THE FUTURE IS HERE

PRESIDENT SHIRLEY ANN JACKSON MARKS THE FIRST FIVE YEARS OF THE RENSSELAER PLAN, PROMISING, “THE BEST IS YET TO COME.”
SCULPTOR'S HANDS—Professor Larry Kagan ’68 joined the faculty at Rensselaer in 1972 to help establish an arts department. He’s been here ever since, as a sculptor teaching art to artists and engineers. Today, Rensselaer offers approximately 65 different arts courses a year.
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When a street was named in September in honor of Garnet Douglass Baltimore, Class of 1881, the City of Troy and Rensselaer celebrated the life and legacy of a trailblazer.

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Moving?
Please let us know your new address. Update it electronically on AlumServ, e-mail us at alum.mag@rpi.edu, or write to: Rensselaer Magazine, Office of Communications, Rensselaer Polytechnic Institute, Troy, NY 12180 or fax to (518) 276-3715.
“At the time of this game, the National Field Hockey Coaches Association Poll had recognized Ursinus College as the No. 1 team in the country,” says Coach Bridget LaNoir ’99. “With the odds stacked against us, we entered the game well aware of what we needed to accomplish.

“It doesn’t happen everyday that everything comes together as you plan. We had experienced a difficult run this year with a stretch of inconsistent play. On this Monday in October on the field against Ursinus, we glimpsed the light at the end of a tunnel that had been dark for so long. The players moved without fear, without hesitation. They stepped up their game and began to play at a level which both they and I knew was possible.

“During games such as these, for just a moment, I take pride in my place on the sideline as their biggest fan. As a coach, you know the level at which each player on your squad is capable of on any given day. You work from day one to help each excel on and off the field in hopes of drawing out that potential from them. Although we lost the game, for the team to display this potential working as a single entity against an opponent who entered the game ranked No. 1 in the country, our team was able to experience success.”
The Rensselaer Plan reaffirms a core commitment to the undergraduate experience

Raising the Level of Living and Learning

The Rensselaer Plan marks the fifth anniversary of the launch of The Rensselaer Plan, which has guided the unprecedented transformation of the Institute and propelled it to new heights of achievement and prominence (see page 16). While the plan is “evergreen” and evolving, it also serves as an impetus for even more ambitious initiatives. With a record of solid accomplishments under the plan in research, programs, and facilities, the focus now turns more sharply on the overall undergraduate experience.

With this in mind, we have launched a new initiative: The Undergraduate Plan. This plan signals a major commitment to raise the level of the undergraduate experience at Rensselaer. Through the manifold elements of the plan, we will strive to create a living and learning environment to rival the best in the nation. Already through the implementation of The Rensselaer Plan, there have been significant changes at the Institute that have made the undergraduate experience livelier and more engaging. The Undergraduate Plan will build on this momentum as it will reach into myriad facets of the student experience at Rensselaer.

The plan encompasses academics, student life, and all the elements to serve the undergraduates of the future. First, we are committed to offering challenging, engaging, and highly relevant academic programs which combine theory with hands-on experiences. An exciting element of this will be an increased rate of participation of undergraduates in research with faculty and graduate students. Today, about 30 percent take part in research activities; the plan calls for an increase to 80 percent over the next five years. Hand in hand with this goal is the focus on preparing students to be global leaders through increased opportunities to study at universities around the world and to participate in international co-ops and internships.

The plan also builds on the strides made by the First-Year Experience program, which has made hundreds of Rensselaer students feel part of this community from the moment they arrive. Student retention and success begins in the critical first year. Thus, the plan expands upon programs and activities that ease the transition to university life, including enhanced and strengthened residential life programs, such as theme houses and affinity groups; academic Early Warning System and Early Intervention teams to keep students on track and succeeding in their studies; and programs and services to support student health, safety, and well-being.

Athletics are an important component of the undergraduate experience addressed by the plan, as more and more Rensselaer is attracting talented and smart student-athletes. Moreover, the plan includes ambitious projects to serve the more than 5,000 undergraduate and graduate students who play sports each year. Plans to upgrade athletic facilities will focus on what is called the East Campus Athletic Village, which will include a new athletics support facility, an additional artificial turf field, a basketball arena, natatorium, and a field house for indoor sports, including indoor track and field.

Finally, we must focus on the undergraduates of the future. It is clear that unless new groups of students—women, underrepresented minorities, and students with disabilities—enter technological fields in greater numbers, we will not have enough engineers and scientists to continue our national capacity for innovation and discovery. The Undergraduate Plan is addressing this and other elements of the “Quiet Crisis” by establishing a plan, led by the Division of Student Life, to increase the diversity of our student body, the pool of applicants to the Institute, and our national visibility by building relationships with a variety of national “pipeline” programs preparing students who might not otherwise attend college.

This initiative is in the early stages of planning, study, and implementation. Given its far-reaching goals, the support of all members of the Rensselaer community is crucial to its success. To move the plan forward, Prabhat Hajela, vice provost and dean of undergraduate education, is working across all portfolios to expand academic programs in targeted areas. Provost G.P. “Bud” Peterson is working with deans, department chairs, center directors, and faculty to ensure that the Institute has the capabilities to achieve the plan’s goals. Meanwhile, Vice President for Student Life Eddie Ade Knowles is focusing on the myriad aspects of the student experience.

With the mounting challenges of the 21st century, we can do no less than to prepare our students fully and broadly to lead in a complex, technology-based global future. The Undergraduate Plan represents Rensselaer’s strong commitment to providing a world-class undergraduate experience that will continue to attract talented and promising young people who will change the world.
Colorful Memories of Rensselaer

I just read the article on Richard Herbert ’83, president of Pantone Inc., the leading developer of color measuring systems. This reminded me of my own experiences with color science at RPI.

When I was a senior chemistry major, with a not-too-great GPA, I decided I needed some sort of puff chem course to bring my grades up. An introductory course in Color Science taught by Professor Fred Billmeyer seemed just the class to take. I had survived his class in Polymer Science as a junior and he seemed pretty easygoing, so I signed up. I had no idea what Color Science was.

Amazingly, the course proved one of the best I ever took, and certainly one of the most fascinating. Though I never worked in the field, I still remember most of the precepts, and have always been glad I took the class.

The late Professor Billmeyer (he died in 2004) brought to class several key attributes, including a brilliant mind and the experience that came from literally inventing the field. He really wrote the book and we all couldn’t wait to see him enter the class—but not for the reason you might imagine. He was a living example of color science in action. A typical outfit might be a plaid jacket, checkered shirt, striped pants, shoestring tie, argyle socks (different patterns for each foot), and a gigantic turquoise belt buckle as the centerpiece! We often wrote down what he wore in our notes, just to tell our disbelieving friends.

LAWSON FOWBLE ’77
East Worcester, N.Y.

Hurricane Response

I am a Rensselaer Class of 2004 alum and I wanted to say that it is wonderful of Rensselaer to allow the students of Louisiana to attend RPI free of charge. Out of all the other schools I’ve heard of and known, no other has been so humanitarian in nature and gracious to the public. I have never been in a place that provides a greater sense of community and a sincere interest in making a positive impact on the world. I am proud and grateful to have been able to spend four years of my life there.

CHRISTOPHER LEE WILLIAMS ’04
Los Angeles, Calif.

Ethics in Business?

I was disappointed to see no mention of ethics in your reprint of the BusinessWeek article on the new MBA program. If all the recent business scandals have driven home any point, it’s that U.S. business leaders are totally lacking in ethics. They can’t see anything but increasing their own personal wealth. Perhaps most stay within the law, but they care nothing for their workers, communities, customers, or national wellbeing. In the short term, they and a few other big shareholders get rich—in the long run, everyone else suffers as their companies go down the tube. If I ran the circus, I’d make a thorough indoctrination in ethical behavior part of every B-school curriculum!

PHIL PERRY ’80
Woodstock, N.Y.

Lally Dean David Gautschi responds:

Phil Perry certainly has a point in highlighting the importance of ethics in business, especially in light of recent ethical lapses that have had significant unfavorable consequences for investors, consumers, and employees. Notwithstanding the significance of the widely reported ethical lapses of top executives at a number of corporations, financial services firms, and consultancies, it would be misleading to paint all “U.S. business leaders” as being “totally lacking in business ethics.” In fact, there are some business leaders who set examples that most of us should consider emulating. A good source of ethical icons in business is the Institute for Business, Technology, and Ethics (ethix.org). Mr. Perry was justified to call our attention to the lack of mention of ethics in the remodeling of the Lally MBA program. In fact, it is a dimension on which the Lally School intends to establish distinctive excellence. This fall, we featured business ethics topics in two professional development workshops for the MBA students. Additionally, Al Erisman of the Institute for Business, Technology, and Ethics has joined the Lally School’s Advisory Council.

Conservative Engineers

It may be the result of unexplained counter-intuition, but after 55 years I have observed how engineers have been continually shooting themselves in the foot. The comments of the Hillary letters support my point [MAIL, Fall 2005]. In 1948 when I was a junior, a straw poll on campus was taken and over 80 percent of the students and faculty supported Dewey against incumbent Harry Truman... we all know the result of that election.

After 54 years of industrial experience I find that nothing has changed and support is greatest among my engineering friends for the more conservative of our two parties, a party that is not afraid to show that it is most interested in big business, not engineers.

I can arguably say that engineering, the cost of education, professional opportunities, and the use of engineers by the government has been on a steady downward spiral. That’s not to say I advocate a one-party system, but let’s use our personal natural resources, i.e. brains and rational judgment, and make the two parties compete with each other on our behalf.

NORMAN ZELVIN ’51
Eastchester, N.Y.
High-tech information hubs and a temperature-controlled LED lighting system are just a few of the renovations made to the main floor of the Folsom Library so that the space can better serve a new generation of Rensselaer’s tech-savvy students.

“Our students today have adopted new ways of accessing information and new ways of interacting with it,” says Loretta Ebert, director of Rensselaer Research Libraries. “Our challenge is to meet the new demands of today’s information seekers.”

Renovations to meet those demands included installing information hubs consisting of new IBM computers and pop-up LAN connectors for additional notebook computer use around six of the library’s original concrete columns at varying heights to facilitate standing, sitting, and wheelchair access. Wireless LAN access is available throughout the building. New low-profile shelving and mobile tables were also added, to provide a flexible “learning laboratory” environment where students can work both individually and collaboratively.

A computer-controlled LED lighting system is operated by a Thermonitor program, which senses the temperature outdoors and produces a spectrum of subtly changing colors designed to make the library inviting throughout the seasons.

Additional upgrades to the main floor include an art wall featuring a Hobo-Dyer inverted map of the world imprinted with the Rensselaer phrase “Why not change the world?” in 21 languages and scripts, new carpeting, and a completely revamped Library Café.

Jorge Vidal ’91, project manager and designer with Rensselaer’s campus planning and facilities design department, developed the overall project design with input from faculty, students, and staff. “We now have a space that, indeed, enables and supports an engaging experience for everyone in this community, and creates a lively environment in which students can learn, can do, and can be,” said President Shirley Ann Jackson, during a dedication ceremony that took place on Dec. 1.

The renewal of the main floor of the Folsom Library represents the first major refurbishment since the space opened in 1976.
A barge was blown inland and pushed atop a levee wall in East New Orleans.

**CIVIL AND ENVIRONMENTAL ENGINEERING**

**Levee Failures Investigated**

It is clear that there were multiple causes for the levee failures in New Orleans, but researchers need to gather more data to better understand what they were and how to rebuild properly after the devastation caused by Hurricane Katrina, according to testimony Nov. 17 before the U.S. Senate Committee on Environment and Public Works. Tom Zimmie, professor and acting chair of civil and environmental engineering at Rensselaer, offered his perspective on the degree to which the preliminary findings on the failure of the Gulf Coast levees are being incorporated into the restoration of hurricane protection.

“There is not one simple answer as to why the levees failed,” Zimmie said in a prepared statement. “Field observations indicated various causes: overtopping of the levees, erosion, failure in foundation soils underlying the levees, seepage through the soils under the levees causing piping failures, and this is not a complete list.”

Zimmie was joined at the hearing by several other panelists: Dan Hitchings, director of Task Force HOPE for the U.S. Army Corps of Engineers; Sherwood Gagliano, president of Coastal Environments Inc.; Larry Roth, deputy executive director of the American Society of Civil Engineers; Joseph Suhayda, emeritus professor of engineering at Louisiana State University; and Robert Verchick, a professor at Loyola University Law School in New Orleans.
**PRESIDENTIAL LECTURE SERIES**

**IBM CEO Outlines Innovation Challenges**

**Samuel Palmisano**, chairman of the board and chief executive officer of the IBM Corporation, delivered a Presidential Lecture on “Innovation and Leadership in the 21st Century,” on Sept. 15 in the Center for Biotechnology and Interdisciplinary Studies. In a ceremony prior to the lecture, Palmisano was awarded an honorary doctorate in humane letters from Rensselaer.

“The act of honoring someone whose life and work serve as a role model benefits us, because when we honor a person whom we admire, we reaffirm our high ideals for ourselves,” said President Jackson. “Using an ancient tradition to honor a man whose contributions help us to understand ourselves and our world better creates a tangible link between our rich past and a promising future.”

Palmisano spoke of the “longstanding partnership between IBM and RPI, a partnership that has enriched both of our organizations,” and noted the number of alumni working at IBM, including in leadership positions, and the research partnerships that exist between the two organizations. “But what truly unites IBM and RPI, I believe, are our shared values.

This is an institution that asks, ‘Why not change the world?’ What better partner for a company like IBM, which for nearly a century has relied on innovation not only to fuel our own success, but more importantly, to contribute in meaningful ways to the global society,” Palmisano said.

Palmisano outlined the innovation challenges and opportunities for the United States in the global marketplace, and he discussed the importance of embracing “a new model of innovation—one that is open, collaborative, multidisciplinary, and global.”

“The opportunities are too important, and the economic stakes are too high, for America to compromise its longstanding commitment to innovation,” Palmisano said. “In an era when commoditization happens at unprecedented speed, innovation has become an economic and societal imperative. And it is a collective responsibility—business cannot do it alone. Neither can universities. Neither can governments. Innovation requires all of us, working together as a society. If we demonstrate that kind of collaborative leadership, the opportunities are ours for the taking. And the benefits will be ours to share.”

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**MINUTIA FILE**

**Comic Relief**

The Rensselaer name is often cited in newspapers and journal articles. It’s not so often that Rensselaer appears in the funny pages.

In the Oct. 25 Doonesbury comic strip, Michael Doonesbury’s daughter Alex is talking with her parents about touring college campuses. Alex, who “already holds five patents,” is interested in pursuing an engineering education. Her list includes “MIT, Cornell, Rensselaer—and Walden.”

In a statement relayed by Universal Press Syndicate, Doonesbury writer-artist Garry Trudeau said he used Rensselaer “because it’s one of the premier institutes of technology.”

He should know. Trudeau delivered the 1986 Rensselaer Commencement address and received an honorary doctorate in engineering science.
Improving Terrain Maps

A RENSSELAER RESEARCHER HAS BEEN awarded $845,000 in federal funding to create improved computer representations of terrain on the surface of the Earth and beyond. The research could have a variety of both military and civilian applications, from strategically positioning soldiers to placing radio towers on the moon.

“I’m studying better ways to compress the massive amounts of terrain data now available from radar and laser scans of the Earth’s surface,” says W. Randolph Franklin, associate professor of electrical, computer, and systems engineering and principal investigator for the project, which is funded by the Defense Advanced Research Projects Agency.

Current methods often produce unacceptable terrain maps, giving rise to errors that are clearly visible in any commercial mapping product, Franklin says. For example, one common mapping software renders Niagara Falls as a gentle slope, while another has 50-foot elevation contours crossing a shoreline.

The program funding Franklin’s work exists because effective support for military operations requires better ways to represent Earth’s surface. A specific focus is on the need to improve navigation of unmanned aerial vehicles.

“I will be researching and developing three different terrain representations,” Franklin says. “I will also study some important applications of terrain data.” One application is geared toward identifying the best sites to position a group of soldiers to allow them to see as much terrain as possible. Such a technology could also have civilian uses, such as in placing cell phone towers or locating visual nuisances where they would be the least visible.

“A far-out application for radio towers would occur when the moon or Mars are settled,” Franklin says. “Both have no ionosphere to enable long-distance radio, and the moon has no stable satellite orbits for potential communication satellites.” He suggests that ground-based radio relays, visible to each other, could be the best way to communicate on these surfaces.

Christian Vogt, M.S. ’04, from Liechtenstein, and Col. Clark Ray, Ph.D. ’94, assisted in the research.

TO ENCOURAGE PHILANTHROPY, A NUMBER OF COMPANIES offer employees the opportunity to increase the value of their charitable giving through corporate gift matching programs. One Rensselaer alumnus was surprised to learn just how much such a program can magnify the power of giving.

John Hill Shaw III ’67 attended Rensselaer on a full-tuition scholarship, earning a bachelor’s degree in electrical engineering. He enjoyed a successful career with the Exxon Corporation, spending 20 years in Asia and retiring at age 55.

“I believe that education is very important,” says Shaw, whose wife, Joanna, is a native of Malaysia. They provided for the education of three members of her family at universities in New Zealand and the United States. “It has been fulfilling,” he says, “to see the impact on their lives.”

After hearing about The RENSSELAER PLAN and its transformation of his alma mater in recent years, Shaw decided it was time to travel back to Troy to see for himself. He toured new facilities, met with faculty and students, and mingled with fellow Rensselaer alumni, including Ray Ash ’60. Ash, chairman of the Patroon Scholars Program of the Rensselaer Annual Fund, told Shaw about a great opportunity to support students. Through the Patroon Scholars Program, a donor makes a commitment to support an individual student throughout his or her four years at Rensselaer.

The news for Shaw, however, was that as a retiree of Exxon Corporation, he could take advantage of a three-to-one match through the ExxonMobil Foundation’s Educational Matching Gift Program. He decided that he couldn’t wait for his estate to help Rensselaer students and so provided Patroon Scholar support for five undergraduate students for the next four years.

Shaw enjoyed meeting them at the annual Celebration of Student Support in December.

RENSSELAER/WINTER 2005-06

CARBON NANOTUBES HAVE ENTICED researchers since their discovery in 1991, offering an impressive combination of high strength and low weight. Now a new study suggests that they also act like “super-compressible” springs, opening the door to foamlike materials for just about any application where strength and flexibility are needed, from disposable coffee cups to the exterior of the space shuttle.

The research, which is reported in the Nov. 25 issue of the journal *Science*, shows that films of aligned multiwalled carbon nanotubes can act like a layer of mattress springs, flexing and rebounding in response to a force. But unlike a mattress, which can sag and lose its springiness, these nanotube foams maintain their resilience even after thousands of compression cycles.

In foams that exist today, strength and flexibility are opposing properties: as one goes up, the other must go down. With carbon nanotubes, no such tradeoff exists.

“Carbon nanotubes display an exceptional combination of strength, flexibility, and low density, making them attractive and interesting materials for producing strong, ultra-light foam-like structures,” says Pulickel Ajayan, the Henry Burlage Professor of Materials Science and Engineering at Rensselaer and coauthor of the paper.

Carbon nanotubes are made from graphitelike carbon, where the atoms are arranged like a rolled-up tube of chicken wire. Ajayan and a team of researchers at the University of Hawaii at Manoa and the University of Florida subjected films of vertically aligned nanotubes to a battery of tests, demonstrating their impressive strength and resilience.

“These nanotubes can be squeezed to less than 15 percent of their normal lengths by buckling and folding themselves like springs,” says lead author Anyuan Cao, who did much of the work as a postdoctoral researcher in Ajayan’s lab and is now assistant professor of mechanical engineering at the University of Hawaii at Manoa. “After every cycle of compression, the nanotubes unfold and recover, producing a strong cushioning effect.”

The thickness of the nanotube foams decreased slightly after several hundred cycles, but then quickly stabilized and remained constant, even up to 10,000 cycles. When compared with conventional foams designed to sustain large strains, nanotube foams recovered very quickly and exhibited higher compressive strength, according to the researchers. Throughout the entire experiments, the foams did not fracture, tear, or collapse.
A COME-FROM-BEHIND VICTORY OVER St. John Fisher in the ECAC Northwest Championship Bowl marked the end of the 2005 football season for Coach Joe King's Engineers. With the close of the winning (8-2) season also came the end of a 15-year-long football dynasty.

Senior linebacker and team captain Grant Cochran '06 played his final game as an Engineer during the ECAC Championship. He is the last of six Cochran brothers who have consecutively played football for Joe King at Rensselaer.

Since 1990, at least one Cochran brother has been listed on the football team's roster. Andy Cochran '95 received an academic scholarship and came to Rensselaer to play football, study engineering, and join the Navy ROTC in 1990. Chris '98 and Dan '98 followed in their brother's footsteps soon after. Next Evan '02, Flynn '04, and Grant came to Rensselaer to study and play football.

Although the brothers were alike in their academic and athletic choices, they were individuals on the football field, playing different positions at different levels of skill.

Andy, a linebacker, played in six games and served as assistant coach after graduating from Rensselaer.

Chris, a defensive lineman, led the Engineers with five sacks during his junior year. Dan played for a year on the junior varsity team.

Two of Rensselaer's best wide-receivers, Evan and Flynn, are both team record-holders. Evan scored a team-high 15 touchdowns in 2001 and holds the team's career touchdown record at 28. Flynn also holds multiple records including single-season and career records in both receptions and yards.

Grant, a four-year starter, two-year captain, and Academic All American, ranked second on the team in terms of tackles.

“They were all different,” said Coach King in an interview with the Albany Times Union. “Some were offensive linemen. Some were defensive linemen. Some were receivers. They came in all shapes and sizes. But one thing they all had in common was they wanted to find a way to win.”

Last summer Grant was married to his wife, Alene. The wedding reception was held on '86 Field, where—fittingly—the brothers and even Coach King played football.

CHRISTIAN RAVI HAWK TALK

Football Family Dynasty

Rensselaer has been selected as one of six universities nationwide to be awarded a two-year, nearly $1 million planning grant from the National Institutes of Health (NIH). The grant will provide a foundation for the development of a center for cheminformatics research. The Rensselaer Exploratory Center for Cheminformatics Research (RECCR) will bring together an interdisciplinary research team to seek improved understanding of the relationships between chemical structure and function for use in biotechnology applications.

Testing the Power of Polymer Membranes

Rensselaer researchers have started a new fundamental research project on the component that is often referred to as the heart of the fuel cell—the polymer membrane.

The Rensselaer team developed a new polymer membrane that may facilitate hydrogen separation, purification, and transport at high temperatures, according to Brian Benicewicz, professor of chemistry and chemical biology at Rensselaer who is the principal investigator for the project. The new polymer membrane is now being tested for potential use in proton exchange membrane (PEM) fuel cell and hydrogen applications. The project is funded by a projected three-year, $900,000 grant from the U.S. Department of Energy.

Improved Prediction of Bone Fracture Risk

A team of researchers led by Rensselaer has been awarded a five-year, $1.2 million grant from the National Institutes of Health (NIH) to work on improving the prediction of bone fracture risk by developing a new way to measure bone quality. Recent studies have shown that current bone mass index tests are not a reliable means of predicting fracture risk. Deepak Vashishth, assistant professor of biomedical engineering at Rensselaer and principal investigator of the research project, suggests determining the quality of the bone, not simply the quantity of the bone mass, can improve the prediction of fracture in the elderly and osteoporotic population. Research in his lab focuses on identifying, establishing, and reversing the effects of age and diabetes-related bone fragility. Studies involve the modification of proteins in bone and their influence on bone fracture.
FROM THE ARCHIVES

20 Years of Electronic Arts

In 1985 Professor Neil Rolnick, then director of iEAR Studios, founded iEAR Presents, a series of public performances, exhibitions, and lectures that feature pioneering and emerging artists who explore the boundaries of electronic art. In November the series celebrated its 20th anniversary.

Created to enhance the education of students enrolled in the integrated electronic arts at Rensselaer (iEAR) program during its earliest years, the series added depth to the computer music, animation, and video art courses that were taught in large, lecture-style classrooms. Attendance at iEAR Presents events became mandatory for all electronic arts students.

“iEAR Presents was created to act as a venue where significant artists in their field could come to Rensselaer and not only perform, but also interact with our students,” says Rolnick. “There is no better way to teach our electronic arts students than to let them experience the world’s leading performers and their art firsthand.”

Since there was no single space on campus dedicated to the arts program, early iEAR performances were held in a blackbox theater in the basement of the Darrin Communications Center, at the Rensselaer Chapel + Cultural Center, and even in empty storefronts in downtown Troy.

Early performers included Alvin Lucier, a pioneer of electronic music who opened the fall 1988 season. Lucier made history when he used amplified brain waves to drive the instruments in one of his compositions. At Rensselaer he performed musical compositions developed from the studies of acoustics, electronics, and physics.

Ed Emshwiller, an influential figure in the experimental film movement and one of the first people to work with computer animation, visited Rensselaer during the 1986-87 season of iEAR Presents. He presented Sunstone, a groundbreaking 3-D computer work that showcased his breakthroughs in the development of an electronic language to articulate three-dimensional space.

Video installation artist Kathy High came to iEAR Presents in March 1988 and exhibited Not Black & White, a video and domestic installation that explored social issues surrounding femininity, including eating disorders and the notion that females are the less dominant sex. She also exhibited Romance of the Monk, a multimedia installation that used three videotapes, six audio tracks, and sculptural, photographic, and drawing elements.

In 2002 Kathy High returned to Rensselaer as associate professor of video and new media. Today she serves as chair of the arts department (see page 14), which is still home to iEAR Presents. Over the past two decades the series has featured the work of nearly 100 electronic artists.

STUDENT LIFE

Giving Back

The 2004-2005 academic year was a remarkable one for Rensselaer’s Student Life community service initiatives. Reports from various constituencies contributed to a year-end total of 12,003 volunteer hours, 32,234 federal work study community service hours, and $38,939 raised in programs sponsored by Student Life groups. The figures as of June 30, 2005, follow.

“I enjoy working with Habitat simply because it’s a really fun way to make a big impact,” says Johanna Wogaman, president of Rensselaer’s Habitat for Humanity student chapter. “There’s the practical side of just learning construction techniques, simple home repairs, building schedules, material purchasing, etc. On top of learning all those skills, you’re able to not only build a house but create a home for a family in need. Being in college, as much as you might want to help, it can be hard to donate money through the semester. Habitat is a really easy opportunity for students to take a day, half a day, or a few hours and just work.”

Community Service Contributions by Rensselaer Students for 2004-2005

| Total Community Service Hours | 44,237 |
| Volunteer Hours | 12,003 |
| Community Service Work Study Hours | 32,234 |
| Money Raised | $38,939 |
| Pints of Blood Donated | 584 |
| Computers Installed | 24 |
| Bags of Toiletries Donated | 2 |
| Pounds of Food Collected | 22,090 |
| Bins of Clothing Collected | 21 |
| Big Boxes of Toys for Tots Collected | 5 |
| Basket of Holiday Food Donated | 1 |
| Tutoring Sessions | 1,258 |
| Registration for Football Camp Donated | 1 |
Student Designs Go Global

Two teams of fifth-year architecture students at Rensselaer garnered top honors—first and third place overall—in the Global House 2005 International Design Competition, selected from among more than 250 entries from 44 countries.

Hosted by Arquitectum, an enterprise dedicated to the organization of architectural contests, the Global House competition challenged professional architects and architecture students ages 28 and under to create a house that best represents the values of contemporary global society and that can exist on any site, anywhere in the world.

Stephanie Cramer of Castleton, N.Y., and Ryan Salvas of Old Saybrook, Conn., saw an opportunity to incorporate housing into the bridges, sign trusses, and on and off ramps associated with highways. Their proposal involved using highway sign trusses as a structure for houses that would be suspended over the roadways.

The team was awarded first place and a prize of $2,000 for their design, titled 56West: Utopia.

NOMAD, designed by Priyanka Mara of New Hartford, N.Y., Moniera Buck of Brooklyn, N.Y., and Brian Janeczko of Garden City, N.Y., won third place, and a prize of $500. The group proposed a reconfigurable housing unit, designed for nomadic users, made up of telescoping tubes that could be shifted, pushed, and pulled, providing users with a high level of flexibility within a small amount of space.

“Once again Rensselaer students have demonstrated their capacity as global thinkers, creating architectural designs that have the potential to enhance living environments, and improve the human condition on a universal scale. I applaud them for their creativity and for this achievement,” said Alan Balfour, dean of architecture.

Rensselaer’s research and people continue to garner national media attention.

The November issue of FORTUNE SMALL BUSINESS magazine featured a full-page photo of Rensselaer alumni and students John Blackburn, Tom Rossi, and Ryan O’Donnell. The trio garnered an honorable mention in the publication’s student startup competition for their company, BullEx, which offers a safe and clean solution to fire extinguisher training.

After previous coverage in THE NEW YORK TIMES and VOICE OF AMERICA, the collaboration between Pulickel Ajayan, the Henry Burlage Professor of Materials Science and Engineering, and scientists at the University of Akron continues to attract attention. Their research project to mimic the sticky feet of the gecko lizard recently appeared in the October issue of SMALLTIMES magazine.

IEEE SPECTRUM included Rensselaer’s Gulf Coast Scholars Program for students displaced by Hurricane Katrina in an Oct. 31 story about how technically oriented schools have responded to recent disasters. Rensselaer President Shirley Ann Jackson noted: “You want to do as much as you can, but you also want to be able to deliver on what you promise.”

Two winners of the Change the World Challenge, an idea competition funded by a $1 million gift from Sean O’Sullivan ’85, were featured in their hometown newspapers. The DesMoines Register carried a story about Casey O’Donnell, a Ph.D. student whose “Virtual DJ” program teaches students how to manipulate mathematical equations. The Springfield (Mass.) Republican wrote a piece about Brendan Kavanagh, a senior who designed a way to send a signal to a car’s taillights when the brakes are applied forcefully.

The Scientist magazine highlighted a Rensselaer team’s approach to predicting how proteins separate based solely on their chemical structure. The team was led by Curt Breneman, professor of chemistry and chemical biology, and Steven Cramer, professor of chemical and biological engineering.
Kathy High: Bridging the Arts and Sciences

Arts department chair Kathy High was drawn to Rensselaer by the opportunity to connect art with the world beyond it. For more than 20 years she has done just that, through documentaries, experimental videos, sculptures, and multimedia installations shown around the world. High’s work also has put the spotlight on social issues related to women’s health, medical ethics, and advances in science and technology.

“I love teaching art, but for me it’s more fulfilling to teach the discipline at a university where it’s not the only subject students are studying,” says High. “I wanted to teach at a university that had educational focuses stretching far beyond the arts, allowing me to extract pieces of the research, the scientific, the technical world and incorporate them into my art world. The strength of the engineering and science programs really attracted me to Rensselaer.”

Currently High is finalizing the department’s new Ph.D. program in electronic arts. “Everybody’s ready for it,” she says. “We’d like to admit our first students by fall 2006.”

Also under way is the implementation of an international exchange program. High expects to establish a visual arts student and faculty exchange program with the Hong Kong Arts Center and the City University of Hong Kong, and an electronic music exchange program with the Central Conservatory of Music and Peking University in Beijing.

In the future, High would like to develop a “Living Art Center” at Rensselaer, which would collaborate with the Center for Biotechnology and Interdisciplinary Studies on projects bridging the arts and sciences. She envisions the center as a public venue that integrates science and technology into the arts to increase awareness and understanding of biotechnology and other science and technology-based disciplines. Similar centers exist in other countries, but are relatively uncommon in the United States, according to High.

“I see the Living Art Center as a place where people—all people, not just scientists—can feel involved and participate in the advances made in biotechnology,” says High. “Science advances extremely quickly. Art gives people the opportunity to stop and look at both the risks and the rewards of these advances.”

The growing arts department is based in the renovated West Hall, part of the envisioned “arts corridor” along Eighth Street that will include the Experimental Media and Performing Arts Center (EMPAC) when it opens in 2008.

“I see EMPAC as an invaluable resource for our arts department and for our students,” High says. “I think the international connection that EMPAC will bring to Rensselaer is only going to enhance our students’ educational experience—it’s going to be a great resource for them.”

High is active in the arts scene beyond campus as founder and editor of FELIX: A JOURNAL OF MEDIA ARTS AND COMMUNICATION, a publication geared toward alternative film and video makers that she started in 1991. The newest volume of FELIX, a print publication and DVD titled TOOLS: ANALOGUES AND INTERSECTIONS, will focus on the intersections between early video art and new media art practices. A curated festival of “old” and new media works will be held at Rensselaer in the spring of 2007, to celebrate its release.

High credits her fellow professors for the increased prominence of the program. “The faculty—each one of them—brings their unique strengths to our department and to our students,” she says. “They are the foundation of the arts program; I am simply building on top of that foundation.”
JOHN WEN has been appointed new director of the Center for Automation Technologies and Systems (CATS). Wen brings extensive experience in robotics to the newly renamed center, which matches Rensselaer research with targeted industrial applications ranging from manufacturing and microsystems assembly to the automation of medical systems. Wen earned a Bachelor’s degree from McGill University in 1979, a master’s from the University of Illinois at Urbana-Champaign in 1981, and a doctorate from Rensselaer in 1985, all in electrical engineering. He joined the Rensselaer faculty in 1988, and was named a fellow of the Institute of Electrical and Electronics Engineers in 2001.

CHRISTOPHER DAVEY, lead environmental specialist, has received the 2005 Pillars of Rensselaer Award, the highest honor Rensselaer gives to a staff member. The Pillars 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 showed 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.

NATACHA DEPAOLA has been appointed chair of the Department of Biomedical Engineering. A member of the Rensselaer faculty since 1994, DePaola received a National Science Foundation Faculty Early Career Development Award in 1996 and is a member of the Biomedical Engineering Society, American Society of Mechanical Engineers, American Society for Cell Biology, American Association for the Advancement of Science, and American Society for Engineering Education. Her research focuses on the fundamental aspects of fluid mechanics and mass transport involved in the modulation of mammalian cell function.

JAN STEGEMANN, assistant professor of biomedical engineering, was awarded the Rita Schaffer Young Investigator Award at the Biomedical Engineering Society annual meeting. As part of the award, Stegemann delivered a plenary lecture on current research in his group.

PETER COLLOPY ’71 has been appointed director of environmental health and safety. He has more than 30 years of experience in health physics and environmental health and safety in both industry and academia, and is board certified as a health physicist and industrial hygienist. Collopy earned both master’s and bachelor’s degrees in environmental engineering from Rensselaer.

MICHAEL SHUR, the Patricia W. and C. Sheldon Roberts ’48 Chaired Professor in Solid State Electronics at Rensselaer, has been elected a fellow of the American Association for the Advancement of Science (AAAS). Shur is one of 376 newly elected fellows recognized for their efforts to advance science applications that are deemed scientifically or socially distinguished, according to AAAS. Shur is director of Rensselaer’s Center for Broadband Data Transport Science and Technology.

MICHAEL TENTNOWSKI has been appointed director of the Rensselaer Incubator, one of the first university-based incubators in the country. Tentnowski has had more than a decade of experience in small business and entrepreneurship development in the academic and business arena. Tentnowski received a bachelor’s degree in accounting, and an MBA from the University of Montana, Missoula.

GARY SAULNIER, associate professor of electrical, computer, and systems engineering, has received the 2005 Military Communications Conference Technical Achievement Award from the Institute of Electrical and Electronics Engineers. The award is given in recognition of sustained contributions to military communications.

G.P. “BUD” PETERSON, provost, has been honored with an international award for his commitment to science education. The Frank J. Malina Astronautics Medal, presented yearly by the International Astronautics Federation, is given to an educator who has demonstrated excellence in promoting the study of astronautics and related space sciences. A fellow of both the American Society of Mechanical Engineers and the American Institute of Aeronautics and Astronautics, Peterson has written more than 125 refereed journal articles and holds nine patents.

ANGEL GARCIA, senior constellation chaired professor in biocomputation and bioinformatics and professor of physics, will be presented the 2006 Edward A. Bouchet Award by the American Physical Society (APS) at the 2006 APS March Meeting. The award recognizes García’s contributions to the understanding of the role of water in the dynamics and folding of proteins through computer simulations.

TOH-MING LU, the Ray Palmer Baker Distinguished Professor of Physics, was presented the first-ever Semiconductor Research Corporation (SRC) Faculty Leadership Award at the TECHCON 2005 meeting in Portland, Ore. The award was created by the SRC Board of Directors and seeks to recognize individuals who have demonstrated outstanding leadership in addressing the most important problems facing the semiconductor industry through excellence in the creation and management of large SRC-sponsored multi-university and multidisciplinary collaborative programs. Lu was recognized for his work as past director of Rensselaer’s Center for Advanced Interconnect Science and Technology.

STEPHEN DERBY, associate professor of mechanical, aerospace, and nuclear engineering and co-director of the Flexible Manufacturing Center, won the best paper award in the Material Handling Engineering Division at the ASME International Mechanical Engineering Congress and Exposition Nov. 5-11. The paper, which was co-authored by Bernhard Bringmann ’02, a former master’s student at Rensselaer, discussed a novel method for stacking mixed case lot pallet loads on top of one another.

STEVEN ROECKER, professor of earth and environmental sciences, recently received a medal from the U.S. Civilian Research & Development Foundation in recognition of his support in developing international science and technology collaborations. Roecker has served as an adviser to the funding agency on science in central Asia, primarily in Kyrgyzstan and Kazakhstan, and served on a number of review panels (see article, page 16).

FRANK SPEAR, professor and chair of earth and environmental sciences, has been named the 2007 Dana Medal recipient by the Mineralogical Society of America. The medal is intended to recognize a mid-career individual’s continued outstanding scientific contributions through original research in the mineralogical sciences. Spear’s research is focused on developing new techniques to read the history of the Earth through metamorphic rocks, constructing pressure-temperature-time histories used to interpret tectonic evolution.
“The transitions so evident in all facets of life, learning, research, scholarship, all across our campuses, are signs of an intellectual vigor and vibrant activity. As we renew our commitment to our roots—the very premises upon which Rensselaer was founded—we are marking a transition from a storied past to a breathtaking future.” —President Shirley Ann Jackson

**PLAN FOR SUCCESS**

*Five years on, The Rensselaer Plan continues to transform the Institute and lays the foundation for a renewed commitment to undergraduate education.*

This year marks the fifth anniversary of the launch of *The Rensselaer Plan*. A strategic blueprint for the future, the plan put Rensselaer on the road to its most significant and far-reaching transformation in more than a century, with the goal to raise the Institute to the level of a “top-tier technological research university with global reach and global impact.”

The results have been wide-ranging, reaching into almost every aspect of life at the Institute. Under the plan, Rensselaer already has made its mark nationally and globally in the targeted areas of information technology, nanotechnology, and biotechnology. The Institute has recruited some of the most talented and distinguished faculty in the world. Research awards have more than doubled, from $37 million to $80 million, and the number of doctoral students has increased. Student quality and diversity is on the rise as well. More than $400 million has been poured into new construction and renovations of facilities for research, teaching, and student life. A renewed commitment to undergraduate education has sparked the recent introduction of the Undergraduate Plan, to strengthen the overall undergraduate experience at Rensselaer.

Meanwhile, the parallel transformation of Rensselaer at Hartford continues. The refocusing of the Education for Working Professionals program, which is based at Hartford and includes distance components, involves the reshaping of course offerings and the strengthening of ties to business and industry.

To support these and other initiatives, the Institute publicly launched its largest fund-raising campaign in its history, *Renaissance at Rensselaer: The Campaign for Rensselaer Polytechnic Institute*. By Jodi Ackerman Frank.
Shirley Ann Jackson came to Rensselaer in 1999 with the belief that, based on its history, the Institute had the potential to change the world.

“Rensselaer is an educational institution whose mission sits at the very heart of what has changed the world for the last 100 years. Namely, it is a university centered around science and engineering,” Jackson says. “Many of the great discoveries, inventions, and innovations of the last century have completely transformed this country multiple times, and have made it the pre-eminent global leader that it is. If you look at those who have been connected to Rensselaer, they are people who have done just that in their time. That gives us a tradition to build upon.”

The plan has propelled Rensselaer to prominence in critical areas, including health, safety and security, the environment, and energy security, among others. Innovation and discovery in these areas have grown largely from the plan’s strategic research focus on one of the Institute’s significant strengths, information technology, and on an area in which Rensselaer was relatively unknown until recently—biotechnology.

In her inaugural address, Jackson challenged the Rensselaer community to take the bold step of investing in biotechnology, an area that, she said, “holds out great promise and great value to humanity.”

“[I]n the 21st century, genomics, combinatorics, and their marriage with information technology will impact the human condition as strongly as quantum science did in the 20th century,” Jackson said in her address. “This is a field whose impact is so great, so full of promise, so well-suited to Rensselaer, that we simply must drive our stake into the ground of this new frontier.”

Since then, Rensselaer has developed its own niche in biotechnology by combining research in the biological sciences with engineering and information technology. The result has been an explosion of new research, education, and technology commercialization that has fostered collaboration and innovation across all disciplines.

“The Rensselaer Plan has given us the focus, vision, and investment necessary to put the university back on the map with respect to groundbreaking research and leadership,” says Omkaram “Om” Nalamasu, vice president for research.

From developing new methods to rapidly synthesize and screen new potential drugs to creating a living heart wall patch to treat congestive heart failure, Rensselaer faculty are increasingly being recognized for their work, attracting great interest—and funding—from government and the private sector.

The Center for Biotechnology and Interdisciplinary Studies, which opened in September 2004, lies at the heart of the plan’s transformational research initiative. The 218,000-square-foot center houses faculty and researchers engaged in interdisciplinary research. Its core research facilities contain laboratories for molecular biology, analytical biochemistry, microbiology, imaging, histology, tissue and cell culture, proteomics, and scientific computing and visualization.

“This center is a cornerstone in realizing The Rensselaer Plan’s top priority of increasing the university’s research portfolio exponentially while improving the quality of education and expanding the Institute’s prominence and global impact,” says the center’s director, Robert Palazzo, a world-recognized cell and molecular biologist. “The building itself is the physical embodiment of Rensselaer’s commitment to create an atmosphere for transformational research endeavors that will generate new models for interdisciplinary research at the university.”

In addition to biotechnology and information technology, Rensselaer is pushing the frontiers of knowledge in other strategic research areas, including nanotechnology and advanced materials, microelectronics, and modeling and simulation of complex systems, among others.

“Discovery and innovation are critical to solving important problems facing humanity today, and multidisciplinary inquiry at new interfaces of any number of disciplines is imperative,” Nalamasu says. “For instance, we are looking at biotechnology and nanotechnology as important new toolboxes to work on crucial energy issues.”

**DRIVING THE RESEARCH RENAISSANCE**

Expanding the research enterprise required the university to make a significant investment in a critical mass of faculty to not only create the strength needed in focal areas, but to build up related areas in engineering, the sciences, and the arts. In the past five years, 150 new faculty members have been hired, 73 of them in entirely new positions.

Several of these new faculty members are part of the plan’s strategy to create “constellations” as a means to build new research programs from the ground up. Each constellation is focused on specific research programs and comprises a multidisciplinary mix of senior and junior faculty, postdocs, and graduate students.

Last year, Rensselaer completed the Future Chips Constellation, which focuses on innovations in materials and devices and in solid state and smart lighting, and extends to applications...
such as sensing, communications, biotechnology, and energy conservation. The Institute has developed seven constellations, including multiscale computation, and functional tissue engineering and regenerative medicine.

**WHERE THE ARTS MEET TECHNOLOGY**

As Rensselaer embarked on new areas of scientific research under the plan, it also blazed a trail at the intersection of the arts, media, and technology with the introduction of the Experimental Media and Performing Arts Center (EMPAC), a unique building and program to link the arts with leading-edge research and performance across the disciplines.

“Rensselaer combines innovation and success in research and education with an equally sophisticated and demanding cultural environment. This is what EMPAC will build upon,” says EMPAC Director Johannes Goebel. “EMPAC will provide programs and a place where artists, students, and faculty from a wide spectrum of disciplines can convene, exchange, collaborate, watch, listen, think, create, and allow themselves to be challenged.”

In September 2003, the university broke ground for the $141 million building that is rising on the southwestern corner of the Rensselaer campus. Construction is well under way for the 206,000-square-foot building with the grand-opening festival planned for September 2008.

EMPAC will house a 1,200-seat concert hall and a 400-seat theater. It also will have a 3,500-square-foot black-box studio optimized for theater, dance, and visual presentations. EMPAC will incorporate acoustical properties, artistic lighting, and technologically adaptable performance spaces to support research in visualization, simulation, animation, haptics, acoustics, and more.

In the summer of 2002, Goebel joined Rensselaer to begin developing comprehensive programming for EMPAC even before construction began. Previously the director of the Institute for Music and Acoustics, which he founded at the Center for Art and Media in Karlsruhe, Germany, Goebel has brought to Rensselaer his experience as composer, producer, and mentor of interdisciplinary arts and interdiscipliny research.

A number of EMPAC performances have already taken place. In September, the midpoint between the groundbreaking and opening was marked with “EMPAC 360: On Site + Sound,” an event held at sunset that included aerial dance, music, live visuals, and fireworks enjoyed by an audience of 2,000 spectators from the Troy campus and the surrounding community.

EMPAC will anchor what is becoming an arts corridor along Eighth Street on the western side of the campus. It is joined by the highly acclaimed arts department, which is housed in the newly renovated West Hall. EMPAC draws heavily from the department’s leadership position in the electronic arts. The department boasts some of the university’s fastest-growing programs and has attracted a highly diverse, internationally recognized faculty whose work is regularly viewed and heard around the world. In fact, the department’s iEAR (Integrated Electronics Arts at Rensselaer) graduate program that has been promoting leading-edge art for 20 years, and the successful EMAC (electronic media, arts, and communication) undergraduate program convinced Jackson that Rensselaer had the foundation and the vision to establish an experimental arts center that would be unique in the world.

**OUTWARD SIGNS OF PROGRESS**

When Peter Baldwin ’06, president of the Rensselaer Union, was a freshman three years ago, a parking lot stretched between the Playhouse and Academy Hall on 15th Street. Baldwin also noticed the abandoned building that once housed a T-shirt shop in the midst of rundown houses and sidewalks where 15th Street meets College Avenue.

“As far as I was concerned, the south side of campus ended at the Armory. College Avenue seemed to be anything but a part of the college,” says Baldwin, who is completing a dual major in mechanical engineering and economics.

The north side of campus didn’t fare much better. “When I was a freshman, I can remember visiting my friends’ dorms that still appeared to be like Army barracks. The entire landscape of Freshman Hill left much to be desired,” Baldwin says. “But, that was then and the Rensselaer of today is not what it was three years ago.”

Today, the intersection Baldwin remembers as a no-man’s land is a new gateway to the south side of the campus, with new walkways and lighting. The extensively renovated Academy Hall now serves as a student service center. The Institute also transformed an empty T-shirt shop into a lively coffeehouse, Java+++, where students can get a cappuccino, eat organic, and take advantage of wireless Internet access. In fact, the Troy campus is replete with new and renovated houses and sidewalks where 15th Street meets College Avenue.

Indeed, under The Rensselaer Plan, a whole new physical campus has sprung up with new and renovated facilities serving all aspects of the university community.
In addition to construction of the Center for Biotechnology and Interdisciplinary Studies and EMPAC, Rensselaer has invested millions of dollars in new and renovated freshman residence halls that are becoming places of living and learning. Barton Hall, completed in 2000, was the first new residence hall built on campus since 1977. The investment extends to improved housing for graduate students as well, including the renovation of abandoned buildings along Peoples Avenue and other areas near campus.

THE BEST IS YET TO COME

“What we have accomplished at Rensselaer in the past five years is remarkable,” Jackson says. “While The Rensselaer Plan is a document of which we all can be proud, it is the people of Rensselaer who have made the promise of it a reality. What is more, our success is gaining for Rensselaer a national reputation as a model for academic transformation.”

And, “as the song says, ‘the best is yet to come,’” she adds.

The next major initiative is the Undergraduate Plan, which will build on The Rensselaer Plan’s commitment to develop a world-class undergraduate experience. The Institute’s growing faculty, expanding facilities, and model programs are attracting ever more outstanding students. Average freshman SAT scores have increased 60 points in recent years. The undergraduate program has received the highest ranking in years from U.S. News & World Report—43rd, up from 46th last year.

“If we are to continue to attract the very best and brightest, we must focus on elevating our programs and expanding opportunities for our undergraduate students,” says Prabhat Hajela, vice provost and dean of undergraduate education.

With this in mind, Rensselaer is developing one of its most ambitious initiatives for the immediate future: the Undergraduate Plan.

The initiative will build upon Rensselaer’s innovative experiential approaches to education. Living and learning communities, which provide opportunities for groups of students who share common academic interests, are among programs being developed under the umbrella of the plan.

The plan calls for more opportunities for undergraduates to participate in research with faculty and graduate students. It sets a goal for research participation to nearly triple in the next five years, with up to 80 percent of students actively taking part in research activities.

“Our undergraduate programs must go hand-in-hand with what is being done at the graduate level because the most contemporary, forward-looking education one can expect happens when teaching is informed by research,” says Hajela, who is working across all portfolios to expand undergraduate academic programs.

“Such expanded research efforts will also encourage entrepreneurship and contribute to building mentoring relationships between faculty and students.”

Another goal of the Undergraduate Plan is to provide an international experience for every undergraduate student. In preparing students to be good global citizens, comfortable in a multicultural environment, Rensselaer will provide enhanced and new opportunities for students to study abroad at universities around the world. In addition, the plan will increase offerings in international co-op and internship experiences and summer overseas semesters led by Rensselaer faculty.

Strengthening the student-advise ment system is another focus. To support this effort, a new position has been created for an associate dean for academic advising, assessment, and special programs in the Office of Undergraduate Education.

The Undergraduate Plan will build upon Student Life’s well-established First-Year Experience (FYE) program and services. FYE, now in its fourth year, welcomes new students with a full schedule of orientation events, parent and family programs, and social, cultural, and educational activities.

“We want to help students become part of this community, discover their interests and their passions, and form friendships and social connections with their peers, from the moment they first step onto campus,” says Eddie Ade Knowles, vice president for student life.

A new FYE program this year is “Tuesday Night Toolbox,” which offers programming and events that focus on topics of concern to new students, such as healthy living, academic support, and career development. Student Life also is focusing on strengthening student support and counseling well beyond the orientation period. For example, the early intervention program involves a new role of “class dean,” named for each class after the freshman year. These deans lead a team that provides support for and outreach to the class, addressing concerns to help students stay on track.

For years, Jackson has warned that the United States faces a shortage of scientists and engineers, which could cause a decline in America’s economic leadership. She calls this phenomenon the “quiet crisis.”

“Unless we begin, now, to attract new groups
of students, including women, underrepresented groups, and students with disabilities into science and engineering, we will not have enough scientists and engineers to maintain our national capacity for innovation and discovery, which undergirds our economy,” she says.

To address this issue as an integral part of the Undergraduate Plan, the Division of Student Life is increasing diversity, the applicant pool, and national visibility for the Institute by creating internal pipeline programs, and building relationships with national pipeline programs that focus on preparing students who might not otherwise go to college.

One recently established internal pipeline program is the Rensselaer Presidential Scholars, a six-week national summer program to attract talented high-school seniors. Beginning next summer, up to 30 seniors from around the country will take a credit-bearing course in science or engineering with a research component in biotechnology, information technology, engineering, or another science.

FIELDS OF DREAMS
The Undergraduate Plan also encompasses the far-reaching expansion of athletics facilities.

“Athletics is a key element of the Undergraduate Plan, and creating new and better sports facilities for students is a high priority,” Knowles says. “When you consider that more than 4,000 Rensselaer students play varsity, club, and intramural sports each year you can see our need for the update and expansion.”

Plans are being developed to build a new East Campus Athletic Village, a complex of buildings and spaces that will include a new football field with a 7,500-seat stadium, and a basketball gymnasium with seating for 2,000 that will also serve as a centralized location for all the athletics offices. Also part of the plan is to build an athletics support center that will have sports medicine and weight training facilities as well as multipurpose conference rooms, concessions, and lounges.

In addition, during the first phase of the plan the Houston Field House will be expanded to accommodate offices for women’s and men’s ice hockey as well as to provide room for athletics training facilities to support both programs. The first phase of this all-encompassing project is expected to begin next summer.

Later phases will include a 50-meter natatorium, a track-and-field facility with inside tennis courts, and eight outside tennis courts.

SUPPORTING THE RENAISSANCE
To support the vision of The Rensselaer Plan, the Institute publicly launched its largest capital campaign in its history with a goal of raising $1 billion by the end of 2008.

The campaign, titled Renaissance at Rensselaer: The Campaign for Rensselaer Polytechnic Institute, has raised more than $660 million to date—more than three times the amount raised in the last campaign that ended almost 10 years ago.

The campaign’s nucleus phase began in 2000. Less than a year later, the university received a landmark $360 million gift from an anonymous donor. The largest unrestricted gift on record, the donation constituted a powerful endorsement of the transformational goals of the plan.

Several alumni since have made their own significant contributions, including Rensselaer alumnus and Trustee Curtis Priem ’82, who pledged an unrestricted gift of $40 million to Rensselaer on the day of the public launch of the campaign in September 2004. In recognition of this gift, Rensselaer will name EMPAC in his honor. In addition, the Rensselaer Alumni Association has made its largest-ever gift commitment of $300,000 to support the expansion of athletics facilities.

THE NEW FACE OF RENSSELAER
What will the Institute look like when the goals of The Rensselaer Plan are achieved?

“There is no one ‘look’ in the future because if we are stagnant then we are not making the contributions that we intend to make,” Jackson says.

Jackson intended the plan to be “evergreen”—a living document continually evolving and challenging the Institute to reach greater heights.

For example, early discussions referred to EMPAC as the “electronic media and performing arts center,” but as the understanding of the center evolved, “electronic” was replaced with “experimental” to include new domains of exploration in the nexus of the arts and technology.

The Institute also has invested heavily in emerging disciplines that did not exist just a few years ago, such as terahertz science and nanoelectronics. Rensselaer faculty are pioneers in these exciting new areas of science that hold enormous potential in biomedical imaging, genetics diagnostics, and microelectronics.

“We have been opportunistic as we’ve gone,” Jackson says. “But these things still derive from a fundamental desire to build out from strengths we have had all along.”
Rensselaer campus regulars may not be aware of it, but earthquakes frequently surge through the basement of the J. Erik Jonsson Engineering Center. Producing a powerful shaking sensation, these seismic events have taken a considerable toll, leaving behind a trail of broken pipes, damaged pilings, and other serious structural problems.

Not to worry, though. These “earthquakes” are actually scale-model simulations, generated by civil engineers in Rensselaer’s recently redeveloped Geotechnical Centrifuge Center, part of the George E. Brown Jr. Network for Earthquake Engineering Simulation (NEES), a nationwide academic research consortium. The tests often use Rensselaer’s centrifuge, an imposing device with a mechanical arm that can swing model structures around at 250 miles per hour, exerting forces real buildings would face only at catastrophic moments.

“We cannot wait 20 or 30 years for an earthquake to occur,” says Ricardo Dobry, professor of civil and environmental engineering and director of the Geotechnical Centrifuge Center. “This allows us to test structures and full systems.” Recent catastrophic natural disasters—particularly the December 2004 earthquake and tsunami originating in Sumatra and the earthquake in Pakistan and India in October, which have killed tens of thousands—underscore the importance of research in these areas.
While Troy, like all of New York state, rarely experiences significant seismic activity, Rensselaer is a hive of research activity on the subject. Institute researchers stand at the leading edge of studying both the causes and the effects of earthquakes, examining everything from the physical construction of fault zones to the safe construction of buildings in those zones.

The Geotechnical Centrifuge Center is just one node of earthquake research at Rensselaer. Institute earth scientists have fanned out across the globe to perform significant fieldwork for years, studying faults and earthquake activity from Kyrgyzstan to California and from Indonesia to Oregon. Rensselaer research on earthquakes also engenders interdisciplinary projects: engineers work with computer scientists, and geophysicists collaborate with mathematicians. Earthquakes may be an age-old problem, but the research methods used to understand them are distinctly new.

I FEEL THE EARTH MOVE…

Earthquakes are a product of the motion of the planet’s tectonic plates—the 20 or so large segments of the Earth’s crust slowly moving around the globe—which are responsible for the ongoing rearrangement of the world we see. A head-on collision between tectonic plates, which has happened at the edge of the Indian subcontinent, can produce spectacular features such as the Himalaya mountain range and the recent Kashmir earthquake.

Tectonic plates do not always meet in this precise fashion, however. When a plate largely supporting an ocean meets a continent-bearing plate, the heavier oceanic plate tends to dive underneath its neighbor, in the process called subduction. And sometimes plates scrape past one another in a lateral motion, as is the case with the San Andreas Fault in California.

Whatever the precise movement, a single earthquake represents the release of tension that accumulates along a fault, where plates move in fits and starts. “It’s like a spring getting loaded,” says Rob McCaffrey, professor of geophysics, who has helped pioneer the use of Global Positioning System (GPS) technology to measure the movements of plates. “The number-one question is how much of the fault will go at one time,” McCaffrey adds. “That determines the magnitude of the earthquake and the duration of its shaking.”

In geologic time, spanning billions of years, an individual earthquake is a tiny, incremental event. In human terms, however, as Doby notes, major earthquakes are infrequent (although small ones happen every day around the globe). Yet that is only one reason engineers need to generate their own steady stream of data through simulated quakes.

“With earthquakes, another big problem is, you never know when or where they’re going to happen,” says Tarek Abdoun, assistant professor of civil engineering and associate director of Rensselaer’s centrifuge center. “Whenever you put instruments in a certain area, earthquakes never happen there. But for us, as engineers, to be able to understand a certain phenomenon and design for it, you need to know what is happening. With a centrifuge, you have instrumentation, you can recreate the event, you learn a lot, and now you can improve the design and the foundation of buildings.”

The sheer scale of the planet means researchers still are just beginning to collect earthquake data in many places. In the 1980s, McCaffrey was among the first scientists to use GPS measurements in Indonesia, the site of last year’s catastrophic earthquake. Today, much of McCaffrey’s work involves “measuring the buildup of the energy right now” in complex fault systems in order to develop a detailed picture of fault activity and, eventually, a better sense of which fault segments might be most prone to move in a given period.

Specific earthquake predictions remain an elusive goal. The outlines of tectonic plates might look simple on a world map, but the view from the ground is another matter. Within a fault zone itself, tectonic plates do not just neatly collide or grind past one another, but can shatter into smaller pieces, like a fractured eggshell. The more scientists measure subduction zones, the more they realize how complicated they can be—especially in places like Sumatra.
“It’s not just a simple subduction,” says McCaffrey, who over the years has become something of a specialist in such regions, including Oceania and the Pacific Northwest of the United States. “What New Zealand and Cascadia and Sumatra have in common is that the upper plate in the system is breaking apart and forming these little plates that are moving around independently.” Oregon, for example, sits on a small plate rotating clockwise relative to the rest of the United States. Such intricacies make charting the mechanics of a fault zone much more difficult.

**JOURNEY TO THE CENTER OF THE EARTH**

The challenges inherent to earthquake research do not daunt Rensselaer researchers. “The fact that the Earth is complicated, well, that’s what you have to deal with,” says Steve Roecker, professor of earth and environmental sciences. Roecker is undertaking multiple projects designed to help reveal, case by case, what substances lie underneath faults, and how these materials relate to their motion.

Roecker spent the summer of 2005 in Kyrgyzstan, studying the Tien Shan mountains—considered a geologic puzzle because they exist not at the edge of a tectonic plate but in the middle of one, the Eurasia Plate. “The real mystery is why there are mountains there at all,” Roecker says. It’s possible that there could be a large fault covered up by the mountains, or a series of smaller fractures near the Earth’s surface that act like miniature plate boundaries.

To study the Earth’s insides, Roecker sets up networks of seismometers—sensitive measuring devices—and records the speed of the waves generated by earthquakes. For a geophysicist, this data reveals much about the materials lying underground. High-temperature rocks, for instance, slow down earthquake waves. Recent technological advances now allow small seismometers to pick up waves originating far away. “We’re able to make some nice pictures just by setting up instruments and waiting for an earthquake to happen anywhere in the world,” says Roecker.

For the Tien Shan project, those pictures may involve the Earth’s mantle, the viscous layer underneath the crust that ranges roughly 20 to 2,000 miles below the Earth’s surface—a distance almost impossible to reach with today’s technology. By contrast, in California, Roecker is part of a project called the “San Andreas Fault Observatory at Depth,” an attempt to drill just a couple of miles into the Earth’s surface. Scheduled for completion in 2006, it aims to reveal what substances enable plates to slip and slide past one another (underground water is a prime suspect).

Roecker’s efforts to turn the data into maps of the Earth’s interior, at any depth, are often conducted with colleagues at Rensselaer’s Inverse Problems Center, including mathematicians Margaret Cheney and Joyce McLaughlin, who have years of relevant experience from analogous areas like medical imaging. “They have a very fundamental understanding of these techniques,” says Roecker. Ultimately, he says, “the idea is to try to connect the stuff at the surface, like mountain-building, with the forces driving it beneath the surface.”
Understanding the composition of the Earth in a fault zone also happens to be where geophysicists and civil engineers find common ground. The ground a building stands on has an enormous impact on the stability of that structure. In an earthquake, soft areas like landfill often undergo the phenomenon of "liquefaction," the Jello-like shaking that dramatically increases the chances of a building collapse.

Thus, when engineers in the centrifuge center conduct tests, they both expose a structure to a powerful force and examine how that structure will react in certain ground conditions.

Consider pilings under a building, or pipes running through the ground. Near the surface, the Earth creates little stress. But further down, the stress increases. The centrifuge can mimic those stresses—either as a catastrophic event or an accumulation of stress over time—and tell engineers if their structures will pass muster.

A typical test in the Rensselaer centrifuge might have a length of pipe embedded in a mix of soil, on a tray fixed to the whirling arm of the machine. The pipe will be heavily wired with sensors transmitting information for analysis. “The interaction between the soil resisting and the building pushing in, that’s what creates the actual response,” says Abdoun.

Indeed, the roots of the center go back to soil studies Dobry and Thomas Zimmie, professor of civil engineering, started pursuing in the 1970s. In the late 1980s, Rensselaer acquired the centrifuge. A decade later, spurred on by the National Science Foundation (NSF), a new idea in earthquake research took hold: Forming NEES as a network of linked labs. “The information revolution was in full swing, and the emphasis changed,” says Dobry. “Instead of upgrading a bunch of separate earth engineering centers around the country, the idea became to build an integrated national laboratory.”

Backed by NSF funding for refurbishment—including $5 million over the next five years—the upgraded center, along with the rest of NEES, opened in the fall of 2004. The center is replete with intriguing-looking equipment, in addition to the centrifuge, including a “shake table,” a rectangular metal frame with segmented walls that can replicate seismic effects; a related octagonal tool the staff call “the slinky;” a robot on the centrifuge that alters models while swinging around in mid-experiment; and a videoconferencing center. The staff includes computer specialists and a variety of engineers.

“As we build things in the center, we’re interacting with mechanical engineers, electrical engineers, robotic engineers, and information technologists,” says Dobry. “It’s the definition of interdisciplinary research.”

GOING GLOBAL
Dobry believes information technology will change earthquake research profoundly, with remote sensors becoming an increasingly pervasive way of gathering data. Abdoun has developed a wireless sensor that can be lowered into the ground and has initiated a California-based project along with Caltrans, the state transit agency, taking real-time ground movement measurements near highways. Eventually, Dobry says, there will be “hundreds of thousands” of sensors in use, on the ground and in “the constructed environment—buildings, bridges, pipes, structures. When an earthquake happens, we will get data from the real world.”

For now, the increasingly networked nature of engineering research compensates for what researchers have yet to learn. At Rensselaer they are participating in a novel computer-simulation project, testing a bridge with faculty at two other NEES universities. The bridge’s deck is being tested at Lehigh University, its piers at the University of Illinois, and the foundations at Rensselaer, with the results shared via the NEES supercomputer in San Diego.

Rensselaer researchers also are conducting NSF-funded tests jointly with engineers from Cornell of critical lifelines” such as pipes during quakes. The Cornell researchers can produce ruptures on full-scale pipes in a large testing facility in Ithaca, but Rensselaer’s centrifuge, because of its smaller scale, can subject model pipes to a greater relative range of forces. The result is a combination of data otherwise unavailable to a single group of experts.

Beyond NEES, Rensselaer engineers are using their shake table to share test data with researchers in Japan, who use the world’s largest shake table in a warehouse-sized facility. And along with the flow of data comes a flow of people: Visiting researchers at the centrifuge this academic year will include two experts from the Advanced Institute of Science and Technology in Korea.

This globalization of research seems a natural development in the study of a global phenomenon, with experts in geographically disparate regions, from Japan to Chile to Australia, and other earthquake-prone areas. Meanwhile, in Troy, where research rolls on, residents do not have to worry much about earthquakes—even when they are in the Jonsson Engineering Center.

“As engineers, to be able to understand a certain phenomenon and design for it, you need to know what is happening. With a centrifuge, you have instrumentation, you can recreate the event, and now you can improve the design and the foundation of buildings.”

Professor Rob McCaffrey has helped pioneer the use of Global Positioning System (GPS) technology to measure the movements of plates. Today, much of McCaffrey’s work involves “measuring the buildup of the energy right now” in complex fault systems in order to develop a detailed picture of fault activity. At left, one of his assistants sets up the GPS equipment at Ohme Gardens, just north of Wenatchee, Wash.
When Garnet Douglass Baltimore quietly celebrated his 84th birthday in April 1943, the Troy Record published an article lauding the distinguished civil engineer and landscape architect as “one of the best known residents of Troy.” Three years later his death was front-page news, and the Times Record followed up his lengthy obituary with an editorial eulogizing this first citizen of Troy who, born into a family of barbers, and grandson of a slave, became in 1881 the first African-American graduate of Rensselaer Polytechnic Institute. He then built his accomplished engineering career around the city that was his lifetime home. “There are citizens who become so valuable that race, religion, ancestry or any other divisive attribute is merged in the standard of service,” wrote the Record. “Garnet D. Baltimore is not thought of in Troy by any narrower conception than that of Trojan. He was born here, educated here, practiced here, served the public here, died here. He represented Troy; he helped to develop it; he bet on it from birth to death.”

By Meg Gallien
The sentiments of his contemporaries were echoed in September when the City of Troy renamed in his honor a section of the street on which Baltimore was born, lived for many years, and died. At a ceremony announcing the naming of Eighth Street between Federal and Ferry Streets “Garnet Douglass Baltimore Street,” Mayor Harry Tutunjian said Baltimore was “one of the first believers that the City of Troy was a jewel that should be cherished by all those who live in upstate New York.”

The section of Eighth Street chosen to bear Baltimore’s name ends at the foot of Prospect Park, which secured Baltimore’s fame as a landscape designer.

Jannie Gibson Daggs, a descendent of Baltimore’s who lives in Cohoes, N.Y., and attended the ceremony, says she is happy that Baltimore, who also was recently inducted into the Rensselaer Alumni Hall of Fame, is finally being recognized in a very public way.

“The street was more than I ever dreamed of,” says Daggs, who has been researching Baltimore through published sources as well as stories handed down through the family. Daggs’s great-grandmother Annie Baltimore was a cousin of Garnet Baltimore.

“He was the first one in the family to go to college,” she says. “This was important. There is a lot of pride.”

Family and Community Roots

Garnet Douglass Baltimore was born April 15, 1859, in a cottage at 162 Eighth Street, the same address he occupied at the time of his death.

He was the son of Peter F. Baltimore and Caroline Newcomb Baltimore. Peter was a larger-than-life figure in Troy in the 19th century. He carried on the family trade, that of barber, at an establishment known as the Veranda, on First Street. It was described in Peter’s obituary as “a high-class tonsorial resort and it was used as a gathering place for the most prominent citizens of Troy.” Peter was a respected and well-liked citizen who “exercised through his personality a wide influence in this vicinity.”

Garnet grew up mingling among this clientele, says Daggs. “He was accustomed to conversation. He learned the gift of gab from his father, his uncles, and went on to school and did what he could do.”

Garnet Baltimore, according to his father’s 1913 obituary, was the grandson of Samuel Baltimore, a slave who fought in the Revolutionary War. When Samuel’s owner refused to honor an agreement promising freedom to slaves who fought in the war, Samuel fled north.

“To think that you come from a slave,” says Daggs. “And that a grandchild went on and finished college.”

Peter Baltimore had christened his son in honor of two towering figures in the anti-slavery movement, Henry Highland Garnet and Frederick Douglass. Peter was a pupil of abolitionist minister Garnet, who from 1840 to 1848 was minister of the first African-American church established in Troy, the Liberty Street Presbyterian Church. Peter also associated with Frederick Douglass, black mathematician Charles Reason, and Underground Railroad activist Robert Purvis.

Troy attracted such notables because it was host to many state and national conventions for African Americans. Troy also was an important stop for runaway slaves on the Underground Railroad. In a well-known incident in 1860 involving the arrest of escaped slave Charles Nalle, Peter Baltimore and his brother, William, were central figures in the large crowd that helped Nalle get away.

William Baltimore, Garnet’s uncle, also was well-known and respected in Troy. According to his 1877 obituary in the Troy Daily Times, he served in various representative offices for the colored people of this state, including the presidency of their state conventions and membership of important committees. His counsel was sought by them as a cool-headed and true-hearted man.

But for all the activity among the African-American community in Troy, in which his father and uncle played prominent roles, Garnet himself seems not to have been involved. He graduated from the Troy Academy in 1877 along with the sons of Troy’s most successful citizens, graduated from Rensselaer in 1881 with a degree in civil engineering, and pursued a lifelong career as an engineer.

“Garnet always stuck to the business of his profession,” says Daggs. “I don’t think he saw a black and white world. I think he saw a world of people.”

Elegant Nature

Baltimore took on a wide variety of engineering assignments—building bridges, railroads, canals and waterways, designing cemeteries and, most notably, creating Prospect Park in Troy. He was a noted surveyor and consulting engineer throughout his career.

According to newspaper accounts, Baltimore started his first job the day after graduation from Rensselaer when he was appointed assistant engineer on construction of the Albany and Greenbush Bridge, between Albany and Rensselaer. He then was engaged in several assignments with the Sandy Hill, Granville & Rutland, and Greenwich & Johnsonville railroads.

For eight years he was employed by the state department of public works. It was in this capacity that he made notable accomplishments in his

Editorial from The Times Record, Troy, N.Y., Thursday Evening, June 13, 1946

Garnet D. Baltimore.

A great student of racial relationships once said that the problem was to build up character to such a point that observers would “forget the color for the man.” There are citizens who become so valuable that race, religion, ancestry or any other divisive attribute is merged in the standard of service.

Garnet D. Baltimore is not thought of in Troy by any narrower conception than that of Trojan. He was born here, educated here, practiced here, served the public here, died here. He represented Troy; he helped to develop it; he bet on it from birth to death.

There was a time when he was in the thick of municipal affairs. He was architectural engineer at Oakwood Cemetery. He laid out Prospect Park. He was probably the greatest surveyor of the city’s history. People have not yet forgotten this part of his career.

But the present generation will remember him better when, on the sunny side of life, perhaps in its later afternoon, he walked the street, speaking to very nearly everyone he passed, stopping for a friendly chat along the curbside. He was as much of Troy as the monument—or the ancient elm at State Street and Fifth Avenue. Until it adjusts itself to the swinging pendulum of time and passes on to the affairs of another day many a Trojan will find himself somewhat lost without him.
At Prospect Park, Baltimore created a circular landscape with winding roads and pathways, gardens, tennis courts, a pond, and a scenic overlook, made out of red cedar in an Adirondack style, on the western edge of the plateau... The park was described at its completion as 84 acres of elegant nature.
work with New York state waterways. After serving as assistant engineer and surveyor on the Erie Canal, Baltimore was put in charge of the Shinnecock and Peconic Canal on Long Island.

His most renowned work with canals came in 1884, when he supervised the extension of the Oswego Canal lock known as the “mud lock.” Confronted with quicksand on the site, Baltimore devised a system of cement testing that became a standard for the state. The state engineer’s report noted: “Although the masonry was built in sections, and the character of the material so soft that bearing piles, 20 feet in length, often floated out of place, no settlement sufficient to show a crack in the cement could be found, the quicksand being so confined that a solid foundation was formed.”

The focus of Baltimore’s work returned to Troy in 1891 when he was hired as assistant engineer for the city’s Public Improvement Commission. Three years later he became assistant city engineer, and in 1906 he was named engineer for the city’s Department of Parks.

It was in 1903, when he was appointed landscape engineer for the public park system at a salary of $2,000 a year, that Baltimore was engaged to draw up plans for the park on what was then known as Warren Hill. Today this prized asset of Troy, transformed by Baltimore into the popular Prospect Park, stands as testament to the blossoming of Baltimore’s talents as a landscape engineer.

The City of Troy purchased the lands for the park from the Warren estate for $110,000. In the 1700s, Samuel Wilson, the meat supplier who became known as “Uncle Sam,” settled there and opened a brickyard and slaughterhouse. A century later, prominent Troy families, the Warrens and the Vails, had built homes on the site. The 84-acre plot included an impressive 25-mile panorama of the Hudson Valley. Baltimore’s charge was to create a public park for use by people of all ages.

“It is the calling and duty of the Landscape Engineer to devise ways of arranging land and its accompanying landscape so that whatever the particular purpose in view may be, the result shall be as thoroughly beautiful as possible,” wrote Baltimore in his July 10, 1903, Report of The Landscape Engineer On the Examination of the Parks Systems of Various Municipalities.

The report was the result of an ambitious tour Baltimore made in preparation for his work in Troy of several model parks, including Central Park in New York City, the Bronx Zoological Gardens, Prospect Park in Brooklyn, and parks in New Haven, Hartford, Providence, and Boston.

He noted that the attractions found in the parks outside of their landscape beauty included music, boating, tennis, croquet, swings, sand courts, and even the agreeable presence of gray squirrels. But he remained convinced that the most important goal in designing a park was to enhance the landscape’s natural assets.

To provide for “the refreshment of the bodies and souls of great numbers of people,” he wrote, it is desirable to “follow as far as possible the dictates of poetic and artistic feeling for breadth of composition and picturesqueness of detail.”

He concluded: “It is a law of nature, which must not be forgotten, that satisfying beauty springs from fitness or adaptation to purpose, much more surely and directly than from added ornament or the most careful imitation.”

At Prospect Park, Baltimore created a circular landscape with winding roads and pathways, gardens, tennis courts, a pond, and a scenic overlook, made out of red cedar in an Adirondack style, on the western edge of the plateau. A playground provided areas to play croquet and other sports, and a sand court, where children could dig with spades and shovels. The park was described at its completion as 84 acres of elegant nature.

Baltimore’s long career included cemetery design, including Troy’s Forest Park Cemetery (which subsequently suffered bankruptcy and was unable to complete his plans), Graceland Cemetery in Albany, and cemeteries in Hoosick Falls, Glens Falls, and Amsterdam. He was a consulting engineer at Troy’s impressive Oakwood Cemetery for 30 years. Baltimore is buried at Oakwood, along with his parents, three siblings, and his wife, Mary Lane, about whom very little is known. He had no children.

In his later years he made surveys and maps for attorneys of scenes of accidents and crimes, and testified in court about those measurements. The Times Record hailed Baltimore as “probably the greatest surveyor of the city’s history.”

There is little evidence that Baltimore suffered discrimination. Accept for one incident in which someone tried unsuccessfully to have him removed from a position by changing the job qualifications, Daggs is aware of none.

“This man has never been discriminated upon,” she says. “He was well into his job with the city of Troy before anybody tried to ruffle his feathers.”

With the street dedication and Baltimore’s induction into the Rensselaer Hall of Fame at the same weekend in September, Daggs sees a future for her illustrious ancestor as a role model not only for Rensselaer students, but for the local youth.

“This comes at a time when the children of Troy need someone to look up to,” says Daggs, who accepted the Hall of Fame award on behalf of the many family members attending the ceremony. “There’s Frederick Douglass, who was a great man, and Martin Luther King, who was a great man, but they weren’t Trojans. Now when these kids go by that street sign, they will know about Garnet Baltimore.”

Garnet D. Baltimore Lecture Series

The Garnet Baltimore Lecture Series was established at Rensselaer in 1991 to focus on issues of equality and cultural diversity. The 2005 lecture was delivered by Sylvester James Gates Jr., director of the Center for String and Particle Theory at the University of Maryland at College Park, who spoke on “Thoughts for a Third Millennium United States.”

1991 Johnnetta Cole
President, Spelman College

1992 H. Patrick Swygert
President, University at Albany, SUNY

1993 Sharon E. Sutton
Associate Professor, University of Michigan

1994 Col. Charles Bolden
Astronaut, NASA

1995 Freeman Hrabowski
President, University of Maryland

1996 H. Carl McCall
New York State Comptroller

1997 Shirley Ann Jackson
Chair, U.S. Nuclear Regulatory Commission

1998 Yvonne D. Eagle
Astronaut, NASA

1999 Glegg L. Watson
Xerox Corp.

2000 Shirley Malcolm
Directorate for Education and Human Resources Program of the AAAS

2001 Neil de Grasse Tyson
Frederick P. Rose Director, Hayden Planetarium, American Museum of Natural History

2002 Eugene M. DeLoatch
Dean, School of Engineering, Morgan State University

2003 Morris H. Morgan III
Dean, School of Engineering & Technology, Hampton University

2004 Julian M. Earls
Director, Glenn Research Center, NASA
Baltimore remained convinced that the most important goal in designing a park was to enhance the landscape’s natural assets.
Worldwide Travel Program Visits China

A GROUP OF 39 U.S. ALUMNI AND THEIR GUESTS learned firsthand about the global reach of Rensselaer during a recent trip to China with the Rensselaer Alumni Association (RAA) Worldwide Travel Program.

In October, alumni visited Xi’an, Shanghai, Hong Kong, and many other fascinating destinations. “In a phrase, the China trip was beyond superlatives in almost every respect—the trip of a lifetime,” says Basil Whiting ’60.

Travelers visited big cities and remote countrysides, touring museums, restaurants, shops, factories, and experiencing for themselves the Chinese people and the culture.

“It seems everything is under construction for the 2008 Olympics,” Whiting says. “We endlessly walked Tiananmen Square, the Forbidden City, the Ming Tombs, and the Great Wall, and visited a freshwater pearl jewelry factory where our guide opened a huge freshwater clam to find almost two dozen pearls inside!”

One of the trip’s highlights was the stop in Chongqing. “We explored this bustling city at the western terminus of the new Yangtze lake,” Whiting says. “We saw five pandas at the zoo, and some of us actually patted one. One expects them to be fluffy; actually, I can testify that their fur is rough and coarse and feels like stroking a doormat.”

Another highlight was a reception in Beijing where 20 members of the new China Alumni Chapter met with U.S. travelers. Many chapter members graduated from a specialized MBA program in the Lally School, and have now assumed leading roles in both government and industry. Guobin Zhao ’99, founder of Guobin American English Learning Center, acted as host and master of ceremonies. “It was a wonderful opportunity to swap RPI stories and for us to learn from some of those who were making the China miracle happen,” says RAA President Bob Forman ’61.

The RAA’s Worldwide Travel Program offers many opportunities to bring together alumni from around the world. To learn more, contact Michael Wellner ’64 at CaptMike46@aol.com or call the alumni office at (518) 276-6205. For information on international alumni chapters, contact Dawn Chen at chenx7@rpi.edu or (518) 276-6099.

Whiting has compiled a trip memoir with photos and vivid descriptions. To read the entire story and see the pictures, go to www.alumni.rpi.edu/travel.html.

RAA VISA CARD

The popular Rensselaer credit card program has a new provider—U.S. Bank. The card offers competitive rates and services, carries the image of the Heffner Alumni House, and supports the programs of the RAA. Visit www.alumni.rpi.edu or call (800) 853-5576 ext. 8385 for info.

JOIN RAA BOARD AND COMMITTEES

Do you want to have an impact on campus? Do you have ideas about alumni programs and services? Then get involved with the Rensselaer Alumni Association (RAA). The RAA board, working with the Alumni Relations Office, meets three times per year in Troy, and serves as the voice of alumni to the campus. Nominations to serve on next year’s board and committees are now being accepted. Send a brief statement of support to Joyce Kelly Martin at martij@rpi.edu by Feb. 10, or call (518) 276-6208.

RAA SEeks Nominations for Volunteer Awards

Each year, hundreds of alumni volunteer for Rensselaer. Nominations are being sought to recognize these dedicated individuals through the RAA awards program. Awards include:

DISTINGUISHED SERVICE AWARD—Recognizes distinguished service by alumni or non-alumni to Rensselaer, to a profession, to the nation, or to humanity.

ALBERT FOX DEMERS MEDAL—Established to recognize and stimulate interest in the welfare of the Institute by alumni or non-alumni.

ALUMNI KEY AWARD—Recognizes outstanding service supporting the advancement of Rensselaer, by alumni or non-alumni.

RAA TEACHING AWARD— Recognizes current faculty members for outstanding teaching techniques, contributions to the campus experience, and commitment to students.

Submit a nomination at www.alumni.rpi.edu/awardsnomination.asp by Feb. 10 or write to Laura Bedford O’Donnell, Alumni Relations, 1301 Peoples Ave., Troy, NY 12180-3500.
FEBRUARY

School of Architecture 75th Anniversary Lecture Series. Guest speaker will be James Bradburn ’66. Greene Building Gallery, 6 p.m. Contact Dale Masten at masted@rpi.edu or (518) 276-6478.

Big Red Freakout Ice House. Enjoy a pre-game dinner, have your face painted, and get psyched for the 29th Big Red Freakout hockey game against Brown. Tickets to the sold-out game are available for Ice House attendees. Register at www.alumni.rpi.edu/hockey or contact Peter Pedone at pedonp@rpi.edu or (518) 276-6061.

Alumnae Basketball Weekend. Former women’s basketball players will play at 11 a.m. in the Robison Gym, followed by the varsity game vs. Hamilton. During halftime of the varsity game, former players will be introduced and a special ceremony recognizing the 2001 UCAA Championship Team will be held. Contact Coach John Greene at greenj5@rpi.edu or (518) 276-8037.

Alumnae Hockey Weekend. Watch the former women’s hockey players take to the ice in the Houston Field House. This free event will begin at 11 a.m., prior to the Division I women’s game against Quinnipiac at 4 p.m.

MARCH

School of Architecture 75th Anniversary Lecture Series. Peter Gorman ’67 will present “Designing Luxury Hotels and Urban Mixed-Use Complexes.” Greene Building Gallery, 6 p.m. Contact Dale Masten at masted@rpi.edu or (518) 276-6478.

School of Architecture 75th Anniversary Lecture Series. Richard Rittelmann ’60 will present “The Future of the Profession.” Greene Building Gallery, 6 p.m. Contact Dale Masten at masted@rpi.edu or (518) 276-6478.

Alumnae Hockey Weekend. Watch the former women’s hockey players take to the ice in the Houston Field House. This free event will begin at 11 a.m., prior to the Division I women’s game against Quinnipiac at 4 p.m.

School of Architecture 75th Anniversary Lecture Series. Peter Bohlin ’58 will present “The Nature of Circumstance.” Greene Building Gallery, 6 p.m. Contact Dale Masten at masted@rpi.edu or (518) 276-6478.

School of Architecture 75th Anniversary Lecture Series. Hugh Hochberg ’67 will present “Where Architecture Is Headed.” Greene Building Gallery, 6 p.m. Contact Dale Masten at masted@rpi.edu or (518) 276-6478.

APRIL

“Rensselaer on the Road.” Lally School Dean David Gautschi will discuss the ongoing Renaissance at Rensselaer with Dallas-area alumni. Contact Susan Haight at haighs@rpi.edu or (518) 276-6042.

School of Architecture 75th Anniversary Lecture Series. Hugh Hochberg ’67 will present “Where Architecture Is Headed.” Greene Building Gallery, 6 p.m. Contact Dale Masten at masted@rpi.edu or (518) 276-6478.

Reception for Rensselaer Alumni at the Chicago Biotechnology Industry Association Annual Convention. Contact Geoff Seber at seberg@rpi.edu or (518) 276-2324.

“Rensselaer on the Road.” Engineering School Dean Alan Cramb will discuss the ongoing Renaissance at Rensselaer with Detroit-area alumni. Contact Susan Haight at haighs@rpi.edu or (518) 276-6042.

MAY

“Rensselaer on the Road.” Lally School Dean David Gautschi will discuss the ongoing Renaissance at Rensselaer with Atlanta-area alumni. Contact Susan Haight, haighs@rpi.edu or (518) 276-6042.

200th Commencement. Harkness Field, Troy campus. www.rpi.edu/academics/commencement/
AS MY 45 YEARS AT RPI COMES TO an end, it is fitting that I recall my first days on campus.

I arrived from a small town but with vivid images of universities and the academic life: musty buildings, clever professors, and studies of wondrous things. My very first class filled the bill: Prof. Dis Maly was slight of build, covered with chalk dust, and wreathed in pipe smoke. Pleasant but somewhat distracted, he delivered lectures that were droll and danced when he spoke of mathematics of Change.

Calculus was exciting and bold, something new and different for a confident freshman who had prided himself on All Things Mathematical in high school. This math course required a new alphabet—Greek—adding to its mystique. And, it was not that difficult. My first bi-weekly quiz proved it: A. I was rolling.

The Greek alphabet gave way to more complicated stuff functions, and then limits. My next two quiz grades: B and C. Then came differentiation and Quiz #4: F.

It was clear that I was going to have to come to terms with The Mathematics of Change, or my college career was going to be seriously foreshortened. I had two choices: dig deep and figure it out, or go home in shame. In retrospect, there was no choice. I pulled it out.

Fast forward 45 years. I am still heavily involved with The Mathematics of Change.

Consider the Rensselaer of 2005. In the past six years, it has hired 150 new faculty, and in areas unheard of when I sat in Carnegie 02, Prof. Maly’s dusty classroom. The faculty received $80 million in research awards—more than doubled in six years—and they are taking on many of the key challenges of our times. Average scores of entering students have increased dramatically in six years. The Institute has initiated nearly $500 million in new construction and renovation, and has raised more than $660 million.

Among colleges and universities, this represents extraordinary—no, titanic—change. Within the rubric of The Rensselaer Plan, every part of the Institute has placed bets and is achieving startling results.

My own school, Architecture, has undergone dramatic growth in the past six years. Undergraduate enrollment has grown to nearly 300, and there are 65 graduate students. The Lighting Research Center is the world’s best. The school has opened graduate programs in lighting, acoustics, and building conservation, and is offering a newly approved Ph.D. in architectural sciences.

The undergraduate student experience has changed dramatically as well. Academic programs, while rigorous as ever, place a premium on student initiative, teamwork, and innovation. Mobile computing allows students to work anywhere and everywhere. Clubs, organizations, sports, and community service provide ubiquitous opportunities for initiative and accomplishment. We see the results in the math: Freshman to sophomore persistence rates are in the 91-93 percent range, and the six-year graduation rate is at 81 percent (compared to 68 percent 10 years ago).

Rensselaer has moved boldly into the life sciences and biotechnology. If I had known that, I would have listened more attentively to Prof. Faigenbaum in Chemistry I, or tried harder to get those Saturday morning chemistry lab experiments to work!

We’ve moved, too, into the arts. Here we architects had opportunity—and also Prof. George Rickey, an outstanding teacher who was becoming America’s leading kinetic sculptor. His sculpture, Six Random Lines Excentric, stands in front of the Greene Building today.

Life sciences and the arts are big bets for RPI in the 21st century, and big changes are already under way. Faculty members are both changing lives and saving lives with their research and teaching. The digital platform is hosting an extraordinary convergence of science, technology, visualization, art, and performance.

For my part, I am proud to have served my alma mater as professor, dean, and vice president during the formative years of some of these initiatives, and especially during the past six years when so many wonderful changes have come to full blossom in the fertile environment provided by The Rensselaer Plan.

Those many years ago, The Mathematics of Change brought me to a fork in the road at RPI. Following Yogi Berra’s advice, I took it! For the past four-and-a-half decades, I have lived The Mathematics of Change, as Rensselaer Polytechnic Institute has grown from a small, lean and mean engineering school in upstate New York into a top national technological research university. I feel I have thrived in this environment, and I owe it all to an extraordinary professor named Dis Maly.
Inspiring Tomorrow’s Leaders

A renaissance is under way at Rensselaer. Our world-class faculty, state-of-the-art research facilities, and dynamic campus environment attract top students from around the world. Recently admitted classes have been among the highest quality in Rensselaer’s history, with record numbers of women, minorities, and Rensselaer Medalists.

> Quality Students—Average freshman SAT scores have increased 60 points in the last six years.

> Creative Curriculum—The undergraduate program received the highest ranking in years from U.S. News & World Report—43rd, up from 46th last year.

> Commitment to Teaching—Reduced faculty/student ratio from 17:1 to 14:1.

Join us on this remarkable journey. Call (518) 276-2566 to visit the campus and see for yourself, or visit us online at rpi.edu/campaign to learn more about Renaissance at Rensselaer: The Campaign for Rensselaer Polytechnic Institute.
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