cell types as they are developed.”

Those more efficient cell types may emerge from work being conducted at the Baruch ’60 Center for Biochemical Solar Energy Research at the Rensselaer campus in Troy. K.V. Lakshmi, associate professor of chemistry and chemical biology and the scientific director of the Baruch Center, is working to dramatically improve

The Integrated Concentrating Solar Facade (ICSF) is a building-integrated photovoltaic system that takes a dramatically different approach to providing interior space with electrical power, thermal energy, enhanced daylighting, and reduced solar gain.

With the ICSF, concentrating glass solar receptors are mounted on a tracking mechanism that responds to the sun’s position to maximize light gain. The kinetic receptors magnify and concentrate the incoming light on a small photovoltaic cell in the center of each receptor. The ICSF is also designed to capture thermal energy trapped by the glass receptors for use in the building’s heating and cooling systems.
solar energy by finding a way to mimic plants’ ability to convert sunlight into usable energy.

“I’d say I’m dedicated to unlocking the secrets of photosynthesis,” she says. “Really trying to understand the mechanisms of solar energy conversion reactions in nature and replicating them in artificial devices.”

Scientists say that life on Earth is solar-powered—all plants and some algae use photosynthesis to convert solar energy to chemical energy to sugars that power metabolic processes. Photosynthesis occurs in two stages with multiple steps: the light reaction stage and the Calvin-Benson cycle—also known as the “dark reaction” stage, since it’s conducted without the aid of light. During the light reaction stage, plants convert light energy to chemical energy by splitting water.

“It’s mind-boggling,” says Lakshmi. She explains that because water is a stable molecule, a lot of energy is produced when it is split—a driver of the development of fuel cell technology. But scientists still don’t completely understand how plants do it. If they could understand it, and eventually replicate it, it could revolutionize solar energy.

Light travels in electromagnetic waves—photosynthesis mostly occurs in the range of visible light, within the 400-700 nanometer (nm) band of the electromagnetic spectrum. Plants convert the light at about 96 percent efficiency. In contrast, most semiconductors with silicon work in the UV—200-300 nm—range, at about 10 to 12 percent efficiency.

“That efficiency could go up,” says Lakshmi. She and her team are working to “map out the step-by-step process of what plants are doing.”

For the moment, they’re primarily concerned with understanding the steps in the light reaction cycle. During that cycle, light energy excites electrons to move to another level, coupled with protons in a balanced way that keeps them from falling back, maintaining the momentum through multiple reactions. Scientists have yet to understand exactly how these multi-step “forward electron transfer reactions” occur in nature.

Mapping that process requires an interdisciplinary effort. It took “a couple of” years of weekly meetings between Lakshmi and researchers in the computational, physics, and lighting fields to understand how to build the highly advanced magnetic resonance spectrometers and develop quantum mechanical algorithms that would allow the scientists to try and witness photosynthesis in action.

“We try to slow the process down to see what is going on,” says Lakshmi.

The team is also looking ahead to what can happen when they do unlock the secrets of photosynthesis, including applying solar energy conversion onto buildings more directly. Lakshmi is already thinking about how to incorporate light-driven electron transfer onto graphene using photocatalysts, then layer it onto or disperse it into windows.

“How do you take this out of the lab? That’s where CASE comes in. That entire life cycle is unique to RPI. We do demonstrations in my lab, combined with fabrication, then manufacturing, all the way eventually to Anna Dyson,” she says. “We’re still doing basic research, with lots of unanswered
questions, but we can also now translate it into application—which adds creativity.”

buildings that breathe

This culture of creative application combined with science has led Dyson and others at CASE to wonder whether buildings could have thermodynamic capacity built directly into their “skin.”

The inspiration comes from evaluating the built environment in the developing world, where much of the surge in global development is taking place. “It’s a lab that’s available right now,” says Dyson. In the humid tropics, there are, ironically, nearly catastrophic water shortages, due to polluted agricultural runoff, salination of freshwater from the destruction of mangrove ecosystems, and concentrated human populations along the coastlines. Water scarcity in turn generates intensive energy use: In areas around Mumbai, larger building complexes need their own energy-intensive on-site water filtration plants. These problems won’t be limited to the developing world—Florida, for example, will soon be facing similar challenges.

Six years ago, the CASE team joined the 25-year redesign of the Mumbai International Airport, evaluating the highly detailed data sets on the environmental conditions the infrastructure would face. One of the biggest concerns was heat and humidity: Cooling and removing humidity accounts for 60 to 80 percent of the energy use in tropical climates. The analysis led CASE researchers to wonder whether they could develop a “skin” that could passively absorb the water from the air when humid and release it when dry. They imagined building envelopes integrating a water-absorbent material, maybe a hydrogel, that could perform this thermodynamic function.

But Dyson didn’t want to wait for materials science to develop something synthetic that they could try to adapt. “We thought it would be much better to work with brilliant chemists to come up with new materials systems that can meet the needed behaviors,” she says.

Rensselaer Chemistry and Chemical Biology Professor Linda McGown has thought about architecture all of her career—the architecture of molecules. She’s most interested in those, such as the nucleotides that make up DNA and RNA, that can form “reversible molecular aggregations,” or can get together in structures that can then come apart again.

McGown’s interest led to studying guanosine monophosphate (GMP), which has been known for over a century to form reversible gels under certain conditions. She and her team of graduate students discovered that when GMP is mixed with guanosine, the solution forms gels with what she calls “interesting” properties, including “reverse thermal responsiveness”—becoming liquid in the refrigerator, forming a gel at a high temperature—and that they could be “tuned” by adjusting factors like pH and salt.
The team then found that the GMP and guanosine gels “are excellent” at solubilizing single-walled carbon nanotubes individually, rather than in clumps, suggesting various additives could be solubilized to adjust the gels’ properties. Together, the discoveries meant the possibility of developing tunable hydrogels. “She got so excited,” says McGown of Dyson. “They’re purely aqueous, just molecules in water, with no organic solvents.”

McGown describes the objective of tuning the gels so they could absorb humidity when it’s hot and release it when it’s cool, while capturing excess water and filtering it to reclaim it. She speculates on the need for the capture and filtration system, and on how one would bind the gels to the building. “Then it becomes an engineering problem—having something that could be a thin coating, a thin skin, that could be contained in a porous material,” she says. “It has to be able to interact.”

That problem is being taken up at the Rensselaer Center for Biotechnology and Interdisciplinary Studies by Ryan Gilbert, associate professor of biomedical engineering, who is working to develop methods for freeze-drying and compositing the gels into device-scale components that are both inexpensive enough and rugged enough to be used in buildings.

The problem of finding strong, biodegradable, and what Lakshmi calls “Earth abundant” materials has brought CASE to develop a demonstration project in Accra, Ghana, on agricultural waste products. They’re experimenting with pressing natural resins in coconut waste byproduct at low heat—enough heat to make them structurally strong, but not so much that they cannot later be broken down—to create building materials and systems. The resin holds exciting possibilities for other products too—even computers could someday be swathed in coconut resin.

“We believe that emerging economies have a tremendous opportunity to leapfrog infrastructure,” says Dyson. “They often have much more ambition to capitalize on emerging scientific advances because they don’t have as much vested interest [that comes from existing infrastructure]. It’s a chance for them to develop technologies from within their own materials cycles.”

“MANY SCHOOLS OF ARCHITECTURE MAKE A CONSCIOUS, CLEAR DELINEATION BETWEEN ARCHITECTURE AND BUILDING SCIENCE; WE DON’T DO THAT.” EVAN DOUGLIS

putting the green in green

Though we’re aware of the need for heating and cooling, and for shelter from the elements, humans are largely unaware of the “microbial flows” that give us healthy air, and of the fact that they largely come from plants and soils.

CASE is serious about bringing plants into human-designed environments for microbial biodiversity. Central HVAC systems turn indoor spaces antibiotic, which is not good for human occupants. And urban areas are becoming increasingly sterile, as soils are disrupted by development. CASE research in the area of built environment “microbiomes” is led by Rensselaer microbiologist Cynthia Collins, associate professor in chemical and biological engineering, who argues buildings need to be “probiotic,” bringing in the world of microbes found in the root systems of plants.

CASE designed the “plant wall” prototype that would “bioengineer the root environment,” taking up carbon dioxide while releasing oxygen and water vapor. Eventually the plants may also help break down the volatile organic compounds (VOCs) that come from off-gassing from sources such as office equipment, carpeting, and glues.
This plant-engineered air filtration system will soon be put to the test in a new building planned in the Bronx: a New York City emergency communications center called PSAC II. A model of PSAC II shows a small, gray, nearly windowless box surrounded by a parking lot with a few trees. One of the building’s main requirements was to be able to provide a continued fresh air environment in the event of an external catastrophe—terrorist attack, nuclear meltdown like Fukushima—that required staffing but would be closed from outside influences for days or even weeks at a time. Keeping humans alive in closed environments has been the purview of NASA, with whom Collins has collaborated, but has not yet been widely applied to Earth-bound situations.

architecture for the skin

Alexandra Rempel, assistant professor of architecture, has always been interested in the unseen flows that give life to enclosed spaces. Years before becoming an architect, as a biology Ph.D. student at MIT, she first studied biogeochemical cycles of nitrogen, arsenic, and carbon in diverse environments. She would later set up passive solar design experiments up and down the West Coast while noticing the slight changes in climate that affected yields on her home farm. All of this prepared her for teaching the questioning, observant, interdisciplinary work of built ecologies.

Sitting in the café at EMPAC, a crown jewel of the Rensselaer campus for its striking design and breakthroughs in acoustics, Rempel offers a critique of the building’s thermodynamics.

“Here we are encapsulated in a mechanically conditioned bubble,” she begins. “Even though it’s breezy outside, perfectly beautiful—it’s the perfect temperature and humidity—there is no mechanism to let that in in a controlled way.”

This is what Dyson and the CASE team like to call “architecture for the skin” rather than “architecture for the eye.”

Rempel points out that air flow used to be designed into buildings before central heating and cooling, and gives as an example the traditional turn-of-the-20th-century building that houses the School of Architecture. In one experiment, Rempel gave students wind meters and had them walk around opening and closing the enormous doors and windows, determining which combinations encouraged the best aeration.

“At one point, we had a lively breeze going,” she says. “Dean Dougls walked in and said, ‘It really feels nice in here!’”

The students got into it, says Rempel. “I see them walking around with their meters.” Back at her office, she pulls one out, a rectangular device with a tiny fan embedded at one end. She holds it up against one of her huge windows with a four-foot sash. “Yeah, that’s about a mile an hour.”

She pulls out a slim volume, called Thermal Delight, about designing for air and temperature. “I asked my students, ‘Should this be a design element?’” The class concluded there shouldn’t be thermal distraction, but that it is important to design for thermal experience, using the sun and wind available at the site.

the design ecosystem

All of these considerations must somehow come together in the design process. “We have very multivalent criteria for a building’s performance, including environmental, cultural, and social parameters—like the need for informational exchange, the importance of aesthetic patterning, privacy, and comfort levels for temperature, view, or glare,” says Dyson. “These criteria change situationally.”

The CASE offices in New York create a physical nexus between academia, industry, and demonstration projects. Collaborating students from the Schools of Architecture, Engineering, and Science benefit from this level of access and the CASE approach.

“Many schools of architecture make a conscious, clear delineation between architecture and building science; we don’t do that,” says Dougls. “Students who come here, from my perspective, get the best of both worlds, and they are in a position to assert themselves in a far more ambitious way when they get out into the world. They see there’s a whole set of perspectives that need to be managed simultaneously.”

If the 19th and 20th centuries were about conquering the natural world, the 21st century may be about trying to take our place within it. Around the world, new buildings are going up alongside existing infrastructure. If you ask the people at CASE, we need to make them—in the middle of the soot and the stone and ancient HVAC systems—something closer to living, breathing things.
As more companies recognize the value of data analysis, new graduate programs at the Lally School are preparing students for leadership roles in industry.

The Lally School of Management’s new master’s program in business analytics was an easy sell for Christopher Low ’12. Low dreamed of working at IBM, and he knew that exposure to the company’s proprietary SPSS Modeler, a predictive analytics platform, would greatly increase his chances for getting a job there.

The business analytics program provides students with the firsthand experience and knowledge required to succeed in analytics jobs spanning a range of industries. This spring, the program added a new Predictive Analytics With Social Media course in which students used IBM’s SPSS Modeler for predictive analytics and IBM Cognos Insight for dashboards and visualization. The program also works with IBM in some of its research initiatives.

When graduation neared, Low was courted by three companies. He was excited when IBM made the first offer.
said the dearth of skilled people in the industry that big data plays in maximizing operations and gaining an edge on the competition, the need for skilled data mining, analytical processing, and data-reporting professionals is far outpacing supply. Business analytics and supply chain management, the two newest master’s programs at the Lally School, respond to the need for qualified individuals.

Low started working at IBM Global Business Services in New York City in August, where he is part of the company’s Consulting by Degrees leadership and development program. As part of the two-year program, he is assessing the technology and business intelligence needs of IBM clients. Then, using the data he mined, Low works with his clients to find more cost-efficient and productive ways to operate.

Increasing numbers of corporations rely on big data to address their challenges, and new applications for this specialized work are evolving every day. These data sets, which are too large or complex to manipulate using standard methods, were collected for years but never analyzed because industry, government, and philanthropic organizations lacked the tools and business intelligence to interpret them.

Today, that same data can now identify causes of diseases, predict a customer’s next purchase, and better manage a manufacturer’s flow of goods and products. As more companies recognize the vital role that big data plays in maximizing operations and gaining an edge on the competition, the need for skilled data mining, analytical processing, and data-reporting professionals is far outpacing supply. Business analytics and supply chain management, the two newest master’s programs at the Lally School, respond to the dearth of skilled people in the industry.

The skills that we’re learning place us in the center of a hot job market. What I love about the program here is that the professors who teach it are so passionate about the field,” says Ocampo. He is earning his master’s over three semesters while working part-time at the university, and plans to work as a data scientist when he receives his degree.

“Companies need to be making data-driven decisions. It’s not a competitive decision anymore. You have to do it.”
for us to be relevant in the market,” says Ocampo. “Companies need to be making data-driven decisions. It’s not a competitive decision anymore. You have to do it.”

In time, Ocampo wants to earn a Ph.D. in predictive analytics, an advanced branch of data mining that uses historical and transactional information to make predictions about future events and identify business risks and opportunities.

Opportunities for well-paying positions in big data are widespread, mainly because the pool of professionals being trained for these specialized jobs is so small.

By 2018, the country will face a shortage of 190,000 people with the analytical skills necessary to interpret big data, and an even greater shortage—1.5 million—of managers and analysts able to use those interpretations to make effective decisions, according to McKinsey Global Institute, the business and economics research arm of global management consulting firm McKinsey & Company.

Indeed.com, one of the largest online employment sites, lists more than 56,900 available openings for “data scientists” in the United States at such corporate giants as IBM, Amazon, Booz Allen Hamilton, Bloomberg, and General Motors.

**VALUABLE PARTNERSHIPS**

This gap leaves Lally’s new programs poised for growth. “What we’re doing right now is cutting edge. One of the many advantages here is that it’s a tech university with great data resources. We are more quantitative than other business schools, which makes us a really good fit for this program,” says Dorit Nevo, associate professor and academic director of the M.S. in business analytics program. “Add our strong network with corporations, and we really play all fronts here.”

She says Rensselaer’s unique resources, such as IBM’s Watson computer system, the Advanced Multiprocessing Optimized System (AMOS) supercomputing system, and the Center for Computational Innovations, as well as its relationships with private industry, help to distinguish business analytics as a niche program.

The university’s long-standing partnerships with corporations such as IBM, General Electric, GlobalFoundries, Microsoft, Boeing, AngioDynamics, and others allow students to solve real problems that can impact a company’s efficiency, revenue, and bottom line.

For example, Christopher Low and his team used IBM’s SPSS Modeler, a software program that helps companies make predictions based on large volumes of data, to predict sales of lead batteries for cars and trucks for a leading battery manufacturer.

Low’s undergraduate industrial engineering degree had landed him a position researching the health-care and utilities industries for Imprenta, a public sector marketing company in his home city of Los Angeles. That brief experience ignited a passion for big data and a desire to improve his business skills.

Initially, Low had doubts about his programming abilities, an essential skill for manipulating data for some of the business analytics courses. But, he says, by employing the problem-solving techniques he learned at Rensselaer, he practiced on the software for two or three hours a day. “It was a steep learning curve, but I got an ‘A’ on the test,” Low says.

Rensselaer’s M.S. in supply chain management program looks at strategies and techniques to manufacture and move goods effectively. The skills that students develop through the program prepare them for careers in procurement, logistics management, general manufacturing operations, and consulting. Potential employers range from traditional manufacturers and retailers to specialty consulting firms and transportation service providers.

This year’s graduates found jobs with Price Chopper, L’Oreal, Connecticut Natural Gas, and Ketra, a digital lighting company in Austin, Texas.

Among them is Christian Griffin ’13. Griffin is a project engineer for L’Oreal in Piscataway, New Jersey, where she interned for two summers while attending Rensselaer. Her job with L’Oreal, the world’s largest cosmetics company, involves identifying ways in which the company can reduce costs and improve efficiencies on the manufacturing floor. Griffin identifies these shortcomings by analyzing company data, then she uses the information she mined to develop strategies for improving L’Oreal’s manufacturing and distribution processes.

“Taking supply chain management is one of the best decisions I made. I did some research and learned that this is a growing sector. That kind of sealed the deal for me,” says Griffin. The co-terminal graduate from the Bronx earned her bachelor’s in industrial engineering and master’s in supply chain management in five years.

Rensselaer’s reputation and its partnerships with high-level companies give students like Griffin access to employment resources that they may not have elsewhere. Approaching graduation, Griffin received job offers from three companies in addition to L’Oreal. United Technologies Corp., W.L. Gore & Associates, and medical device-maker AngioDynamics, where she completed her capstone project, all offered her positions.

Griffin also appreciated the intimacy of a smaller class, and its strong focus on soft skills. “Professional development is a big part of RPI anyway, but it was great that the first half of our capstone project focused on working with different personalities, where we learned the best ways to respond to conflict, and how to negotiate.”

Job projections in the supply chain sector certainly support Griffin’s decision to pursue a career in this fast-paced field. Demand for supply chain professionals is expected to grow 26 percent between 2010 and 2020, faster than the average for all occupations, according to the U.S. Bureau of Labor Statistics.

And those with master’s degrees will command much higher salaries, according to the American Production & Inventory Control Society. The organization, with 40,000 members, reports that supply chain managers with graduate degrees earn 36 percent more than those with bachelor’s degrees.

**BIG JOB GROWTH IN SUPPLY CHAIN MANAGEMENT**

T. Ravichandran, professor and director of Rensselaer’s supply chain management
program, says employment growth in the sector will continue to balloon as more companies recognize the essential role that effective supply chain management plays in bringing the right products in the right assortments at the right cost to the right markets in an increasingly global economy.

“Companies today have a large number of partners who manufacture for them, and it’s becoming more difficult to coordinate the flow of goods across the supply chain,” Ravichandran says. “Supply chain management has become a very critical capability that companies are keen on acquiring and doing well at. There is a growing need for professionals trained in this area.”

Coordinating logistics is especially important to the Northeast, where much
of its economic growth depends on connecting its abundance of small manufacturers to larger global companies. These small companies need access to supply-chain experts who can help them identify potential new business.

“Regionally, there is a push to see how well small manufacturers can connect to the larger network of companies that need things supplied to them,” Ravichandran says.

“We need to create an infrastructure that connects them with the larger ecosystem, allowing these local companies to network globally.”

As more companies recognize the value of data analysis in cutting costs, improving operations, and expanding into global markets, enrollment in these two leading-edge programs at Rensselaer is gaining momentum.

Supply chain management enrolled four students in 2013 and doubled enrollment to eight this year. The program has a goal of 20 students in 2015. In its first year in 2013, business analytics enrolled 23 students, some of whom graduated in May 2014 and others who graduated in December. It enrolled 23 this year and will grow in proportion to its resources.

**SPREADING THE WORD**

Currently, much of the interest in these two new degree programs comes from engineers looking for a career change and Rensselaer undergraduates. But Begley says university officials are reaching beyond the immediate community to spread the word.

“It’s always a challenge letting the rest of the world know you have these programs, but we are working intensively to get the news out,” Begley says. As such, those involved are engaged in activities like visiting graduate- and student fairs and promoting the new advanced degrees at colleges where big data and business studies are a logical next move for their graduates. Begley expects that some of the best endorsements will come from Rensselaer graduates, who, by virtue of their strong preparation, will make strong impressions when they move into management positions.

2015 will be the first year that business analytics will require a capstone course. Capstones, critical components of many Rensselaer graduate programs, involve students in problem-solving issues for a company. Nevo is finalizing projects with Boeing and the Icahn School of Medicine at Mount Sinai.

Ravichandran can speak to the importance of these partnerships, both for the companies and the students. “Students get to handle significant problems for which a company would otherwise hire a consulting team or deploy their own people. They help find solutions to issues that are often priorities for these companies,” Ravichandran says.

Last year, supply chain management students did their capstones with AngioDynamics and GlobalFoundries, the large computer chip manufacturer in Malta, New York.

The two students assigned to GlobalFoundries for their capstone worked with teams in Malta and, remotely, with staff in Dresden, Germany, to redesign a supply-rating process across GlobalFoundries’ three locations.

Christian Griffin and Angelo Polanco worked with a team at AngioDynamics to reduce the manufacturer’s stock keeping units, or SKUs. “The goal was narrowing inventory to reduce the cost of their goods,” Griffin explains. “We helped them identify what key products they should keep in their portfolio.”

Griffin points to the job offer she received from AngioDynamics, her capstone partner, as proof of the impact that a student can make in a temporary role at a company. “It definitely made me more marketable,” she says.

She also valued feedback that the pair received from a board that reviewed and critiqued their final project. The board was comprised of Rensselaer alumni who work in the supply chain field.

Vienna Yee ’14 is in her first semester of the supply chain management program. A student in Rensselaer’s combined bachelor’s/master’s program, Yee will balance her undergraduate degree in chemical engineering with the business skills she learns at Lally, skills that will better position her for a management job.

“I think I’m really fortunate. I already have a lot of opportunities as a chemical engineer,” says Yee. “But by getting into the supply chain sector, I could work someplace like New York. This should position me well, and hopefully allow me to use my master’s degree to get a job in management in two or three years.”

Most people view the supply chain field as limited to transportation and
logistics, Yee says, but the career opportunities in the sector are much greater. For example, she is intrigued with the connection between product sales and a person’s lifestyles, and may pursue that career path when she begins her job search. “It’s about more than just scheduling things and holding inventory,” Yee says.

These new programs build on the success of the master’s program that is now a major component of the Lally School. In 2008, the school offered an MBA and an M.S. in management. Degree opportunities expanded in 2009 with the introduction of M.S. programs in quantitative finance and risk analysis, and technology commercialization and entrepreneurship.

The business analytics and supply chain programs launched in 2013. Today, Lally, in its 50th year, enrolls 300 undergraduates and 200 graduate students.

Lally’s growing master’s program marks a significant milestone for Rensselaer. The degrees support the university’s focus on technology, innovation, and quantitative skills, while teaching the business skills that prepare students for roles in technical management. An undergraduate degree in a STEM field combined with a master’s in management or business is a powerful tool in the job market, Begley says.

“Six years ago we only offered an MBA and a master’s of science in management, both generalist degrees. Now, we offer six different degree options at the graduate level, four in specialized areas,” Begley says. “Expanding our offerings gives a broader array of fields to contribute to, in areas that are naturally suited to our strengths.”
Celebrating 150 Years of Zeta Psi
Chapter to mark occasion in April | By Jim Ljunglin ’57

Zeta Psi Fraternity, the third of five fraternity chapters formed at Rensselaer as the Civil War was ending, marks its sesquicentennial on January 13, 2015. Theta Xi and Delta Phi passed this milestone in 2014 and the Rensselaer Society of Engineers (RSE) will do so in 2016. (The fifth, Delta Kappa Epsilon, established in 1866, has been active since 1965, and is now working to return.)

As was usually the case with fraternity expansions, the Pi chapter of Zeta Psi developed from connections Rensselaer students had with friends and relatives at other colleges. Satterlee Arnold, Class of 1866, the first charter member, had a cousin in Zeta Psi at Brown. Zeta Psi alumni of other colleges who lived in the Capital Region also played roles in organizing the group and securing approval of a charter from the national organization, including alumni of Penn, Brown, Colby, and Union.

The total Rensselaer student body averaged fewer than 200 in the late 1800s, so the fraternities were also small. Eight to 12 Zeta Psi brothers were typical, and they rented quarters at 11 Second Street, a building that still stands today. Fraternity members participated in the lively student scene, providing leaders to the student organizations, including Grand Marshals, as well as to the Zeta Psi Grand Chapter, with some acting as presidents. They led in making Zeta Psi the first fraternity at the newly opened Cornell.

The chapter provided an interesting multicultural aspect to campus, with its many Latin American members. This reflected students coming to Rensselaer from that part of the world to study civil engineering, and particularly the railroad industry, which was growing rapidly.

By the 1890s, eight fraternities in the small student body were too much to sustain, and Zeta Psi deactivated. The Pi chapter charter was returned to the Grand Chapter to await better days—which arrived a half century later in 1951, in the flush of fraternity growth after World War II. Eleven 19th-century Rensselaer Zetes, including brothers in Cuba and Peru, were still living to witness the reactivation. The restored Zeta Psi joined the Pawling-Pinebush group of fraternities, where it has been resident now for 63 years.

Zeta Psi has continued to provide leaders in Rensselaer government, athletics, publications, and the Zeta Psi Grand Chapter, providing two presidents in recent decades—Jim Ljunglin ’57 and Lauck Walton ’84. Brothers also include former president of the Rensselaer Alumni Association Jay Webb ’61 and the chair of the Rensselaer Board of Trustees, the Honorable Arthur Gajara ’62.

With the anniversary date falling during winter break, the celebration weekend will be April 24–26 on campus and in Albany. Zeta Psi alumni have chosen, as an anniversary gift to the Institute, to fund the conversion of underused space in the Folsom Library for activities that student groups have requested.

21 An Evening With Rensselaer Alumni Hall of Fame Member Steve Sasson ’72, ’73G. Sasson, inventor of the digital camera, will speak at the George Eastman House Museum of International Photography about his role in inventing digital technology. For more information, contact Kathy Kinsey at kinseyk@rpi.edu or (518) 276-2832. #RPibridgesto2024.

24 Mayor’s Cup Men’s Hockey Game at Times Union Center. Albany, Join fellow hockey fans as RPI takes on Union in this annual crossover rivalry game. For more information, contact Peter Pedone at pedonp@rpi.edu or (518) 276-6061.

7 Alumnae Hockey Weekend. Women’s ice hockey alumnae are invited to return to campus for the alumnae game, women’s varsity hockey, and more. For more information, contact Peter Pedone at pedonp@rpi.edu or (518) 276-6061.

14 Big Red Freakout Ice House. This annual hockey tradition takes place at the Heffner Alumni House, and includes a buffet dinner, face painting, and more. Take the shuttle to the Houston Field House, then return post-game for a dessert reception with the team and coaches. For more information, contact Peter Pedone at pedonp@rpi.edu or (518) 276-6061.
NOMINATE A DESERVING VOLUNTEER FOR AN RAA AWARD

Do you know alumni or alumnae whose volunteer work for Rensselaer is worthy of recognition? Nominate them for one of the Rensselaer Alumni Association's annual awards! The awards program recognizes alumni contributions in every area of volunteer work. For criteria and information on how to submit a nomination, visit alumni.rpi.edu/RAAawards, or contact Joyce Kelly Martin at martij@rpi.edu or (518) 276-6208. Nominations are due May 1.

GET SOCIAL WITH THE RAA

For links to chapter and affinity group social media accounts and information, visit the RAA’s social media page—alumni.rpi.edu/social. The page will keep you connected with fellow alumni across a range of social media platforms.

RAA BOARD OF TRUSTEES SEeks NEW MEMBERS

The nominations committee of the RAA Board of Trustees is accepting nominations through the end of February for the upcoming RAA Board of Trustees year. Nominate yourself, or a fellow alumnus or alumna. Typical terms last from one to three years. The RAA Board helps plan programs and services for alumni, and serves to represent alumni interests to the Institute. If you are interested or have questions, contact Joyce Kelly Martin at (518) 276-6208 or martij@rpi.edu.

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 AWARD PROGRAM

RAA Supports Inaugural Red & White Emerging Leader Award

In 2013, the RAA established an endowment to support the programs and needs of alumni and students. This year, the endowment has funded an annual cash award to be given to a rising junior or senior who is a member of the Red & White Student Organization. The recipient of the inaugural RAA Red & White Emerging Leader Award is Elise Budd ’15.

“We recognize Elise for her dedication to strengthening the student and alumni communities, and for her exceptional leadership and commitment to the RAA’s mission,” said Jeff Schanz, assistant vice president for alumni relations.

Budd has been an active member of Red & White since her freshman year, and has served in several leadership capacities. She is a Student Orientation adviser and coordinator, a co-founder of weR—The Spirit of Rensselaer Society, a member of RPI TV, and active with her sorority, Alpha Omega Epsilon.

For more about the RAA Award Program, visit alumni.rpi.edu/raaawards.

BRING OUT YOUR RED!

4th Annual RPI Spirit Day, February 13

Get ready to show your Rensselaer pride on Friday, February 13, during the fourth annual RPI Spirit Day celebration. Simply wear or display your Rensselaer gear wherever you may find yourself that day, snap a picture, and share it via your favorite social media with #RPISpiritDay.

In addition to sharing your pride with the world, you may meet someone at your place of business, school, or in your community that you did not know was also an alumnus or alumna!

Tout your connection to the ‘Tute on RPI Spirit Day! Visit the website for more details and images to download—alumni.rpi.edu/spirit!

MARCH

14 Men’s Hockey Alumni Weekend. Men’s ice hockey alumni are invited to return to campus for the traditional alumni hockey game, men’s varsity hockey, and more. This year, we will celebrate the 20th anniversary of the 1995 ECAC Championship Team and the 30th anniversary of the 1985 NCAA Championship Team. For more information, contact Peter Pedone at pedonp@rpi.edu or (518) 276-6061.

14 Women’s and Men’s Basketball Alumni/ae Weekend. Women’s and Men’s basketball alumni/ae are invited to return to campus for their respective annual alumni/ae games and varsity games—including a celebration to recognize the retirement of Head Coach Mike Griffin. For more information, contact Peter Pedone at pedonp@rpi.edu or (518) 276-6061.

3 Alumni Reception at Game Developers Conference. San Francisco, Calif. Network with other alumni in the field at this exclusive annual event. For more information, contact Kathy Kinsey at kinsek@rpi.edu or (518) 276-2832.

APRIL

An Evening with President Shirley Ann Jackson. Harmonie Club, New York City. Join area alumni for a reception with President Jackson. For more information, contact Kathy Kinsey at kinsek@rpi.edu or (518) 276-2832.
39

Betty Sonneborn was studying English at Wellesley College in 1942 when she was recruited for wartime work. She was one of 100 women sent to Rensselaer for training, after which she worked at the Curtiss-Wright airplane plant. Betty Sonneborn was studying English at Wellesley College in 1942 when she was recruited for wartime work. She was one of 100 women sent to Rensselaer for training, after which she worked at the Curtiss-Wright airplane plant.

Robert Cross and the Air Medal. After the war he worked in Reston Recreation Associates and in Software Engineering Technology. After a third retirement to the NASA facility. He worked as an engineer and executive at IBM. After retiring he was a founding partner of the Curtiss-Wright airplane plant.

43

The Albany Times-Union reported that the bad weather in July in Longmeadow, Mass. (near Springfield) caused the tree to fall on city property so it did not cost Dick anything. Fortunately, Dick is now over 96 and has the ailments of a senior that age.

44

A pilot in WWII with service in the China-Burma-India theater, he earned the Distinguished Flying Cross and the Air Medal. After the war he worked at the Langley Air Force Base, which later became a Hedstrom.

45

Dick Trepp's daughter, Arnold Beckardt, sent the following excerpt of a column about the Class of '45 reunions:

Class Notes

Alumni who attended Reunion & Homecoming
Weekend in October enjoyed a live chat with astronaut Reid Wiseman ’97, who was serving aboard the International Space Station.
Worlds on Display

HASS seeks to explore life’s enduring questions within the context of contemporary culture. | BY MARY SIMONI

For the more than 1,200 new students who arrived on the Rensselaer campus this fall, the first day of classes was filled with instruction: where to sit, which books to buy, and what homework to complete.

For nearly half of those first-year students who were enrolled in a new slate of first-year courses within the School of Humanities, Arts, and Social Sciences (HASS), the semester instead began with a question: Just because we can, should we?

That question serves as the touchstone for discussions of ethics, morality, technological progress, and the evolution of socio-economic values in these new and highly varied courses.

Perhaps more so than in any other school within Rensselaer, the students and faculty within HASS seek to explore life’s enduring questions within the context of contemporary culture. Our raison d’être is to guide the next generation through the tangled milieu of social issues that arise from our own humanity and human engagement with technology.

These new HASS Inquiry courses—nine of which were offered during the fall semester—lay the groundwork for a huge swath of the first-year students across all disciplines to see the world in a new way and approach problems from a humanities perspective.

The HASS Inquiry courses take the form of traditional classes and are then intensified through field study, sharpened by the use of technologies, reinforced through engagement with guest speakers, and contextualized through discussions.

Worlds on Display, one of the HASS Inquiry courses, explores the human spectacle of technological innovation and the cultural implications of exhibition with an intensive study of world’s fairs. This course, led by Professors Tamar Gordon and Rebecca Rouse, gives rise to potent lines of inquiry about the social import of such fields as technological innovation, cultural anthropology, media archeology, and architectural history. Students gain firsthand experience of the historic, global spectacles that were the 1939-40 and 1964-65 world’s fairs by conducting field study at the site in Queens. Though most of the architectural marvels of New York’s world’s fairs have fallen into shambles, students experience the marvels of those moments in history by developing augmented reality applications. The apps allow them to experience this piece of cultural heritage through immersive experience allows students to see the world through the eyes of earlier generations.

In a suite of three HASS Inquiry courses focused on The Wire—an HBO series set in Baltimore that portrays the intermingling of the illegal drug trade, the criminal justice system, media, and government—students use the acclaimed drama as a jumping-off point to explore issues in public health and government. In these courses—Public Health and the War on Drugs, Justice and the Media, and Social Problems and The Wire—students are confronted by questions dealing with drug policy and public health policy; the portrayal of humanity in criminal justice, social services, education, and government systems; and how gender and racial inequality intersect with electoral politics and urban development.

HASS Inquiry evolved from the First-Year Studies program, which used a trans-disciplinary approach to allow students to examine social phenomena such as world religions, economic globalization, human identity, and the culture of technology from multidisciplinary perspectives. HASS Inquiry has embraced the essence of First-Year Studies and extended it through pedagogical innovations like the augmented reality applications as well as flipped classrooms, online learning communities and discussions, and blended learning.

HASS Inquiry faculty also work with Student Life staff to leverage CLASS—Clustered Learning, Advocacy, and Support for Students—and create a seamless, holistic, living-learning experience. For example, students enrolled in The Wire courses screen the show in the residence halls as a group, accompanied by resident staff.

What makes the HASS Inquiry so significant is that the opportunity is offered to most first-year students at Rensselaer, thereby laying the foundation for each student to experience personalized growth in the humanities, arts, and social sciences at a critical juncture in their lives. As we prepare the leaders of a diverse global community, let us nurture and cherish the joy that is born from curiosity, discovery, and imagination.

Mary Simoni is dean of the School of Humanities, Arts, and Social Sciences at Rensselaer.
Rensselaer students expect the world to be radically transformed in their lifetimes, with the pace of change accelerating. Futurists tell us they will need to reinvent themselves in their careers. Like our alumni and alumnae before them, our students understand their lives will be full of surprises that will demand flexibility and dedication.

The Rensselaer community is committed to preparing this next generation for disruptions and opportunities, providing the capabilities, perspectives, communications skills, and values that will enable them to lead transformation, with understanding, daring, and judgment.

The Rensselaer Annual Fund helps to provide a world-class educational experience to our students, helping to prepare them to meet the demands and challenges of the 21st century. Gifts to the Rensselaer Annual Fund are essential to this mission.

Please join us in supporting our students with your gift to the Rensselaer Annual Fund. Give.rpi.edu/future.
EMPAC is Rensselaer's international hub for contemporary art, performance, science, and technology. This dynamic center offers adventurous public events and performances in dance, theater, music, and the visual arts throughout the year. EMPAC is also a space where artists and researchers engage in new creative practice through its residency program.

For information on these and other upcoming events, visit empac.rpi.edu.