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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) 276-6091.
An Extraordinary Opportunity

Capital campaign is designed to support research, learning, and the transformation of the campus and campus life

The public phase of our $1 billion capital campaign is under way. After the kickoff in September, Renaissance at Rensseelaer: The Campaign for Rensseelaer Polytechnic Institute is now being rolled out to alumni in cities across the country, in Asia, and beyond. This fall, in Hartford, Boston, and New York City, the campaign was highlighted at gatherings that featured distinguished speakers who took part in colloquia on a range of topics.

Called "An Extraordinary Evening of Conversation," this program thus far has included such guests as Claire Fraser '77, president and director of The Institute for Genomic Research and a member of the Rensseelaer board of trustees; Peter Eio, the retired president of Lego Systems Inc.; IT strategy consultant Paul Cosgrave '72; Trustee Thomas Baruch '60, founder of CMEA Ventures, a leading venture capital firm based in San Francisco; and Trustee Paul Severino '69, an investor and adviser to emerging technology companies and venture funds. (Please see page 31 for information on upcoming campaign events around the country.)

The purpose of this unprecedented campaign is to support key goals of The Rensseelaer Plan, the Institute's blueprint for transformation. The campaign is designed to support research, learning, and the transformation of the campus and campus life. Our pledge is to raise $1 billion for Rensseelaer by the end of December 2008. Currently, our campaign total stands at $623 million, and rising.

The continued expansion of our research enterprise is crucial to the ability of Rensseelaer to be a major player in discovery and innovation, which will contribute to global health, safety and security, and prosperity. With the opening, this fall, of the world-class Center for Biotechnology and Interdisciplinary Studies, Rensseelaer has signaled its commitment to taking its place among the handful of research universities that will shape the course of this century. Our growing research presence is evident in the dramatic increase in research funding. For example, in fiscal year 1998, we received $37 million in research awards; in fiscal year 2004, that number grew to $90 million. Meanwhile, awards from the National Institutes of Health (NIH), the primary funding source for research in the life sciences, stand at $24 million today, up from $400,000 three years ago.

Our ambitious research agenda also requires a significant investment in faculty. We thus far have enlivened our campus and our research program with 140 new tenured and tenure-track faculty over a four-year period—73 of these in entirely new positions. We must move forward to complete the constellations in our key areas of research, and continue to compete globally for the extraordinary faculty who will serve as teacher-scholars and groundbreaking researchers.

The campaign is a significant investment in the vigorous pursuit of learning at Rensseelaer, which will help to ensure that our nation has the talent and creativity to sustain our role as a leader in an increasingly global marketplace. Specifically, this means that we must invest in scholarships, fellowships, and curriculum development so that we may attract and support the very best students who, in turn, will be at the forefront of this century's great achievements.

As Rensseelaer graduates are aware, the physical campus is an important component of the quality of student experience. The campaign will support the improvement and expansion of campus facilities and more robust campus life. This investment includes renovations to all freshman residence halls and rolling renovations of upper-class residence halls; upgraded classrooms, laboratories, and athletic facilities; enhanced student counseling services and support for students who need academic assistance; and the transformation of Academy Hall into an integrated student services center.

In addition, as I discussed in my column in the Summer 2004 issue, we are making a major investment in our athletic facilities on the east campus to support a popular athletics program that involves more than 5,000 students each year. Our other major signature facility, EMPAC, currently is under construction on the west campus on the bluff overlooking the City of Troy. When completed in 2007, this unique facility will transform the quality of life at Rensseelaer and will offer a place for students and the entire campus community to experience the intersection of the arts and technology.

The excitement is building for this campaign. In this period of extraordinary growth and dynamism at Rensseelaer, we now possess a unique opportunity to continue the intellectual, social, cultural, and physical transformation which honors our institutional legacy as it propels this university forward into the future.

To learn more, I invite you to visit the campaign Web site, www.rpi.edu/campaign/index.html.
First Visit to Horse Show Nationals? Neigh!

In the Fall 2004 Rensselaer magazine, you've made an oversight. Although it's excellent news that Mariah Hughlock qualified for the IHSA nationals, she was not the first Rensselaer student to do so.

My (now) wife, Dr. JoAnn Johnson '92, qualified and competed in both 1991 and 1992. I don't really know if she was the first Rensselaer student either, but that was what we were told at the time.

JoAnn now owns Frontier Equine Practice (www.frontierequine.com), was also a biomedical major like Mariah, has a doctor of veterinary medicine from Cornell, and an MBA from the New York State University at Buffalo. One of the things that made Jo pick RPI over MIT was that RPI had a riding team and MIT didn't.

On a personal note, Jo and I just had our first child, Megan Elizabeth (Oct. 28). Thanks for an interesting magazine!

Keith Gargiulo '92, PE
West Falls, N.Y.

As a past captain (and treasurer and co-captain) of the RPI Equestrian Team that is funded by the Student Union, I know of several other members who qualified and even placed in the National Horse Show in the early '90s. JoAnn Johnson '92, for stock seat open division, and Alison Lorig '92, for English equitation. The equestrian team during the '90-'94 span always had a member qualify for Regional Competition, and Zonal Competition, which leads on to Nationals.

Jaclyn Bailey '95
Torringon, Conn.

Teach the Children
This is in reply to Carol Yeaton Hartman '84's letter in the Rensselaer Summer 2004 magazine. I am one of those female RPI engineers (Class of 1950) who, after having children, wanted to use my education to help defray the education costs for four children. There was a shortage of math, science, and industrial arts substitute teachers in our school district. I found that I enjoyed teaching. I got my certification by taking some "ed" courses and applied for a full-time position, and was hired because of my engineering background.

Do not denigrate the teaching profession. You will have many wonderful rewards if you use your technical background to influence and encourage young minds.

I had 22 years of gratifying work, and know that former students remember our classes. I am now retired for 20 years, but remember my teaching years fondly.

Irma Shaler Cohen '50
Hempstead, N.Y.

Remembering Professor Gould
Coverage of the RPI Players in the Fall 2004 issue is, in my memory, the very first time that they have ever been featured in an article. After all these years! It is about time.

An error: The Players moved from the old playhouse to the 15th Street Lounge in 1950 (not 1966), due to condemnation of the playhouse for occupancy. You are correct, however, that the move to the Lounge presented problems—and a lot more of them than listed. One was lighting, due to inadequate electric service. And on, and on—but we were successful in making the transition without delaying any production.

I am taking liberties with this reply to report some of the accomplishments and honors accorded to Jay Gould that could not be included in the story. They will be of interest to alumni that enjoyed an association with Professor Gould. Most of us in "those days" had him for English.

Jay Reid Gould, professor of English and one of the Players founders, was the recipient of many honors for his efforts and dedication to teaching technical communication as a professional discipline. He established the world's first master's program in technical communication and, in the late 1960s, helped establish this country's first Ph.D. program in communication and rhetoric, both on the hill. He was the founder of the RPI Technical Writer's Institute, co-wrote two of the early classic textbooks in the field, produced over 50 journal articles, and was founding editor of both the Journal of Technical Communication and a book series.

As one of the founders of the Society for Technical Communication (STC), he was named a fellow of STC in 1965, and later received the STC President's Award. STC presents the Jay R. Gould Award for Excellence in Teaching annually. A member of the honorary dramatic fraternity Alpha Psi Omega, he was deeply moved when STC established Sigma Tau Chi, the honorary fraternity for technical writers, with him as Member No. 1.

Jay Gould had the memory of two elephants. Our paths did not cross from 1952 until 1989; upon our meeting, without hesitation he knew my name and inquired if I was active in dramatics!

Don't wait another 75 years for the follow-up Players article, or for one about any of the other organizations that made four years on the hill a broadening life experience.

David Dobson '52, PE
Chevy Chase, Md.

We'd love to hear from you! To provide space for as many letters as possible, we often must edit them for length. Please address correspondence to: Rensselaer Magazine, Office of Communications, Rensselaer Polytechnic Institute, Troy, NY 12180, e-mail to alum.mag@rpi.edu, or call (518) 276-6531.
Portable Laboratory

Rensselaer's Academy of Electronic Media is developing a first-of-its-kind "mobile studio" for engineering students. Using wireless technology, the studio will allow combined lecture and lab work anywhere on or off campus.

"With the latest mobile technologies, our students will be able to, at any time and anywhere, explore engineering principles, devices, and systems that have historically been restricted to specific laboratories or classrooms," says Don Millard '91, Academy director. "The idea is to take the untethered world of technology and apply it to engineering education so that we no longer have to be dedicated to a particular facility to provide engaging, interactive learning."

The new teaching model will be developed utilizing support from a Hewlett Packard (HP) Technology for Teaching grant of $65,819 in computing equipment and funding. The equipment includes 20 high-performance Tablet PCs, which have ultralight portable touch screen computing pads that allow users to draw, type, and access the Internet, and serve as personal digital assistants. A wireless network, digital camera, printer, and specially designed cart for the tablets also is part of the HP grant.

The mobile studio, being tested this fall, will serve as a pilot program for a circuits course designed for sophomores and juniors. Millard also will use the grant to develop hardware and software that integrates a scope, multimeter (a device that measures electrical currents and resistance), and function generator (a device that produces electrical signals)—turning the Tablet PC into a mobile laboratory instrumentation suite.

"Using the PC to provide similar functionality to that of typical engineering equipment will no longer require us to dedicate bench space that we currently use for housing the many individual units," Millard says. "Our objective is to expand the studio model so that students can use technology to learn in physical environments that offer greater flexibility for student learning," Millard says. "Those environments may include residence halls, library conferencing areas, the Union, and other non-classroom environments that are no longer restricted by locations with wired network access or specialized equipment."
ARCHITECTURE

Students Design Homes for Haiti

EARLIER THIS YEAR, HAITI WAS RAVAGED by Hurricane Ivan and Tropical Storm Jeanne, damaging or destroying 90 percent of homes in the country, according to news reports. In November, Rensselaer hosted a charette called “Haiti: 8x8x40” competition where teams of Rensselaer students designed housing and community complexes using standard steel shipping containers. The students competed for a total of $2,000 in prize money. The contest was organized by Michael Oatman, clinical assistant professor of architecture at Rensselaer.

With an average per-capita income of about $425 a year, Haiti is the poorest country in the Western Hemisphere, according to the Associated Press. Extreme poverty and recent storm devastation have resulted in an immediate need to address the homeless crisis in Haiti.

In countries like Haiti, where imports far exceed exports, there is often an abundance of retired shipping containers. The numbers in the title of the competition (8x8x40) refer to standard container dimensions.

“Retired shipping containers have become a bit of a headache for shipping companies,” explained Adrian Dunner in an interview with the Schenectady Daily Gazette about the competition. Dunner runs a subsidiary of Transamerica Corp., a worldwide shipping company. Each team could use a maximum of 20 shipping containers in their design. On hand to help judge the designs was Eric Davenport, an associate at Michael Phinney ’95’s Phinney Design Group.

The designs included homes, schools, churches, and day care centers. The “best overall design” award of $1,000 went to the team of Joseph Choma, Elise Hilton, Jason Bean, and Elise DeChard, all first-year students.

Oatman credits his friend and co-founder of Shelter Corps, LLC, Edward Beason, with involving him in the cargo container project. Shelter Corps hopes to set up a factory in Haiti to convert containers into buildings.

(below) Architect Eric Davenport and first-year student Claudeen Pierre discuss design concepts.

Research Roundup

NYSTAR Faculty Development Awards

Rensselaer has been selected to receive two $750,000 faculty development awards from the New York State Office of Science, Technology and Academic Research (NYSTAR) to attract world-class scientists to New York. One award will be used to attract a researcher to lead Rensselaer’s functional tissue engineering and regenerative medicine research constellation program, and the second will be used to recruit a scientist to conduct research in semiconductors and biosensors.

Renowned Scientist To Lead Biocomputation and Bioinformatics Constellation

Angel Garcia, a renowned theoretical physicist in biomolecular research, has been appointed a senior constellation chaired professor in biocomputation and bioinformatics at Rensselaer. He will join Rensselaer on Jan. 1, 2005. The Biocomputation and Bioinformatics Constellation will focus on developing new computing tools to analyze complex biological data, make predictions to guide experimental work, and offer powerful new methods to predict molecular structure and understand the complex behavior of living organisms. Garcia is internationally known for his research on mathematical modeling and computational analysis of problems in cellular and molecular biology. He currently leads Los Alamos National Laboratory’s multimillion-dollar research in theoretical biology and biophysics in Los Alamos, N.M.

Monitoring the Mighty Hudson

The final link of the first major cooperative research initiative of the Rivers and Estuaries Center on the Hudson was put in place in August as researchers from Rensselaer introduced a real-time water monitoring device into the river at Lock 2 of the Champlain Canal in Mechanicville, N.Y. The project—called “Riverscope”—is a joint effort with the center’s Upper Hudson Satellite, managed by Rensselaer; and the Lower Hudson Satellite, managed by Lamont-Doherty Earth Observatory at Columbia University. “Riverscope is a first step in achieving one of the primary goals of the Rivers and Estuaries Center: to make the invisible Hudson visible,” said John Cronin, managing director of the center. “With the ability to know and see what is happening while it is happening, we can bring the living Hudson River to the desks of researchers, students, decision makers, and the public.”
Scientists at the forefront of emerging, innovative biomedical research shared their discoveries at a symposium and Presidential Colloquy held to mark the opening of Rensselaer’s Center for Biotechnology and Interdisciplinary Studies in early September.

The symposium included keynote speeches by three top scientists in their fields: Shirley Tilghman, president of Princeton University, and a highly respected molecular biologist; Troy Duster, professor of sociology at New York University and Chancellor’s Professor at the University of California, Berkeley; and Robert Langer, the Kenneth J. Germsheausen Professor of Chemical and Biomedical Engineering at the Massachusetts Institute of Technology.

Topics discussed during the Sept. 9 event included genomic sequencing, regenerative medicine, enzymes in drug discovery, and related research. Several Rensselaer faculty members and invited guests also made presentations about their research.

Langer presented some of his team’s extraordinary developments, including the case of a young victim with severe burns on his chest who was healed with tissue grown from his own cells.

University of Virginia Professor of Chemistry and Pathology Donald Hunt talked about the capabilities of new analytical equipment made possible by the intersection of engineering and life sciences. Using the new mass spectrometer, and a database of peptide sequences, scientists can identify thousands of phosphoproteins in a fraction of the time it used to take. Scientists may someday be able to develop a vaccine that can identify proteins secreted by diseased cells and stimulate cells to produce their own destroying agents.

Capping the day’s activities was a poster session consisting of more than 90 posters featuring some of the groundbreaking work being conducted by graduate and undergraduate students at Rensselaer, and a dinner featuring speaker Dr. Roderic Pettigrew ’73, director of the National Institute of Biomedical Imaging and Bioengineering.

Several of the nation’s top science policy makers and researchers came together at Rensselaer the next day to discuss “Opportunities at the Interface of Bioscience and Bioengineering” at a Presidential Colloquy. The roundtable discussion, moderated by President Shirley Ann Jackson, focused on the risks and the rewards of research at the intersection of the biosciences and bioengineering.

Panels spoke on the promise of the future of biotechnology, including tissue regeneration using both embryonic and adult stem cells, what can be achieved with the information from the human genome project, and the challenge of finding funding for pioneering research.

Panels included Dr. Elias Zerhouni, director of the National Institutes of Health; Bruce Alberts, president of the National Academy of Sciences; William Wulf, president of the National Academy of Engineering; Claire Fraser ’77, president and director of The Institute for Genomic Research (TIGR); James Mullen ’80, chief executive officer of Biogen Idec Inc.; and William Haseltine, chairman and chief executive officer of Human Genome Sciences Inc.

They discussed the importance of scientists as leaders in a public debate on some of the potentially controversial issues, and the need for more funding in basic research.

A ribbon-cutting ceremony for the new center followed the colloquy. Participants included U.S. Representative Michael McNulty, New York State Senate Majority Leader Joseph Bruno, and other leaders, representatives from economic development agencies and Rensselaer.

“I’m not a scientist or a technician, but sometimes I can recognize vision,” said McNulty. “I applaud what’s going to happen in this building, in the fields of biology, physics, engineering, computer technology—it will accrue to benefits to the area, the state, the nation and the world.”
**MAKING A DIFFERENCE**

**Laptop Partnership Renewed**

In today's online, real-time, high-speed economy, there is an unprecedented demand for students with the right technological skills—able to collaborate, communicate, and work effectively in teams, capable of applying knowledge and thinking independently. Rensselaer always has prided itself on preparing students with these qualities by providing them a unique environment in which to work and learn. In fact, the Institute was ranked first in a list of the “most connected campuses” in the country, according to a Princeton Review survey released in October.

This pioneering learning environment is most effectively seen in the Mobile Computing Program, where computing is fully integrated into the curriculum. Since the fall of 1999, Rensselaer has required all incoming undergraduates to have a laptop computer. Thanks to a relationship with IBM Corporation, IBM ThinkPads were made available—and fully loaded with software—from Rensselaer for a competitive price. As of 2002, all undergraduates at Rensselaer were participating in the program.

"Technology is a critical aspect of higher education," says John Kelly III '78, senior vice president at IBM Corporation. "IBM's relationship with Rensselaer ensures that students have both world-class instruction and technology as they build the skills and expertise required in today's economy."

A survey conducted by Rensselaer’s Anderson Center for Innovation in Undergraduate Education revealed very positive attitudes among students regarding the educational benefits of owning a laptop: 78 percent of them agreed that the use of laptops in class significantly enhanced their learning, and 88 percent agreed that laptops made learning more enjoyable.

Students can connect their laptop computers to the Rensselaer network in more than 35 classrooms wired for laptops, and at any of the hundreds of laptop jacks in public areas around campus. In addition, every room in the residence halls has a network connection for each student. Wireless access to the network is available in 30 buildings on the main campus and is being extended to the residence halls.

According to Sharon Roy, director of academic and research computing, "an important reason for the success of the program has been the emphasis on integrating the laptop into the curriculum. Given Rensselaer's expertise in educational technology and interactive learning, our faculty were poised to do so."

"The biggest advantage is having one universal laptop for students," says Carlos Perea '07, an electrical engineering major. "Professors can distribute assignments in a single format and students can get help 'on the spot' in class with computer-based assignments. Having all these tools is awesome!" Perea says.

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**CIVIL AND ENVIRONMENTAL ENGINEERING**

**Ground Monitoring**

TAREK ABDOUN, ASSISTANT PROFESSOR AND MANAGER of Rensselaer’s Geotechnical Centrifuge Research Center, is leading a team of scientists to develop a wireless sensor designed to warn against geotechnical hazards such as earthquakes, landslides, and floods. The research team includes Alhussein Abouzeid, assistant professor of electrical, computer, and systems engineering, and Mourad Zeghal, assistant professor of civil and environmental engineering.

"Recent advances in sensors and wireless networking technologies provide opportunities for new ways to detect and assess the impact of natural disasters," says Abdoun. "The new system is designed to enable a better understanding of ground failure mechanisms and has the potential to significantly reduce losses from natural disasters."

The team's sensor is a long rope about one inch in diameter consisting of various sensors and packed into PVC piping. The system is water-resistant and can be inserted into the ground up to 30 meters. The advanced sensor uses fiber-optic and micro-electro-mechanical-system technologies to simultaneously measure key indicators of impending ground failure—ground deformation and soil acceleration. Each sensor is connected to a wireless node to enable real-time monitoring, as well as remote sensor configuration.

"Real-time monitoring would allow for early detection and warning of geotechnical hazards, such as landslides, and help facilitate evacuations," says Abdoun.

According to Abdoun, real-time remote monitoring could replace manual sensors used by many state and federal agencies and eliminate the need to physically visit each site to take measurements and readings. The traditional manual systems provide limited monitoring capability—sensing acceleration or deformation readings, not both—and prove to be expensive, he says. Initial estimates indicate the new prototype would cost less than one-tenth of traditional sensors.

The U.S. Army Corps of Engineers and California's Department of Transportation are sponsoring the field implementation effort of Rensselaer's new system at four different sites.

The new system was recently tested at the National Research Institute for Earth Science and Disaster Prevention in Tsukuba, Japan, home of the world’s largest shake table for earthquake simulation. The team’s work was recently featured in the September 2004 edition of Civil Engineering, the magazine of the American Society of Civil Engineers.

RENSSELAER/WINTER 2004 7
After 12 seasons in the National Hockey League, former Rensselaer ice hockey standout (and aeronautical engineering major) Joe Juneau '91 has started a new career as a partner and account executive with Harfan Technologies, an engineering technology company based in Juneau's hometown of Pont-Rouge, Que., and in Frederick, Md., that develops infrastructure asset management solutions for the private and public sector. Juneau visited campus in October to discuss Harfan.

Q: Why did you decide to go into engineering after 12 seasons in the NHL?
A: All my life I've played hockey, but I've always been interested in many things. With my degree from RPI, I always wanted to go back to the tech world and do something productive.

Q: What do you do in your job with Harfan Technologies?
A: My job is to make sure people know about Harfan and our sophisticated asset management solutions. I've been a partner with Harfan since 2002. I am helping to develop collaborative opportunities for the company outside of Quebec. Because of the degree that I earned at RPI, and because most of my career as a professional hockey player was in the United States, I'm known as the "engineer hockey player." That makes it easier for me to teach people at the top, the thought leaders and decision makers, which is a significant challenge when you're a small company.

Q: Are you still flying your own airplane?
A: Yeah, and the plane I own now was actually my dream plane, the de Havilland Beaver, which is, up to today, the best bush plane that was ever built. It seats eight people and it gives me the chance to jump in with family and friends and bring them to my fishing cabin - an old log cabin that was built in the '40s. You know, you go there, you don't see anybody else. I'm alone on the lake with no access.

Q: What is your best hockey memory?
A: I think the top would be the (1992) Winter Olympics in Albertville, France. We were all amateurs [on the Canadian men's ice hockey team] and we managed to get a silver medal, and I was the high scorer in the tournament. It was great. I went to the Stanley Cup finals twice, and as much fun as it was, I didn't think it was like the Olympics were.

Q: You didn't speak English when you came to Rensselaer. What was your first day like?
A: It was probably the day in my life that I was the most nervous. It was hard to go into a store and ask for a pack of gum. I was very shy and was nervous about making mistakes. Instead of speaking up in class, I would go over a question in French in my head and work on translating it into English, and I wouldn't say it until I was comfortable. By the time I was ready to ask a question, it was three or four topics ago.

Q: How did you balance your academic program in aeronautical engineering and hockey at Rensselaer?
A: It was just a matter of being organized. Every day that I left my apartment, I had a list of every single thing that I needed to do that day. I don't think I ever failed a test in my life before I came here. And the first two tests that I took at RPI, I failed them, and pretty bad too. On one of them I think I got 22 percent, the other one 30 percent, if not less than that. When I got the results I went right away to the coach's office. I told Mike Addesa the situation, and I showed him all the homework that I did. The next week I had tutors in place for every single class I needed help with. What I gained the most from being around tutors was the fact that I had somebody one-on-one to discuss things with in English.

Q: What was it like to play with Adam Oates '85 in the NHL?
A: My first year [with the Boston Bruins], especially, it was unbelievable. He really took me under his wing and made my transition so much easier. I was playing on his line and, at that point, he was leading the league, so for me to start out in [professional] hockey and to play with one of the best playmakers was amazing.
Rensselaer Research and People Continue to Garner National Media Attention. Following are some recent mentions.

Business Week's 75th anniversary issue special report—"The Innovation Economy," on technologies and new ideas that are changing the world—featured a Q&A with President Shirley Ann Jackson on the importance of encouraging more young people to pursue careers in science, engineering, and math. "Technological innovation, coming out of basic research and invention, has been the engine of our economy...the stakes are clear," Jackson said, warning of a "quiet crisis that could lead to a perfect storm" if left unchecked.

Civil Engineering magazine's November issue profiled the NSF's new Network for Earthquake Engineering Simulation (NEES) consortium, including Rensselaer's renovated Geotechnical Centrifuge Research Center.

"It is not often that an exceptional group of leaders in science, engineering, business, and government are assembled in one place, but it's even less frequent when such an exceptional research facility as Troy, NY-based Rensselaer Polytechnic Institute's new Center for Biotechnology and Interdisciplinary Studies opens its doors," is how Buildings magazine began its feature story on Rensselaer's new "World Class" facility. The story, in the November edition, detailed design features of the new multidisciplinary facility.

Research on carbon nanotube filters by Materials Science and Engineering Professor Pulickel Ajayan was described in stories in November editions of MIT's online Technology Review magazine, Science News, and Chemical & Engineering News.

The Wall Street Journal's CollegeJournal.com quoted Lally School of Management and Technology's Associate Professor of Marketing Jeffrey Durgan in an article on business schools rethinking MBA programs.

The ingenuity of Rensselaer students was showcased in an Associated Press story on the American Institute of Chemical Engineers' "Chem-E-Car" competition in November. The Rensselaer team's use of a fuel cell to power a car made out of LEGO's was noted in the AP story out of Austin, Texas, that appeared in publications nationally.

A Nov. 22 New York Times article titled "Computers as Authors? Literary Luddites Unite!" featured the computer program Brutus 1, developed by Selmer Bringsjord, chair of Rensselaer's Cognitive Science Department and professor of computer science, and David Ferrucci of IBM.


Rensselaer has formed a new Center for Fuel Cell and Hydrogen Research. Under the leadership of Glenn Eisman, former chief technology officer at Plug Power Inc., the center will focus on basic research essential to the commercial viability of fuel cells and hydrogen-related technologies.

"One of the most important challenges we face as a global community is meeting our energy needs. This can be accomplished by diversifying our energy options," says Rensselaer Provost Bud Peterson.

"The addition of Dr. Eisman to our stellar group of researchers in this and other energy-related areas strengthens the national leadership role of Rensselaer in energy research."

Specifically, the new center will focus on fuel cell development, hydrogen generation and storage, electrochemistry, solid state and polymer science, and the application of nano-materials in fuel cell and hydrogen research.

"Drawing from existing expertise on campus, the new Center for Fuel Cell and Hydrogen Research will concentrate on fundamental research and address technical issues while working in collaboration with Rensselaer's recently established Future Energy Systems Center for Advanced Technology (CAT) to help transition next-generation concepts from the lab to commercialization," Eisman says.

According to Eisman, there are fundamental technical issues that must be addressed before fuel cells and hydrogen-related technologies can be considered commercially viable. These include new material solutions to improve fuel cell reliability, efficiency, and cost.

"This new center is a perfect complement to our Future Energy Systems CAT," says Om Nalalsu, director of the Future Energy Systems CAT and director of Rensselaer's Center for Integrated Electronics. "Our focus on technology commercialization will reduce the time it takes for ideas generated in the new fuel cell center to move from the lab to the marketplace, help retain and create new jobs in New York state, increase the incentives for energy companies to relocate to New York, and effectively position us to expand our collaborations with the federal government on important energy research initiatives."

The new center, based in the School of Engineering, will offer students opportunities to participate in research and development activities related to fuel cells and hydrogen generation. Students will have the opportunity to do hands-on research with respect to membrane and electrode fabrication, electrochemical testing, materials analyses, and fuel cell and electrolytic device operation.
THE MINUTIA FILE

Devil of a Tale

RENSSELAER AND ITS GRADUATES CONTINUE TO show up in popular media.

Set in Chicago circa 1893, Erik Larson's bestseller THE DEVIL IN THE WHITE CITY intertwines the true tale of two men—the architect behind the legendary 1893 World's Columbian Exposition (also known as the World's Fair), striving to secure America's place in the world; and the cunning serial killer who used the fair to lure his victims to their death.

It was at the World's Fair where the Ferris wheel made its debut. Civil engineer George Ferris, Rensselaer Class of 1881 and Alumni Hall of Fame member, designed the great wheel. Ferris was the founder of G.W.G. Ferris & Co. in Pittsburgh, a firm that tested and inspected metals for railroads and bridge builders.

"George W. Ferris invented the wheel specifically for the fair as an answer to France's Eiffel Tower," Larson writes. "The wheel was a wondrous feat of engineering: supported by two 140-foot steel towers and connected by a 45-foot axle, it was the largest single piece of forged steel ever made at the time. With a diameter of 250 feet and thirty-six cars holding sixty riders each, the Ferris wheel carried 1,450,000 paying customers over the course of the fair."


NATIONAL INNOVATION INITIATIVE

Summit Explores Innovation

POLICY MAKERS, INDUSTRY LEADERS, AND representatives from regional technological industries met at Rensselaer for a two-day National Innovation Initiative (NII) Regional Summit Sept. 7-8, sponsored by the Council on Competitiveness.

A national organization of corporate, academic, and labor leaders, the Council on Competitiveness was formed 16 years ago with the intention of developing a workable economic framework for keeping America competitive in the global market, and for fostering innovation.

The NII is the council's yearlong effort of nearly 20 CEOs and university presidents—and more than 400 other innovation stakeholders and thought leaders across the country—to develop a strategic and actionable 21st-century innovation agenda for the United States.

Rensselaer's regional summit was one of only a few being held across the country in preparation for the council's final report to be unveiled at a National Innovation Summit Dec. 15 in Washington, D.C.

Many components of innovation were explored during the two-day summit, by speakers that included U.S. Department of Commerce Assistant Secretary David Sampson; Congressman Michael McNulty; IBM CEO and Chair Samuel Palmisano; New York State Senate Majority Leader Joseph Bruno; Debra Wince-Smith, president of the Council on Competitiveness; Kelly Lovell, president of the Center for Economic Growth, and Charles Gargano, chairman and CEO of Empire State Development Corporation. MapInfo Corporation Chair-

Biotechnology panelists Wolf von Maltzahn (Rensselaer), Thomas D'Ambra (Albany Molecular), and Lawrence Sturman (Wadsworth Center).

man John Cavalier and Wolf von Maltzahn, acting vice president of research at Rensselaer, also moderated panel discussions.

"While national policies create the critical, basic environment for innovation and competition, it is often at the local and regional level where firms, universities, laboratories, and entrepreneurs interact most closely to drive innovation. We had to go to the regions to really understand what was occurring," said Wince-Smith.
"This summit is shaping the national debate and the national agenda."

Summit participants discussed how to attract and keep talent, venture capital investment strategies, the need for funding basic research, national business policies that would foster innovation, and the importance of collaboration between academia, industry, and government.

"The United States must prepare for a new wave of innovation," said IBM's Palmisano. "Where once we fine-tuned our organizations for efficiency and quality, now we must optimize our entire society for innovation."

Panelists also concluded that to grow a more skilled, adaptable workforce, retooling the K-12 educational system to teach students new skills needed in today's workplace is crucial. Students today and in the future will need to be adaptable, creative, and technologically savvy; students will need to be problem solvers, work well in groups, be highly productive, and have a commitment to long-term learning, the panelists concluded.

David Sampson, of the U.S. Department of Commerce, said, "The convergence of various technologies now and into the future in nanotech, biotech, IT, and cognitive technology will create new opportunities and new industries...The question we now face is how to connect knowledge creators with knowledge commercializers."

Panelists stressed the importance of collaboration between the scientists and researchers who develop new technologies and processes, and the people in commercial industries who can take an idea and turn it into a marketable product.

"The unique and precious attributes of discovery and innovation are critical components in the formula for continued prosperity in an advanced economy," said President Jackson, a principal of the NII, at the conclusion of the summit. "To sustain a continually rising standard of living, we must find the ways to boost growth and sustain long-term productivity. While innovation is critical to our prosperity, it also is innately valuable globally. Innovation has a multiplier effect, building markets, creating jobs, improving health, lifting hopes. It is this to which the world looks with anticipation and hope."

IBM Chairman Samuel Palmisano and President Shirley Ann Jackson at the Council on Competitiveness regional summit at Rensselaer.

**NEWS BRIEFS**

**Rensselaer on the Move**

**PANAM Transportation Conference Comes to U.S.**

In October, Rensselaer hosted the Pan-American Conference of Traffic and Transportation Engineering (PANAM), bringing together more than 300 industry, government, and academic experts from more than 20 countries to exchange ideas, experiences, and technologies related to transportation research and infrastructure design, traffic engineering modeling, transportation economics, and air quality. Participants from across the United States and Argentina, Brazil, Chile, Ecuador, Guatemala, Mexico, Spain, Portugal, Canada, France, and Germany participated in the highly regarded transportation conference, which was held in the United States for the first time. The conference was organized by Jose Holguin-Veras, associate professor of civil and environmental engineering at Rensselaer (pictured above, second from left).

**Technological Nirvana!**

Rensselaer was noted for its mobile computing program that distributes laptops to all incoming students. "High tech has become an integral part of the students' experience — whether it enhances their academics, their entertainment, or their ability to communicate. Each year we find the bar raised higher and higher as students consider a sophisticated computing environment central to their college experience," said Robert Franek, editorial director of the Princeton Review.

**Space Travel Comes to Troy**

Also in October, Rensselaer hosted the Third International Symposium on Beamed Energy Propulsion (BEP), bringing together some of the world's leading experts working to transform BEP concepts into future space transportation systems. Students from Rensselaer's Space Society showcased their work at the symposium. The conference was co-chaired by Leik Myrabo, associate professor of mechanical, aerospace, and nuclear engineering at Rensselaer. Myrabo's research focuses on the design and development of light crafts using laser beams to fuel the engines and accelerate the crafts into orbit. He predicts that a manned test flight using beamed energy propulsion is possible in the next five to 10 years. Students in the Rensselaer Space Society are working with Myrabo to construct a model of a flight simulator for one of his designs. A section of the students' prototype, called the Mercury light craft project, was on display at the conference. The one-person light craft is similar in size and shape to the Mercury capsule used in America's first manned space flight.
FOCUS ON:

Linda McGown

After 17 years as a professor at Duke, Linda McGown joined the Rensselaer faculty in June as chair of the Department of Chemistry and Chemical Biology.

Two factors convinced her to make the move: the opportunity to make an imprint on the chemistry program during a period of growth and change, and a collaborative research environment that will help her maintain a dynamic research group.

"Rensselaer is an exciting place right now," she says. "It's an old institution, but in a lot of ways it is very new. Coming here is like getting in on the ground floor."

At Duke, she says, the structure is set, allowing only incremental changes. Rensselaer, she finds "is still fluid, a work in progress. There are a lot of experiments going on because the Institute is trying to make significant strides quickly."

McGown, known for her work in analytical and bioanalytical chemistry, was brought to Rensselaer to help strengthen the department and its new focus on biotechnology.

"The momentum is in biotechnology at present," she says. "There is lots of room for growth in that area."

The department is advertising for a new faculty member in bioanalytical chemistry, which will bring the total in that research area to three—McGown, Associate Professor Julie Stenken, and the new hire. There also are searches under way for chaired positions in biochemistry and in organic chemistry.

But McGown emphasizes that Rensselaer researchers are also doing exciting things in other areas of chemistry, including nanotechnology, fuel cells, and polymers. Times change, and in the future, opportunities could come in other unanticipated fields. McGown wants a department that can respond, and she believes the best way to achieve that goal is to maintain a fundamental core of chemistry expertise.

McGown also wants “a department where people can reinvent themselves” if they are doing good science that takes them in unexpected directions.

In her own research, she was feeling isolated at Duke, and she sees Rensselaer’s interdisciplinary environment as her opportunity to move in challenging new directions. She says that on her first visit to campus during the interview process, she talked to three or four faculty members who were interested in her work even though they are not members of the chemistry department.

“I want to collaborate. There are things I want to do that I don’t have the expertise to do by myself. Now I have access to all of these excellent researchers," she says.

One major attraction was Rensselaer’s renowned faculty in bioseparations and microfluidics. Her group has been studying aptamers, DNA oligonucleotides that have been identified for their high affinity for binding to target molecules. The team has been using aptamers to capture, isolate, and purify proteins, a research direction that has clear implications for bioseparation technology.

In other work, her group is exploring a "directed proteomic strategy"—analysis based on affinity binding of certain cellular proteins to immobilized target DNA that corresponds to genomic sequences. The goal is to study proteins involved in basic processes that are important in diseases such as diabetes and cancer.

She also is exploring applications for reversible gels that are formed by guanosine nucleotides, which are found in DNA. People have studied these gels for nanowires and for a few other very specialized uses, but McGown is considering their potential for more general biotechnology applications.

"Professor McGown brings an extraordinary depth of research and education experience to this position," said Provost G.P. "Bud" Peterson. "Strengthening the chemistry department is critical to accomplishing the goals of THE RENSSELAER PLAN, particularly as they pertain to biotechnology. Professor McGown’s dedication to fostering the research capabilities of the department within a collaborative environment are essential as we expand in these areas."
LESTER GERHARDT has been named acting dean of engineering. Gerhardt, associate dean of engineering and professor of electrical, computer, and systems engineering (ECSE) and computer science, brings an extensive background in research, industry, and academia to the position. He served as chairman of ECSE 1975-1986. In 1986 he was appointed director of Computer Integrated Manufacturing; he also was the founding director of Rensselaer’s Center for Manufacturing Productivity. An active researcher and educator, his areas of interest include pattern recognition and adaptive systems, communications, digital signal processing, computer integrated manufacturing, and technology aids for the handicapped.

RICHARD SMITH, professor of mechanical, aerospace, and nuclear engineering, has been named associate dean for academic and student affairs for the School of Engineering. Smith has been a member of the faculty since 1977 and was a Fulbright-Hayes Senior Research Scholar visiting the Polytechnic Institute of Bucharest, Romania. In 2004, he completed a three-year term as program director for thermal transport and thermal processing in the Chemical and Transport Systems Division of the U.S. National Science Foundation.

RAVI KANE, the Merck Assistant Professor of Chemical and Biological Engineering, has been selected as one of the top 100 young innovators in technology from around the world by Technology Review, Massachusetts Institute of Technology’s magazine of innovation. The so-called “TR100,” chosen by the editors of Technology Review and a panel of judges, consists of 100 individuals under age 35 whose innovative work in technology promises to have a profound impact on the world. Kane’s primary research focus is on investigating and solving problems in medicine and biology by the molecular engineering of materials and surfaces. He works in the areas of biotechnology, advanced materials, nanotechnology, and polymers.

KENNETH WARNER, associate professor of architecture, was recognized by Rensselaer’s Board of Trustees with the 2004 Trustees’ Outstanding Teacher Award during the board’s fall meeting. The annual award recognizes outstanding accomplishments in classroom instruction. Warner was honored for “his quiet leadership, integrating social, environmental, and global concerns into the curriculum for more than 35 years.” Warner’s interests include architectural and urban design and theory. He joined Rensselaer in 1968.

KATRIN WESNER, ’89, administrative manager of the Student Health Center, has received the 2004 Pillars of Rensselaer Award, the highest honor Rensselaer bestows on a staff member. Wesner, who joined the staff in 1989 and completed a master’s degree at the Institute, was cited for her “maturity, strength, sensitivity, commitment to excellence, and caring attitude.” Wesner is actively involved in many aspects of the Rensselaer community, “communiversity” events, and in area organizations such as YWCA and Habitat for Humanity. 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, showed concern for students and their welfare, added to the human dimension of the school, and played an active role in her home community.

PULICKEL AJAYAN, professor of materials science and engineering, has been named the Henry Burlage Professor of Materials Science and Engineering at Rensselaer. He is the first person to hold this professorship, which was established as a bequest by the late Henry Burlage Jr. ’44 to honor the memory of his father. Ajayan’s research focuses on the controlled growth of carbon nanotubes. He studies their structure and properties in relation to size and confinement and their potential in a range of applications, including composite materials, sensors, biomaterials, and microelectronics. He is a recognized expert in electron microscopy.

WILLIAM “AL” WALLACE, professor of decision sciences and engineering systems, has received the 2004 INFORMS President’s Award, given by the Institute for Operations Research and the Management Sciences (INFORMS). The award recognizes, and encourages, important contributions to the welfare of society by members of the profession at the local, national, or global level.

THOMAS TRISCARI JR. ’76, clinical associate professor in the Lally School of Management and Technology, has received a Homeland Security Fellowship from the American Association for the Advancement of Science (AAAS) and will spend a year in the U.S. Department of Homeland Security (DHS) working in the Directorate for Science and Technology. Triscari’s principal research efforts have focused on improving information and decision processes in complex organizations. According to AAAS, the fellowship provides the opportunity to learn through participation how scientific and technological information is used in federal policy-making, to demonstrate the value of science-government interaction, and to bring technical backgrounds and external perspectives to DHS.

TOH-MING LU, the R.P. Baker Distinguished Professor of Physics and director of the Center for Advanced Interconnect Systems Technologies, has received the 2004 Materials Research Society (MRS) Medal. The MRS Medal recognizes a specific outstanding recent discovery or advancement that is expected to have a major impact on the progress of any materials-related field. Lu was honored for significant contributions to understanding mechanisms of thin-film surface and interface morphology evolution and establishing the foundations of diffraction and scattering methods for quantitative analysis.

EDWARD “TED” SHUSTER ’81, research associate professor in the Department of Earth and Environmental Sciences, died Sept. 16, 2004. Shuster was an expert on Hudson Basin hydrology. He studied flow, suspended particle transport and deposition, and dissolved organic carbon dynamics in the main stem and major tributaries of the Hudson River. He played a vital role in the ongoing Riverscope project designed to enhance monitoring and observation of the Hudson River’s physical, chemical, and biological systems. Shuster taught graduate and undergraduate students; his teaching focused on groundwater hydrogeology, sedimentology, and environmental geology, and integrated his expertise on the Hudson River.
The business of Biotech

BY PETER DIZIKES
Few industries are as risky as the biotechnology-based pharmaceutical business. For every drug tested in human clinical trials—the critical proving ground of the business—dozens of research projects are derailed on the way. Even among the drugs promising enough for clinical trials, some 80 percent are eventually rejected. On average, it takes more than 10 years for a successful drug to become a finished product. And once that happens, a company merely has to peddle its wares in a competitive marketplace, as investors scrutinize its performance at every turn.

The result is an industry as brutally selective as the research process itself. Just as hundreds of research projects may only yield one worthwhile drug, hundreds of biotech companies have been founded in the last three decades in the United States, yet only a relative handful exist as profitable public corporations. But James Mullen '80 has prospered as CEO at one of them: Biogen Idec, the Cambridge, Mass.-based company high on anyone's list of biotech successes.

Indeed, much of Mullen's job is to address the challenge shared by every biotechnology executive: How do you run a company in a hyper-competitive industry where it takes a decade to make a product, but also has Wall Street demanding ongoing growth?

James Mullen '80 leads a major biotech business by keeping a sharp eye on the future.
Biogen Idec—the firm took its current shape through the 2003 merger of Biogen and California-based Idec—is the world’s third-largest biotech pharmaceutical company, with a market capitalization of about $19 billion as of November, and a stock soaring in 2004. The firm is the maker of Avonex, the best-selling multiple sclerosis medicine, and it boasts a presence in 18 countries, stretching from Switzerland to San Diego, and from Sweden to Sydney. Biogen Idec also has another highly anticipated multiple sclerosis drug, Tysabri (natalizumab), which received government approval this fall. That Mullen oversees this burgeoning business is even more impressive given that he is not a trained biologist. But Mullen has made a career out of adding business discipline and strategic thinking to an industry traditionally dominated by scientists.

The biotech world long has had a feast-or-famine pattern based around the development of breakthrough drugs—and investors, despite their desire for steady profits, love chasing potential blockbusters too.

The biotech world long has had a feast-or-famine pattern based around the development of breakthrough drugs—and investors, despite their desire for steady profits, love chasing potential blockbusters too.

AN UNLIKELY CAREER PATH

At Biogen Idec’s headquarters in Cambridge, Mullen works in a sunny but unpretentious corner office decorated with framed drawings made by his children and a tall spear that rests against a wall, a gift from an appreciative customer who brought it back from a trip to Mount Kilimanjaro.

Mullen’s analytic mind helps to prevent Wall Street’s mood swings from rubbing off on him. “The share price does whatever it is going to do next,” he says. “In every one of these companies, it goes up, it goes back down, and then everybody goes from euphoria to deep depression, and neither one of those things is true. You just have to ride through those waves.”

There’s little evidence in Mullen’s undergraduate years at Rensselaer that he would end up at the helm of a major biotechnology company. “There was little emphasis at all on biology at that point in time, and I did not take any biology courses at Rensselaer,” says Mullen, who received his degree in chemical engineering. “I was probably like the typical student after four years, trying to figure out what to do next.” Although Mullen declines to name any particular class at Rensselaer that had a strong impact on him, he does remember wryly, “I loved organic chemistry at 7 a.m.”

As a member of Rensselaer’s Board of Trustees for the last four years, Mullen is bullish about the Institute’s growing emphasis on biology. “What we see is the realization that the life sciences are really going to be the next 100 years of innovation,” he says. In September, he took part in a colloquy held for the opening of the new Center for Biotechnology and Interdisciplinary Studies. “That highlight on the campus is undoubtedly going to shift the thinking of the students. A lot more of the students will be thinking about the life sciences.”

Mullen started thinking along those lines for his own career after weighing job offers and taking a position with the drugmaker now named GlaxoSmithKline in 1980. “I had a choice of different industries and I ended up in the pharmaceutical industry,” he explains. “Relative to the other choices, I decided that seemed a more interesting place to make a career.” Mullen earned his MBA at Villanova in 1984, then joined Biogen in 1989, as director of facilities and engineering.

At the time, the company was a decade old but not the full-fledged pharmaceutical company it is today, with extensive manufacturing and distributing capabilities. A group of biologists created Biogen in Geneva, Switzerland, in 1978, and the firm boasts a strong scientific pedigree: Two founders, Walter Gilbert of Harvard and Phillip Sharp of MIT, have won the Nobel Prize in chemistry and medicine, respectively. In 1983 the company, which had moved to Cambridge, went public. In the 1980s, however, Biogen made its money largely through licensing deals for the treatments it developed—including a deal with Schering-Plough for a leukemia treatment, and one with SmithKlineBeecham for a hepatitis drug.

When Mullen joined the firm, Biogen needed managers with a hard-nosed operations perspective, who could help transform it from a research shop into something larger. Mullen supervised the construction of production facilities in Cambridge and at the Research Triangle Park in North Carolina. Recognizing the global nature of the emerging market, he also built up Biogen’s sales operation in Europe.

“Building plants was the easy part. Creating a real manufacturing organization was more difficult and the real accomplishment,” says Mullen.

These kinds of capital-intensive projects sometimes can be a stumbling block for growing biotech companies. Unlike standard pharmaceutical firms, which assemble medicines from a list of ingredients, biotech firms make drugs by transforming cells through recombinant DNA technology. Avonex, for
example, is grown from cells taken from Chinese hamster ovaries. Biogen Idec’s facilities, like others in biotech, contain dozens of huge stainless-steel tanks in which the cells grow in a delicate process. To ensure the integrity of their medicine, biotech firms must maintain immaculate facilities and keep complete records on virtually every piece of equipment inside them.

With this infrastructure in place, Biogen was ready to seize the advantage at the right moment: In 1996, the Food and Drug Administration approved Avonex, whose sales quickly spiked. Multiple sclerosis occurs when the body’s immune system misfires and attacks the body itself—and specifically attacks myelin, a fatty protein covering the axons, extensions of the nerve cells. Avonex slows down this myelin erosion and has been so successful it holds a market share of more than 40 percent in the United States, and greater than 30 percent worldwide, with annual sales of more than $1 billion.

By 1996, Mullen was a Biogen vice president, responsible for the company’s international operations. In 2000, he was named CEO. But along with the title and prestige, Mullen faced a unique problem in the history of Biogen, albeit one familiar to other large biotech executives: How do you follow up your company’s smash hit?

**FUTURE TENSE**

Mullen believes Biogen Idec must look forward to avoid the common pitfalls for biotech companies. “If you spend too much of your time rooted in your own history, then companies just slow down and stop,” says Mullen. “I don’t think it’s unique to this company. But we were just coming from one phase of the business, which was successfully having built an operating company out of a research company, and then the question is, ‘how do you sustain that?’”

Among other actions, Mullen has tried to systematize Biogen Idec’s research enterprises to bring “more operating discipline” into a company that, like many other growing biotech firms, used to have what he calls “a campfire culture. You get the work done walking up and down the hallway, talking to people. It was very much an oral culture. That worked fine because it was relatively contained.” With its international presence, Mullen says his company needs “different ways of thinking, a little more formality, a little more clarity on how decisions get made and who makes them.”

That does not mean he craves control. Mullen expects clear-cut research decisions to be made at lower levels. Indeed, he says it’s impossible for a biotech CEO to know everything about his firm. “There’s a certain amount of innovation you can manage, and a certain amount of it that’s going on in the skunk works in the corners. And actually, you need some of both.” Officially, the firm has 30 laboratory projects under way concurrently, and Mullen and other managers formally review their status every year.

In another break with biotech tradition, Mullen welcomes managers with little industry background—something he finds an asset, not a liability in the long run. “They have to have an interest in the science and technology,” he says. “You have to be able to have the conversation with the head of development and not be confused because you don’t understand the definition of every third word... But I think bringing in a diversity of business experience is extremely helpful to the corporation.”

The company’s chief financial officer, Peter Kellogg, came to the firm from PepsiCo, where he worked at Frito-Lay. “Snack products are a long way from biotechnology,” Mullen says. “But he very quickly contributed here.”

Mullen has pursued other practical ways of avoiding the blockbuster-or-nothing syndrome affecting the revenue of so many biotech firms—such as further expanding European presence so the firm can reach customers more quickly. Mullen also has tried to diversify the company’s commercial offerings. While its research strength is immunology, the firm has been funding neurobiology research for several years. Amevive, which two years ago became Biogen Idec’s first drug since Avonex to gain FDA approval, is not a multiple sclerosis drug, but a treatment for the skin condition psoriasis. However, Amevive has not dominated its relatively cluttered niche of the drug market, bringing in about $50 million in sales in 2003.

Amevive is partly a reminder that not every home-grown drug will be a runaway success. So in 2003, Mullen found product diversity not in his own labs but in California—in the form of Idec, the San Diego firm owning the non-Hodgkin’s lymphoma treatment Rituxin. Mullen believes offering multiple sclerosis and cancer treatments will make the new firm stronger in the long run—although Wall Street did not necessarily agree at first, as the share price initially fell after the merger, and the firm took merger-related losses.

“I don’t think we always see the same things,” says Mullen about shareholders. “Their investment objectives and our investments are in a different time frame.” More recently, Wall Street has been highly enthusiastic about Tysabri. In 2004, the firm’s share price has risen more than 50 percent to nearly the $60 level—although the run-up occurred this spring in anticipation of the FDA approval of Tysabri and not as a response to the official approval.

“We feel the success of Tysabri is already reflected in the share price,” said Jason Kantor, a biotechnology analyst at WR. Hambrecht & Co. in New York, in a report in late October. Like others, Kantor suggests a concern for investors is Tysabri’s “potential cannibalization of Avonex” in the multiple sclerosis market. Certainly one paradox of biotechnology is that a specific research strength may not be optimal commercially if it results in multiple drugs aimed at the same illness.

Mullen downplays that concern. “Whatever cannibalization occurs to our product could occur to all the others as well. As long as our market share is under 50 percent, cannibalization across the market is a net benefit to us, not a net negative.” Besides, he says, “What you want to do is replace your product with the next better product,” rather than “watching it get taken away by a competitor’s superior product because you decided to hang on too long.”

That can be a hard decision to make—especially when the previous drug has done so much for a company. Biogen Idec’s offices are a reminder of this biotech business conundrum. There are Avonex posters on some walls. That spear in Mullen’s office came from an Avonex customer. But Mullen feels the company cannot let its past imped its future. “The question is how do you grow, yet retain the entrepreneurial, innovative culture that got you there,” Mullen says. “And that is a tricky proposition. Having said that, growth is not optional.”
LOOKING INTO
SOMEDAY, a person with a potentially deadly allergy to peanuts or shell food may be able to carry an inexpensive spectroscopy lab the size of a laptop computer—or even a ballpoint pen—to test food for safety. Or automobiles may be equipped with special headlights that would improve night vision for drivers to reduce accidents. Meanwhile, the world’s food supply could be increased significantly with inexpensive and efficient growing methods.

Advances in what researchers call “smart lighting” may bring about revolutionary changes in communications, lighting, sensing, and imaging.

Advances in what researchers call “smart lighting” someday may be able to bring about these innovations—and much more.

Revolutionary lighting systems will provide an entirely new means of sensing and broadcasting information, says E. Fred Schubert, Wellfleet Senior Constellation Professor, Future Chips. By blinking far too rapidly for any human to notice, the light will pick up data from sensors and carry it from room to room, reporting such information as the location of every person within a high-security building.

Schubert leads the Future Chips Constellation at Rensselaer, which focuses on research in semiconductor materials and devices to enable significant advances in communications, lighting, sensing, and imaging. A constellation is a multidisciplinary team of senior faculty, junior faculty, and graduate students led by outstanding researchers in strategic fields.

Innovations in smart lighting will spring from new photonic crystal light emitters that will be 10 to 30 times more efficient than light bulbs, says Shawn-Yu Lin, Future Chips Constellation Professor and professor of physics. They will have a huge impact on worldwide energy consumption and the environment. It will be possible to change their color and their intensity independently, so that a homeowner can easily adjust both to match the time of day, the current use of the area, or the mood of the occupants. BY SHEILA NASON
The Future Chips researchers are working on developing the light source for these technologies. "The computers are already very smart. They are waiting on us to provide the data," says Christian Wetzel, the Wellfleet Career Development Constellation Professor, Future Chips, and associate professor of physics.

Schubert, Lin, and Wetzel—all recognized photonics pioneers—form the nucleus constellation, which also includes Thomas Gessmann, a research assistant professor of electrical, computer, and systems engineering; Jong Kyu Kim and Theeradetch Detchprohm, two postdoctoral researchers; and a number of doctoral students and three undergraduate students.

In addition, other Rensselaer research centers, such as the Center for Advanced Interconnect Systems Technologies, the Interconnect Focus Center-New York, the Rensselaer/IBM Center for Broadband Data Transfer Science and Technology, the NSF Nanotechnology Science and Engineering Research Center, and the Lighting Research Center, provide a broad range of expertise, potential collaborations, and facilities for work in this emerging field.

A major focus of the constellation, smart lighting is a revolutionary new field in photonics based on efficient light sources that are fully tunable in terms of such factors as spectral content, emission pattern, polarization, color temperature, and intensity.

"The research program in the Future Chips Constellation aims at nothing less than transforming many sectors of the economy, including communications, medicine, defense, entertainment, and the environment," Rensselaer President Shirley Ann Jackson says. "We are delighted to have these stellar individuals join our dynamic research environment, working to develop next-generation technology in semiconductor design and performance."

Schubert says smart lighting will not only offer better, more efficient illumination, it will provide "totally new functionalities." For example:

Studies have shown that spectral (color) variations in light have profound effects on the human circadian and visual systems. Controlling the amount of red, yellow, and blue in white light has implications for sleep in Alzheimer's patients, growth of premature infants, seasonal depression, jet lag, and the well-being of night-shift workers. Some researchers have sug-

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**About LEDs**

LEDs are semiconductor diodes, electronic devices that permit current to flow in only one direction. The diode is formed by bringing two slightly different materials together to form a PN junction. In a PN junction, the P side contains excess positive charge ("holes," indicating the absence of electrons) while the N side contains excess negative charge (electrons).

When a forward voltage is applied to the semiconducting element forming the PN junction, electrons move from the N area toward the P area and holes move toward the N area. Near the junction, the electrons and holes combine. As this occurs, energy is released in the form of light that is emitted by the LED.

The material used in the semiconducting element of an LED determines its color. The two main types of LEDs presently used for lighting systems are aluminum gallium indium phosphide (AlGaInP, sometimes rearranged as AlInGaP) alloys for red, orange and yellow LEDs; and indium gallium nitride (InGaN) alloys for green, blue and white LEDs. Slight changes in the composition of these alloys change the color of the emitted light.

Light emitting diodes (LEDs) were first developed in the 1960s, but only in the past decade have LEDs had sufficient intensity for use in more than a handful of lighting applications, and specifiers are confronted with an increasing number of lighting products that incorporate LEDs for certain applications. Primarily, these applications have taken advantage of the characteristics of LEDs that have made them most suitable for indication, not illumination.
suggested that inappropriate lighting can upset the body chemistry and even lead to certain types of cancer.

In life-cell biological imaging, smart lighting could make it possible to coordinate intensity, wavelength, and polarization with image scanning to reveal a new wealth of features. Using this revolutionary cellular microscopy technique, for example, researchers could observe and analyze multiple single cells in real time as they react to a drug or infectious agent.

Central and peripheral vision react to different color spectrums. Automobile headlamps with dispersive characteristics perfectly adapted to human vision characteristics could provide enhanced visibility and safety for nighttime driving.

Smart lighting could address the world's pressing need for increased food production because light plays a pivotal role in plant growth and photosynthesis. Adjustable smart-light sources predominately made up of blue, red, and infrared wavelengths—the portions of the spectrum best absorbed by plants—could provide a low-cost, energy-efficient way to grow crops off-season.

The “Century of the Photon”

Such technologies are possible, Schubert says, because of advances in photonics that are transforming society just as electronics revolutionized the world in recent decades. In fact, some have called this the “century of the photon.”

North America’s optoelectronics market grew to more than $20 billion in 2003. The LED (light-emitting diode) market is expected to reach $5 billion in 2007, and the solid-state lighting market is predicted to be $50 billion in 15 to 20 years, Schubert says.

LEDs are specialized semiconductor devices that can potentially convert electricity to light, without the wasteful creation of heat. The color emitted is controlled in large part by the energy gap of the semiconductor and in advanced structures by the “photonic band gap,” a range of wavelengths that cannot travel through that particular substance. By suppressing certain wavelengths and enhancing others, the band gap determines the color.

LEDs commonly are used for indicator lights, displays on consumer electronics, exit signs, traffic signals, and roadwork signs. The first LEDs, which were made of GaAsP (gallium arsenide phosphide), emitted red light. New materials and technologies made amber, green, and blue LEDs possible. Now that several types of white LEDs have become available, manufacturers are looking beyond the specialized display market to the use of LEDs for general illumination, television monitors, and large-area displays.

Researchers also are exploring new organic materials (polymers) for the fabrication of organic light-emitting diodes. The goal is to use these light-emitting polymers to create thin, flexible sheets of light. Light-emitting wallpaper or even clothing may be possible.

A World-Class Team

Schubert arrived at Rensselaer from Boston University in late 2002 to head the new constellation. He holds 28 issued patents and invented the resonant cavity LED that helped transform traffic signals and airport runway lighting, as well as the photon-recycling semiconductor LED, a promising new approach to the challenge of white LEDs.

Wetzel, who joined the team last spring, is known for his work in materials physics and the chemistry of light emission. Since the early 1990s, he has explored the use of gallium nitride compounds for LEDs, first at Berkeley and next in Japan in the lab of Isamu Akasaki, where gallium nitride materials were used to pioneer the fabrication of blue LEDs. With Uniroyal Optoelectronics in Tampa, Fla., Wetzel developed successful MOCVD (metal organic chemistry vapor deposition) techniques to produce very intense green LEDs.

At Rensselaer, Wetzel is tackling the challenges of making green LEDs even brighter and to vary their color into the yellow. He says the large band-gap energy in LEDs gives them the ability to emit short-wavelength colors such as purple, blue and green. Since it is easier to lower the band-gap energy than to raise it, it should be possible to adjust the design to create the whole range of colors, he says.

Lin completed the team in the summer when he joined Rensselaer from Sandia National Laboratories. He is known for his pioneering work in photonic crystals and optical waveguide devices, which are needed for optical signal routing. The waveguide built by Lin’s team from a photonic crystal was listed by Science magazine as one of the 10 most important breakthroughs of 1999.

Photonic crystals, which are critical to Schubert’s vision of a tunable light source, were strongly advanced by Lin, who holds two patents on them. He was the first to demonstrate fabrication and testing of a 3-D photonic crystal at optical wavelengths. He demonstrated the use of photonic crystals of tungsten instead of the conventional dielectric materials, and he has already used VLSI (very large-scale integration) techniques to build a photonic crystal with enhanced emissions at a 1.5 micrometer wavelength. At Rensselaer, he plans to move on to a crystal with emissions in a visible wavelength. Reaching his goal of the emission of photons in a narrow wavelength of visible light with no radiation at other wavelengths would revolutionize lighting, making huge energy savings possible.

Making Smart Lighting Possible

For some smart lighting applications, “design tunability” (fabrication of LEDs that have the...
desired color, polarization, etc.) will be adequate, Schubert says. Structural control can be provided by the use of photonic crystals, reflectors, and cavities—resonator structures with deliberate defects that control photons.

Real-time tunability will be required, however, for such applications as lighting, imaging, and communications. Schubert plans to achieve this by designing devices that include multi-channel electrical and optical controls. Because such factors as temperature and voltage can affect the properties of the light emitted, it is possible to tune the light by controlling these factors. The controls also could be used to activate various portions of a photonic crystal.

With incandescent lights independent tunability of color and intensity is not possible, Lin says, because increasing intensity raises the heat and shifts the color spectrum. With LEDs, the color is largely determined by the material, which is deposited in layers. Color shifts must be obtained by using several different colors of LEDs in an array. Photonic crystals, however, are created by lithography, the technology used to fabricate computer chips. One chip could be designed to carry several colors or intensities, making very precise tunability possible.

Much basic science and computer modeling is still needed to understand what light characteristics are best for specific applications and how to design tunable LED arrays and photonic crystals that produce the desired light. A number of research projects are under way to develop the necessary technology, particularly in materials, photonic crystals, and improvements to LED devices.

One challenge, for example, is that current systems do not extract all of the light from an LED, both because of poor reflectivity and because polymers used to encapsulate the working structure lose transparency in reaction to the light, particularly in short-wavelength and high-power emitters.

Schubert has developed an omni-directional reflector (ODR) that makes it possible to extract more than 99 percent of the light from both inorganic and organic LEDs. This reflector consists of a semiconductor layer, a dielectric (insulating) layer perforated by an array of micro-contacts, and a metal layer.

"The ODR for LEDs will accelerate the replacement of conventional lighting used for a multitude of applications, such as lighting for homes, businesses, museums, airports, and on streets," he says.

The photonics revolution already has provided tremendous benefits in energy savings, improved lighting, versatile new display technologies, and optical communications. Yet, the science and technology are still not available for the full control of many basic characteristics of light. As technical problems are overcome and new photonic products reach the marketplace, smart lighting will revolutionize such fields as illumination, imaging, display, and communications. Improved LEDs and new photonic crystal light emitters, moreover, are expected to greatly reduce the world's consumption of energy and diminish harmful environmental impacts.

"Many roadblocks remain, but we are very optimistic," says Schubert. "We believe that our multidisciplinary team focused on a common goal will change the world and make it a better place by advancing smart lighting from concept to reality."
Lighting the Way Exposure to blue light can improve the sleep cycles of Alzheimer’s patients, reports Rensselaer’s Lighting Research Center. In a recent publication, Mariana Figueiro, who heads the LRC’s light and health program, described for the first time one of the mechanisms within the eye that affects the human circadian system.

Rhythms in our body that repeat at approximately every 24 hours are called circadian rhythms. The most prominent of these rhythms is the sleep/wake cycle. Circadian rhythms are synchronized to the solar day by light/dark cycles. Figueiro says exposure to blue light is much better at improving the sleep cycles of Alzheimer’s patients through the circadian system than exposure to other colors and even to much brighter white light.

“Within the mechanism that affects the circadian system are two color opponent channels. One of those is the blue vs. yellow (BY) channel, which seems to participate in converting light into neural signals to the part of the brain that generates and regulates circadian rhythms,” explains Figueiro. “Through the BY channel, blue light increases the circadian response, while yellow light decreases the response.”

Findings such as these, which define the qualities of light that produce the most benefits in specific applications, provide useful guidance for the “smart-lighting” researchers in Rensselaer’s Future Chips Constellation as they develop improved methods to control such factors as color (spectrum), emission patterns, and intensity. Rensselaer’s smart-lighting research concentrates on compound semiconductor materials and device design, the inside of devices such as LEDs (light-emitting diodes).

The LRC is the world’s leading university-based research center devoted to lighting. Its researchers explore the science and applications of lighting systems and the metrics for assessing them, so they focus on the outside of LEDs. The synergy between the two research groups offers an exciting opportunity to understand lighting from the basic level of the photon to the design of entire lighting systems.

Nadarajah Narendran is the LRC’s director of research. “The white light LED has been developing much more rapidly than any other light source in the past,” says Narendran, who heads the LRC’s Solid-State Lighting program. “LEDs are energy efficient and require little maintenance, and they can provide unique lighting solutions not possible with presently available light sources.” Narendran recently served as the chairman and keynote speaker of LED Expo 2004, an international annual conference devoted to LED technology.

“The LRC is widely recognized for its studies on the life expectancy of LEDs,” says Mark Rea, director of the LRC. “We not only test various LEDs under controlled conditions to determine how long they will operate before their light begins to dim, we also analyze the basic physics to make it possible to predict life expectancy.”

The LRC collaborates with industry, businesses, and utilities to identify lighting applications that can benefit from LED technology. Through field studies, the LRC develops, tests, and demonstrates LED-based, energy-efficient lighting alternatives for everything from retail displays to elevators to aircraft. LRC researchers recently completed a retail lighting project with the Los Angeles Department of Water and Power and the Gap retail chain to demonstrate up to 50 percent energy savings by lighting window displays with colored LEDs. The LRC has also worked with Boeing to evaluate new LED-based passenger reading lights for commercial aircraft.

In other health-related research, the LRC has examined the effects of lighting on premature infants and lighting changes that could help prevent dangerous falls by older adults.
"There is a reason human beings long for a sense of permanence," James Howard Kunstler writes in *The Geography of Nowhere*. "We know not where we come from, still less where we are going, and to keep from going crazy while we are here, we want to feel that we truly belong to a specific part of the world." For many in the Rensselaer community, that sense of permanence is embodied in West Hall, the 136-year-old building that looms over the northwest corner of the campus and has for more than 50 years served as the Institute's face to the world.

In West Hall's long history, tens of thousands of hospital patients, high school students, and generations of Rensselaer students and faculty have undergone dramatic changes within its walls. Each new owner possessed a transformative vision for the building and carried out substantial deletions, additions, or renovations to the structure. But every period of vision and hope was also followed by a subsequent period of decline, so it should come as no surprise that, in many places, West Hall needs a lot of help.  

**Revival**

After decades of use and years of disrepair, West Hall is emerging as a vital campus building and a base for the arts at Rensselaer.
West Hall is being reborn again. As Rensselaer makes a significant investment in new facilities, it also has launched a multyear project to restore the exterior of the building, as the interior is being renovated to house the arts department and a black box theater for emerging programs related to the Experimental Media and Performing Arts Center (EMPAC). Claude Rounds, vice president for administration in charge of facilities on campus, says, "West Hall will become a prominent and important location for the Institute's vision to establish an arts corridor on Eighth Street, and its restoration is the Institute's highest-priority deferred maintenance project."

One reason for the West Hall revival is the $150,000 Campus Heritage Initiative Grant awarded last year to the School of Architecture by the Getty Grant Program to develop the first detailed studies of the 18 buildings that compose the core of the Troy campus. Under the direction of Building Conservation Program Director Fred Cawley, faculty members Steve Bedford '75, Bill Foulk, and others recruited graduate students and began their work with an extensive study of the building with the most complex history—West Hall. "This is the only building that Rensselaer owns that is listed on the National Register of Historic Places," Steve Bedford says, so it was the logical place to start.

West Hall also has served as the gateway building to the campus from the perspective of downtown Troy, and it's been a familiar link between the city and the Institute for more than 50 years, not only for the people of Troy but for all the students and faculty who walked its halls and inhabited its classrooms. For many people, West Hall is more than just an old building in need of repair.

A report by John G. Waite Associates, Architects PLLC, the firm retained for the renovation of the exterior, while stating that West Hall "is generally in better condition than it would first appear," also warns that "portions of the building have reached an advanced state of deterioration which require that they be addressed as soon as possible."

Rich Montena, project manager for the West Hall renovations and planner with Rensselaer's campus planning and facilities design, is realistic about the challenges the building presents. "Unfortunately, this building has been taken for granted for many years, and therefore it has reached a state that will be costly to restore," he says.

Although it might be easier to demolish the oldest, least cost-efficient buildings on campus, it's a terrible waste of resources, says Montena, because West Hall is "part of the face of the university—a face that you see, that you recognize, that you connect with RPI, even though we haven't always owned it." The vision is for West Hall to bookend the projected arts corridor on Eighth Street along with EMPAC, now under construction and scheduled to open in 2007.

In an age of tight resources, every college and university that owns and uses historic buildings must factor in these same kinds of escalating maintenance and/or restoration costs and, ultimately, must decide on whether they should preserve their historic buildings or abandon them. Jack Waite '64, who heads John G. Waite Associates and who has been a strong advocate for historic preservation since his student days at Rensselaer, doesn't see the wisdom of abandoning a significant building like West Hall. His firm specializes in the preservation, restoration, and re-use of historic buildings, and has worked on the Lincoln Memorial, the Statue of Liberty since the tragedy on 9/11, the Tweed Courthouse in New York City, the Assembly Chamber in Albany, and on university buildings at, among many others, Harvard, Johns Hopkins, the University of Maryland, and on Thomas Jefferson's original buildings at the University of Virginia.

"It's not an either/or thing," Waite says. "You go to universities where there are great new buildings and there are also great old buildings: the two complement each other. A university should have that kind of diversity. It should have
good old buildings, good middle-aged buildings, and good new buildings, and if it’s missing any one of those ingredients, it’s not going to be as rich as it could be. RPI really needs that sort of cultural background—it needs the old buildings as well as the new ones. RPI has a really significant history and it doesn’t have an awful lot of buildings that exemplify that history.”

IF THESE WALLS COULD TALK

A plaque on the southwest corner of West Hall reads as follows: THE CORNER STONE OF THE TROY HOSPITAL WAS LAID ON THE 28TH OF JUNE 1868 BY THE RIGHT REV. BISHOP CONROY.

West Hall actually was the second incarnation of the Troy Hospital, the first hospital established north of New York City. The original one was started by a Dutch priest, Peter Havermans, and the Sisters of Charity of St. Vincent de Paul in 1850 to provide medical care primarily to poor Irish Catholics. But proximity to the clanging, filthy tracks of the Troy Union Railroad along Sixth Avenue, as well as fires in 1856 and 1859 within the hospital, inspired the Sisters of Charity and their board of governors to search for a better location. By 1866, they had located a piece of property near the center of the city; yet elevated and away from the river, located at the head of Fulton Street on the east side of Eighth Street, and belonging to Ebenezer Prescott. They purchased it for $18,000, and then commissioned the well-respected Troy architect Marcus F. Cummings to draw up plans and specifications for the new hospital building and to see that the contracts were properly fulfilled by the builders, all for the modest sum of $450.

Begun in 1868, and built of brick and Nova Scotia sandstone in the Second Empire Style and with tall, pyramidal roofs in the manner of the 17th century French architect Francois Mansart for its dominant central pavilion and two spacious wings, the new Troy Hospital boldly proclaimed its intention to be equal with not only the prestigious Rensselaer Polytechnic Institute and the former Troy University buildings but also with its wealthy neighbors who lived on the heights to avoid the rude clamor of Troy down below. From its opening in 1871 until it relocated to Oakwood Avenue as St. Mary’s Hospital in 1914, the hos-

“It’s not an either/or thing. You go to universities where there are great new buildings and there are also great old buildings: the two complement each other. A university should have that kind of diversity. It should have good old buildings, good middle-aged buildings, and good new buildings, and if it’s missing any one of those ingredients, it’s not going to be as rich as it could be.”—Jack Waite ’64
West Hall has had numerous inhabitants during its 136-year history. In its half century as a Rensselaer property, the building has been home to the Geology Department, Earth and Environmental Sciences, the staff of the Rensselaer Union (while their building was being renovated), Property Administration, Purchasing, and more.

Today, West Hall houses the Arts Department, along with the offices of Contracts and Grants, Research Administration and Finance, the Credit Union, and, until the new facility opens in 2007, EMPAC Director Johannes Goebel and his administrative staff.

Over the years, West Hall has been home to some more unusual residents, including a pair of red-tailed hawks who have nested and raised their fledglings underneath a pediment on the western face of the building. Richard Scammell '69, director of research administration and finance, can see the nest from his fifth-floor office. He's "adopted" the hawks and chronicles their lives in photographs each year. For a close-up look, visit www.rpi.edu/dept/cog/hawk.htm.

Perhaps the inhabitant most well known on campus is the rumored ghost (some say there are more than one) that is said to haunt West Hall. For years, people using the building at night have reported the sounds of screams or whining, doors flying shut, and loud thumping noises. One story has it that a pair of students once stayed overnight in the basement to record evidence of the ghost. The night was mostly uneventful, except for a strange fluctuation on the level meter on the recorder. When they played the tape back, they heard a three-second unexplained whine.

Depending on who tells the story, the ghost is named Betsy or Betty, and she may have been a nurse who cared for patients in the psychiatric ward when the building served as a hospital. Others say it's a little girl, who may have attended school there. Still others contend there are up to 36 ghosts haunting these halls.

What West Hall ghost story do you remember? We'd love to hear from you. Send your story to Rensselaer Magazine, Office of Communications, Rensselaer Polytechnic Institute, Troy, NY 12180, or alum.mag@rpi.edu.

pital took in all in need, regardless of background or malady—the poor dying of consumption, Civil War veterans, young women hurt in the shirt factories or their men scalred in Henry Burden's iron factories, abandoned children—a policy that was unusual at the time.

By spring 1918, when Rensselaer signed a contract with the War Department to participate in its Student Army Training Corps program, the now old Troy Hospital had turned into a wreck. Thieves had ripped out its plumbing and vandals had stolen other valuable building materials and sold them for scrap. Rain poured through huge holes in the roof. The hardwood floors buckled. But even in its diminished state, it remained a large, empty building, and that was exactly what the War Department needed. The government spearheaded an intensive restoration effort and transformed the neglected structure into a barracks and training facility for 450 student-officers-in-training in just five weeks, and it quickly became a model training camp. Within weeks, however, the armistice to end the war with Germany was signed and the building was abandoned again.

Two surges in population rescued it. In 1923 the Albany Roman Catholic diocese purchased and then renovated the building to house a growing population of local high school-age students. The chapel was torn down and replaced with a four-story addition that contained a gymnasium, a cafeteria, and an auditorium, as well as separate, enclosed "boys" and "girls" staircases on the western façade. Catholic Central High School, when it was completed in 1925, contained 50,000 square feet of floor space and served 536 students. Within 25 years attendance swelled to more than 1,500 students and, in 1952, the diocese elected to move the school north to a larger space in Lansingburgh.

Rensselaer was experiencing its own population surge in the late 1940s, aided by the GI Bill and the increasing industry demand for engineers. Enrollment rose from 932 students in 1940 to 4,485 students by 1948, so Rensselaer seized the opportunity to buy the building to relieve the overcrowding that existed in several departments. Officially renamed West Hall in 1953, the building expanded Rensselaer's academic facilities by 12 percent and became one of the major projects in the campuswide renovation program that began that year. When it was finished, it provided 34 offices, 20 classrooms, 10 laboratories, and nine additional rooms.

But within a decade, West Hall began to fall into disrepair and its problems mounted: inefficient heating loops, poor exterior physical condition (many of the building's windows had last been painted in 1953), code violations, major cracks due to settlement, considerable deflections in the floors, a proliferation of ivy, sagging interior partitions, the list went on. In 1991, an $11 million project to repair all the masonry, roofs, windows, and dormers at West Hall was proposed. But after $850,000 was spent on roof repairs, the project was abandoned and West Hall entered another period of neglect.

Today Rensselaer is committed to righting this history with a restoration that is enabling West Hall to operate at full capacity as an academic building.

HOME FOR THE ARTS

Inside West Hall, especially as night approaches, the shadowy atmosphere seems to lend credence to the campus legend that the ghost of a 19th-century nurse wanders its hallways. West Hall's basement and five meandering floors present a labyrinth of corridors, art studios, and offices. Sounds like the insistent, staccato buzzing of a stairwell light, the moaning heat pipes, and the relentless gurgling of an aquarium complete the atmosphere. But there's also laughter as several art students with portfolios walk down the hall, as a professor digitizing music in his office pokes his head out to say hello. A monitor above the aquarium shows clips from a new documentary, and posters on the bulletin board advertise upcoming events sponsored by the arts department's iEAR Presents!
a series of performances, exhibitions and lectures featuring pioneering and emerging electronic artists.

The high-tech present mixes with the 19th century in West Hall.

"I've been here since 2002, and people are still saying to me, 'Oh, there's an arts department at RPI!"' says Kathy High, the chair of the Arts Department. Her office is a large, front-corner space on the first floor of West Hall that affords her a panoramic view of Troy. The arts department has added six new faculty members—almost doubling the size of the faculty over the last three years, which represents the Institute's commitment to developing the arts, High says. The department currently uses the first four floors of the building. High hopes to move the department's editing facilities and production studio, which are still in the Darrin Communications Center, down to West Hall.

"First of all, it's really a good idea for us to have both our studios and our classrooms and our research facilities in the same area," she says, "because oftentimes students will come and want to show us a project that they're working on or ask about a technical problem, and just to be able to walk into a studio and work out those problems or critique a work is really essential to the teaching, and to our whole pedagogical approach of combining practice and theory."

High also notes that the Arts Department serves as an essential link to the Troy community, both through the art work they do, which often involves the community, and also through the literal position of West Hall on the edge of campus.

The diverse nature of the arts department just fits with the unique layout of West Hall, says High, who believes being situated on the edge of the campus aptly represents the department's role within the Institute as well. "We sort of sit slightly outside of what has traditionally been the pedagogical approach of the university, which has been primarily an engineering and science-based university. That's changing. It's one of Dr. Jackson's mandates—to expand that and to include more humanities. This building has a lot of character, a lot of presence, and I love it for that."

Montena agrees. "Rensselaer is a venerable old institution, and we would rather have a restored building that represents it rather than the kind of neglected and abandoned building that is usually in every town, that just sits there until it falls in on itself," he says. "West Hall is architecture that people can relate to. It's more human scale, and I think it's a connection to the past."

Historic photos courtesy of Rensselaer County Historical Society and Manuscripts and Special Collections, New York State Library.
The action at this year's Big Red Freakout hockey game will be hotter than ever as Rensselaer welcomes back members of the 1985 National Hockey Championship team to celebrate the 20th anniversary of their NCAA victory. The 1985 squad will be honored on the ice, prior to the start of the game against Brown on Saturday, Feb. 12.

NHL great Adam Oates '85 (at left, center), who was recently inducted into Rensselaer's Athletic Hall of Fame, led one of the most talented lineups in Rensselaer history, including NHL destined Ken Hammond '85, Daren Puppa '85, and George Servinis '86.

This year also marks the 10th anniversary of the 1995 team's ECAC Championship, so members of that team also will be in attendance.

The annual Big Red Freakout "Ice House," a buffet dinner with a pep rally atmosphere held at the Heffner Alumni House, begins at 4:30 p.m. The cost of $18 per adult and $9 for children ages 5-12 includes the buffet, parking at the Heffner Alumni House, and a free shuttle to the Houston Field House for the game. A combination of game tickets and Ice House can also be purchased for $25 for adults and $13 for children ages 5-12. After the game, the shuttles will bring fans back to the Heffner Alumni House for hot beverages, a cash bar, snacks, and a chance to meet and mingle with the current men's and women's teams and coaches, as well as members of the 1985 championship squad.

The weekend also includes the annual Alumni Hockey Game at noon in the Houston Field House. All past members of the men's varsity team are welcome to participate in a scrimmage, and everyone is invited to watch the fun at no cost.

Can't make it to Troy? No problem—the game is being televised live to locations across the country for the 13th annual Satellite Hockey Telecast. In addition to the chance to watch the Engineers in action, the evening offers an opportunity to meet and network with other alumni in your hometown. The $10 per person ticket price helps defray the cost of production. New this year: Everyone who registers for Satellite Hockey by Jan. 31 will be entered into a drawing to win a one-week vacation at a resort of their choice, courtesy of the RAA.

To sign up for either Big Red Freakout Ice House or Satellite Hockey, visit www.alumni.rpi.edu/hockey, or contact Peter Pedone at pedone@rpi.edu or (518) 276-6061.

NOMINATIONS FOR RAA BOARD, 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 in conjunction with the Office of Alumni Relations, meets three times a 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. To nominate yourself or another alumnus/a, send a brief statement of support to Joyce Kelly Martin at martj@rpi.edu by Feb. 7 or call (518) 276-6208 with questions.

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—This highest award recognizes distinguished service by alumni or non-alumni, to Rensselaer, to a profession, to the nation, or to humanity.

ALBERT FOX DEMERS MEDAL—This second highest award was 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/awardsnominations.asp by Jan. 31 or write to Laura Bedford, Alumni Relations, 1301 Peoples Ave., Troy, NY 12180-3500. Include the nominee's name, your name and phone number, the award you are nominating the individual for, and a brief rationale.
JANUARY

6 Business Networking Affinity Event. Successful entrepreneurs will share their stories, and Chicago area alumni will have the opportunity to network. Wyndham Hotel, Itasca (Chicago), 6-9 p.m. $25 per person. www.alumni.rpi.edu/si/events.html

11 An Extraordinary Event. President Shirley Ann Jackson will discuss highlights of the ongoing Renaissance at Rensselaer. Boca Raton Museum of Art, Boca Raton, Fla. www.alumni.rpi.edu/events/

13 Venture Forum. Three companies from Rensselaer's Incubator Center will present business plans. Venture capitalists, angel investors, and alumni interested in encouraging these young RPI entrepreneurs are invited. Yale Club, New York City, 6-9 p.m. www.alumni.rpi.edu/si/events.html

14 An Extraordinary Event. President Shirley Ann Jackson will discuss highlights of the ongoing Renaissance at Rensselaer. The University Club, Sarasota, Fla. www.alumni.rpi.edu/events/

FEBRUARY

1 Campus Update. Alumni in the Detroit area will hear updates on the dramatic changes taking place at Rensselaer from Provost "Bud" Peterson. Contact Susan Haigh at haighs@rpi.edu or (518) 276-6042. www.alumni.rpi.edu/si/events.html

2 Spring 2005 Career Fair. Employers offering summer, co-op, and full-time employment to students gather at the Heffner Alumni House. Contact the Career Development Center at (518) 276-6234. Rensselaer campus. www.rpi.edu/dept/cdc/careerfairs.html

MARCH

30 Robert Resnick Lecture. Virginia Trimble, professor of physics and astronomy, University of California, Irvine, will present "Cosmology: Man's Place in the Universe." Contact the Department of Physics, Applied Physics, and Astronomy at (518) 276-6310. Rensselaer campus.

APRIL

1 Grand Marshal Week. Variety of activities all week leading up to the annual student government elections. Rensselaer campus.

9 Alumni Volunteer Conference. For alumni who volunteer for Rensselaer in a variety of activities, including admissions, regional chapters, fund-raising, and reunions. Contact Laura Bedford at bedfol@rpi.edu or (518) 276-3757. Rensselaer campus. www.alumni.rpi.edu/si/events.html

11 An Extraordinary Evening of Conversation. President Shirley Ann Jackson and special guests Roderic Pettitgrew '73, Anthony Tether '64, and Ben Carson '03H will participate in a roundtable discussion. Washington, D.C. www.alumni.rpi.edu/events/

16 MAN OF LA MANCHA. The RPI Players' 75th-year celebration ends with a special luncheon for current Players, Old Timers, and their guests after the final performance of MAN OF LA MANCHA, The RPI Playhouse, Rensselaer campus. Contact the Players at players@rpi.edu or visit www.players.rpi.edu/75thseason.php.

JUNE

9 Reunion 2005. For alumni with class years ending in 0 or 5. June 9-12. Contact Kathy Kinsey at kinsek@rpi.edu or (518) 276-2832. Rensselaer campus. www.alumni.rpi.edu/si/reunion/reunion.html
Class Notes Deleted for Privacy Concerns
In Search of the Chrinitoid

One alum’s devotion to a memorable campus icon | BY TOM PAYNE ’86

MY WIFE THINKS I AM OBSESSED. Bordering on crazy. And when I get e-mails from other alumni, she thinks they are a little off as well. “What is it with you RPI people and that statue?!”

First of all, it’s not a statue. It’s a sculpture. And secondly, it’s not just any sculpture, it’s the Chrinitoid!

Officially known as “Two Rectangles, Vertical Gyratory Up, Variation III,” this George Rickey masterpiece stood in the center of the RPI campus from 1972 until the summer of 1984. There was a brief obituary in the Polytechnic that September. “The Chrinitoid, a sculpture created by former Rensselaer Professor of Architecture George Rickey, has been the subject of much discussion amongst students and faculty. The sculpture was first erected 12 years ago and was removed this summer.”

Thus began my search for the beloved artwork. OK...“beloved” may be a stretch. The Chrinitoid seemed to be the constant subject of a love/hate relationship. As with my wife, there was a great percentage of the campus that simply didn’t “get” the simple elegance of two huge slabs of aluminum being tossed by a gentle breeze. I am sure there were many students and faculty who were happy to see it go. But for the rest of us, it left a huge gap in the middle of campus that remained empty, the threaded bolts protruding up from its installation site a constant reminder of what was no more.

Fast-forward 10 years or so: I was standing outside the recently renovated San Francisco Public Library, when out of the corner of my eye I noted something oddly familiar.

Twisting around in the breeze were several pieces of polished aluminum. On the plaque below the mass of metal was the name of the artist. “George Rickey” didn’t really strike a note, but the sculpture was familiar. I was heading into the library anyway, so I might as well look up this Rickey guy. It turns out that George Rickey was quite a prolific artist. His specialty was indeed kinetic sculpture. And he once taught at Rensselaer!

It’s likely that my visit to the library was in 1998. Intrigued by my encounter, I headed home and did what any other red-blooded RPI alumnus would do... I searched the Internet. Sadly, I only found two references worth noting:

One was from an online copy of the infamous Not the Rensselaer Handbook: “Chrinitoid - n. (RPI) Two Rectangles Vertical Gyratory Up, a kinetic metal sculpture which was lent to the Institute by the sculptor, George Rickey, a professor at RPI from 1961 to 1966. Often confused with meteorological equipment on the Science Center. Although gone, it may be coming back.”

The other was a picture from Steven Staton ’85’s “WRPI Mmoire” Web site. Neither was much to go on, but they did inspire me to develop my own “In Search of the Chrinitoid” Web site. Over the years, it got a couple of hits. Most of them came from people similar to me... just doing random Google searches and my page happened to come up.

One day last February, I got an e-mail from a non-RPI Rickey fan who stumbled upon my site. He is a collector of Rickey sculptures and pointed me to Birgit at the George Rickey Workshop. I had never heard of this place, but it certainly sounded like an excellent place to start another phase of my search...

Birgit was a fountain of Chrinitoid knowledge. She advised me that Mr. Rickey had recently passed away. She remembered the sculpture and more importantly, she knew where it was! The sculpture had been purchased by the Union Bank of Switzerland (UBS) in 1990.

A little more research led me to UBS’s corporate Web site and references to their extensive art collection. I took a random chance and filled out one of those “Contact Us” forms, never expecting to hear back from anyone. Much to my surprise, just two days later I got a very friendly letter from Dominik Saam, head of public events and culture for UBS. Indeed, he did know of the sculpture and told me it was in front of their Schanzenbrücke-Building in Zurich.

Well, I never appreciated New York City’s grid street structure quite as much as when I tried to find the “Schanzenbrücke-Building” in Zurich. Not wanting to bother Mr. Saam, I hit the Web again. I am quite impressed with Europe’s online mapping software. Eventually, I found references to the building, made some guesses and found the street... or strasse... which is now home to the Chrinitoid. And in another stroke of luck, while UBS didn’t have any pictures, the Zurich Board of Tourism did!

I have not yet been able to make the trip to Zurich myself. I had a friend visiting Switzerland and he took some pictures. As for you, please accept my invitation to visit the Chrinitoid on the Web (www.pynecentral.com/tompayne/chrin). If you do get to Zurich before I do, please drop us all a note.

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George Rickey (1907-2002) was an internationally acclaimed sculptor who was one of the pioneers of the kinetic, or moving, genre in sculpture. Rickey was an adjunct professor of art in the School of Architecture from 1961-1966 and holds an honorary doctor of fine arts from Rensselaer. Another Rickey sculpture, “Six Random Lines Excentric”—a gift from Rensselaer Trustee and entrepreneur Nancy Mueller—today stands on campus in the Hassan Quad.
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