Men's lacrosse is one of several teams that will take the field in fall 2009 in Rensselaer's new East Campus Athletic Village. The new facility will feature a multipurpose stadium with a synthetic turf field for varsity football, soccer, and lacrosse, and outdoor intramural and club sports. More than 75 percent of Rensselaer students participate in intramurals, club sports, or varsity team sports.
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EMPAC Grand Opening Celebrations Planned

Construction is nearing completion for Rensselaer's Experimental Media and Performing Arts Center (EMPAC). The 1,200-seat concert hall, designed and constructed to the highest acoustical standards, features maple floors and walls made of cedar and precast stone that are gently convex in shape for acoustic diffusion. The concert hall's ceiling will consist of fabric panels less than one millimeter thick, selected and supported to be gently reflective to high-frequency sound and increasingly transparent to mid- and low-frequency sound.

As EMPAC continues to take shape on the edge of campus, three weekends of events are being planned in honor of the center's grand opening in October. Intended to highlight the range of EMPAC's mission and potential, the celebration will demonstrate how EMPAC can engage and enlighten artists, scientists, and audiences.

Beginning with a ribbon-cutting and presidential colloquy on Oct. 3, EMPAC's first opening weekend will include events ranging from classical musical performances to interactive multimedia works to research exhibitions.

The second weekend of festivities (which begins Oct. 9) will include a symposium featuring renowned artists, researchers, and scientists discussing the topic of where their respective fields might intersect and connect.

The third weekend (Oct. 18 and 19, which is also Rensselaer's Family Weekend and Homecoming) will include performances by student groups from Rensselaer and other universities. Visit empac.rpi.edu for more details.
Fostering Sustainability

Rensselaer promotes energy innovations all across campus

Increasing interest in environmental sustainability is an important aspect of the complex geopolitical issue of global energy security. Rensselaer is examining the extent of its involvement, and with “Energy and the Environment” already a strategic thrust of The Rensselaer Plan, the Institute is addressing the challenges of sustainable energy security within a range of arenas.

Our key investment as an Institute resides within our ongoing commitment to the education of the next generations of scientists and engineers. Rensselaer graduates and our current students already are innovating technologies for alternative energy sources and energy conservation. Many will go on to careers in these fields.

Related coursework and degree programs are found across the curriculum. The School of Science offers courses assessing the scale of human activities in relation to natural processes. An interdisciplinary program trains doctoral students in fuel cell science and engineering. Engineering design and innovation classes challenge students to identify global needs and to innovate affordable and sustainable technologies for the developing world. Architecture courses focus on performance-driven building technologies to support self-sustaining building environments. Management and Humanities, Arts, and Social Sciences courses encompass ecological economics, values, and policy.

Rensselaer research centers—ranging from the Center for Future Energy Systems to the New York State Center for Polymer Synthesis—are developing better hydrogen fuel cells, brighter LEDs, more efficient solar cells, and elements of a more robust electricity distribution grid.

Faculty research encompasses a broad spectrum of energy- and sustainability-related research. Some focus on applications for fuel cells, and fundamental technical issues for hydrogen-related technologies.

A nanoengineered “paper battery” that can function as both a high-energy battery and a high-power supercapacitor will enhance integrated electronics, semiconductors, and energy storage devices. Research at the world-renowned Lighting Research Center specializes in energy-efficient solid-state lighting and advanced light source technologies.

Other research areas include power electronics and electric energy conversion, power electronic circuits and systems modeling, and grid management.

As the Institute continues its unprecedented growth, we are committed to growing sustainably, and the design and renovation of facilities is driven by this goal.

As part of the East Campus Athletic Village project, a photovoltaic renewable energy system will be installed on the Houston Field House to make ice for the hockey rink. A similar photovoltaic system is installed next to the Voorhees Computing Center, and provides the center with about 2 kilowatts of electricity. A 10-kilowatt, three-blade wind turbine is installed on the east side of campus, transmitting power to the campus power grid.

Rensselaer is working to attain the Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ certification for EMPAC and the East Campus Athletic Village. LEED is the nationally accepted benchmark for green buildings, with standards in sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.

Rensselaer is focusing on renewable energy sources and reducing dependence on external sources. We have implemented a very aggressive program to conserve energy and improve efficiency, with consumption per square foot reduced by up to 15 percent over the past five years, despite significant campus growth.

We are upgrading our electric transmission systems, and we have replaced one entire set of transformers with a more modern, energy-saving version. We are initiating a campuswide energy reduction plan, and reviewing the usage of all computers, fax machines, scanners, and printers to limit power-drawing during off-hours. Salvageable Institute resources are saved and reused, and we are installing a biodiesel processing facility to convert waste cooking oil from the dining halls into fuel for campus vehicles.

Students have established a Student Sustainability Task Force to discuss planning for sustainability initiatives, and to solicit ideas and feedback. Another Rensselaer club, Engineers for a Sustainable World, is examining the possibility of refurbishing a 30-kilowatt hydroelectric facility on the Poestenkill River.

As we move toward even greater sustainability, I have proposed a campuswide Sustainability Task Force to work with the Student Sustainability Task Force to foster the implementation of initiatives on the Troy campus.

Sustainability requires that each of us—as global citizens and as responsible institutions—commit to making modifications. Rensselaer continues its commitment to the power of discovery and innovation to conserve energy and protect the environment.
Rock & Roll Memories Live On

What a pleasant surprise to see the back-page article in the current issue of Rensselaer ["It's Only Rock & Roll and We Liked It," Winter 2007-08]. The article—actually, the distinctive image of Roger Beckett, which I remember from posters on campus—really grabbed my attention instantly!

My eventual wife, Jill (Carey) '84, and I showed up on campus in the fall of 1980, which I think was the start of a short "golden age" for undergraduates; not quite the crazy '70s, but not yet the buttoned-down late '80s and '90s. One of my earliest memories is sitting just a few feet from Bill Staines as he performed his "Yodel Song" in the Rat; I had read him on Prairie Home Companion, which at the time had just celebrated its fifth anniversary.

The article mentions many favorites and sparks lots of memories; for example, how many Fridays were punctuated by awesome Quad parties accompanied by the Basement Blues Band (dragging themselves out of the architecture building, from whence they got their name) and others cranking it up in the early afternoon? And yes, who can get "I-i-i, wanna be a lifeguard..." out of their heads once they've heard it at a concert in the great hall of the Union? Or the Roches? Great times.

There was another aspect of musical life that I also remember fondly—for a while, there were talent contests, with the award being a two- or three-night gig in the Rat. Dave Smith (an amazing banjo, guitar, and mandolin player) and I (merely accompanying him on guitar) won it once as freshmen. A brief bit of fame! But it was a great way to kick off a college experience.

Finally, I'll never forget when Cheap Trick came to campus during their Dream Police tour—my ears are still ringing from that one!

JOHN ERICKSON '84
Norwich, Vt., and Bristol, UK

The article by Rick Hartt '70 was a terrific trip down Memory Lane. But what Rick was too modest to disclose is that he has been integral to bringing music to campus for nearly 40 years. Long before he became director of the Union in 1983, his avocation was managing rock bands (mostly comprised of Rensselaer students) and arranging for them to perform at fraternity parties, the Rathskeller, and even the McNeil Room (crisp acoustics). More than anyone I know, Rick Hartt should be considered the "Keeper of the Campus Culture" for the past several decades. He is a walking repository of names, dates, and events that have a Rensselaer connection. Want to hear about Jimi Hendrix playing at the Armory or The Doors at the Field House? No need to google—just ask Rick.

ROGER MIKE '70
Clifton Park, N.Y.

I read with interest Rick Hartt's article. I played with Joe Salvo in bands both at RPI and after graduation. The gig I remember most was a combined show with another Tau Epsilon Phi-based band called Redneck Jump. After the electric experiment, some of us formed the folk-rock group Three Days Ride, playing at Mother's Wine Emporium several times. We were based in Rhode Island for a while after graduation. The biggest gig we did was opening for Don McLean at MIT in the mid-'70s.

My biggest musical thrill came when Joe was invited to be the opening act for Joan Armatrading at Carnegie Hall. He got to include an acoustic guitar player and one back-up singer (me). It was pretty amazing.

Joe also was road manager for Tom Rush for a number of years. Since Tom put together several big shows, I would be recruited to assist. At these shows I had the chance to meet people like Bonnie Raitt, Joan Baez, Richard Greene, and others I had admired for a long time.

GLENN DEWELL '72
South Kingstown, R.I.

The picture with Bermuda Triangle really blew me away! Really took me back. I remember them well. I guess I can safely admit now that I had a thing for the girl on the violin. Anyway, thanks for the brief trip back!

STEVE RUGGIERO '75
Notre Dame, Ind.

I just read Rick Hartt's article. It conjured up lots of great memories of some headliners like Jackson Browne, Bruce Springsteen, Grateful Dead, Silver Bullet, ELP (in a winter storm), and the likes of Pat Metheny in the McNeil Room. Music on campus was so vibrant then.

WILSON FRANCIS '79
Glen Ellyn, Ill.

Astronaut Ties

I was pleasantly surprised by the very well-done story on Rick Mastracchio on the STS-118 Endeavour Shuttle mission to the International Space Station. However, I was also very proud to see that Barbara Morgan, who was aboard as a "mission specialist," appears in some of the pictures. Barbara's name before marriage to Clay Morgan was Radding. Her
grandfather and my father were brothers.

Barbara trained as backup for Christa McAuliffe, who was lost with her crewmates in the Challenger accident in 1986. Barbara has a bachelor's degree from Stanford in human biology and teaches math and science. Her function on the mission was to operate the shuttle and space station robot arms and to spend time speaking to schoolchildren from orbit. NASA hopes Morgan's mission will inspire youngsters to pursue science, math, and engineering careers.

EARL RADDING '33
Greenwood, Del.

Campus in Bloom

Please excuse my tardiness in writing to tell you how much I enjoyed the article “Campus in Bloom” in the fall issue of the alumni magazine. It is an excellent piece of writing and I hope you will extend my hearty congratulations to Scott Litvin and his team of 16 for such beautiful results. I’m sure alumni and other visitors are very favorably impressed with the overall effect. I hope I may be able to visit some spring myself.

DAN LADD '47
Winchester, Mass.

More Music Memories

I have fond memories of Joel Dolven [“Mail,” Winter 2007-08] and consider him one of my two mentors at RPI. I sang with the Glee Club and then took a music appreciation course in the summer of 1956. This was one of two non-technical courses I needed to graduate from RPI and, by far, the most enjoyable. I can’t remember just why, but Joel had to be away at exam time and, since I had aced the course, he trusted me to administer the final exam. What an honor!

Joel was an extraordinary teacher and conductor. I can recall some of our joint concerts with women's groups and being asked, “Where did you get him?” This was a reaction to Joel’s unique ability to command full attention from the chorus.

Some may recall when the very first stereophonic broadcast came from the RPI campus in December 1952. The term used at that time was “binaural broadcast.” We were invited to the student union where there were two speakers in position to pick up the sound from two different sources: WRPI, a 60-hertz carrier, and WHAZ each had a microphone placed in the WHAZ facilities. I recall a string quartet performance and how amazed we all were that we could pick out the position of the individual instruments as we listened. Not too long afterward, WQXR, the classical music station of the New York Times, was broadcasting “binaural” music. During this time period, Joel directed the Glee Club in its first live binaural broadcast.

GUNThER WINKLER '56
Bolton, Conn.

Radio Waves


Harry Rowe Mimno (Class of 1921) casually mentioned to me, during a conversation in the 1970s, that he had been a part of the establishment of the still-standing distance record for radio communication at 300 meters. This was done while students and faculty were in the testing phase of the radio transmitter and towers installed in/on Sage Hall by repeated communications with Invercargill, New Zealand, which is very close to the antipode of Troy.

Harry—as he told everyone to call him—went on to have a very productive and interesting career as a professor and researcher in the field of radio wave propagation. Due to his innate shyness, those who knew him felt that he never really received the credit due to him for his contributions to the field of wave propagation. His pioneering work, and the authorship of the (famous) Red Book, provided the foundation for many systems that came into being. There are, for those who have persistence and know where to look, bits and pieces of documentation of his contributions to the field of electronics.

To me he was one of those many unknown alumni that made great contributions to science, engineering, and society, in silence and with little or no recognition.

DAVID DOBSON ’52
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, Strategic Communications and External Relations, Rensselaer Polytechnic Institute, Troy, NY 12180, e-mail to alum.mag@rpi.edu, or call (518) 276-6531.
Researchers Develop Darkest Material Ever

Researchers at Rensselaer have created the darkest material ever made. Able to absorb more than 99.9 percent of lighting, the discovery could one day be used to boost the effectiveness and efficiency of solar energy conversion, infrared sensors, and other devices.

"It is a fascinating technology, and this discovery will allow us to increase the absorption efficiency of light as well as the overall radiation-to-electricity efficiency of solar energy conservation," says Shawn-Yu Lin, professor of physics and a member of Rensselaer's Future Chips Constellation, who led the research project. "The key to this discovery was finding how to create a long, extremely porous vertically aligned carbon nanotube array with certain surface randomness, therefore minimizing reflection and maximizing absorption simultaneously."

The Washington Post called the material, which is a thin coating comprised of low-density arrays of loosely vertically aligned carbon nanotubes, "a Roach Motel for photons—light checks in, but it never checks out." The newspaper covered the research in a front-page story titled "Their Deepest, Darkest Discovery."

All materials reflect some amount of light. Scientists have long envisioned an ideal black material that absorbs all the colors of light while reflecting no light. So far they have been unsuccessful in engineering a material with a total reflectance of zero. The total reflectance of conventional black paint, for example, is between 5 and 10 percent. The darkest man-made material, prior to the discovery by Lin's group, boasted a total reflectance of 0.16 percent to 0.18 percent.

Lin's team created a coating of low-density, vertically aligned carbon nanotube arrays that are engineered to have an extremely low index of refraction and the appropriate surface randomness, further reducing its reflectivity. The end result was a material with a total reflective index of 0.045 percent—more than three times darker than the previous record, which used a film deposition of nickel-phosphorous alloy.

The research has been accepted by the Guinness Book of World Records.
MECHANICAL ENGINEERING

Strengthening Fluids With Nanoparticles

Rensselaer researchers have demonstrated that liquids embedded with nanoparticles show enhanced performance and stability when exposed to electric fields. The finding could lead to new types of miniature camera lenses, cell phone displays, and other microscale fluidic devices.

"This study may open up a new vista for using nanofluids in microscale and nanoscale actuator device applications," says Theodorian Borca-Tasciuc, professor of mechanical engineering, who led the research project.

The manipulation of small volumes of liquid is critical for fluidic digital display devices, optical devices, and microelectromechanical systems such as lab-on-chip analysis systems. Most research into such systems has been conducted with regular liquids, but not nanofluids, which are liquids embedded with different nanoparticles. Nanofluids have been shown to exhibit some attractive properties, including enhanced heat transfer and capillary properties, as compared with regular, or pure, liquids.

Borca-Tasciuc's team placed droplets of water-based solutions containing bismuth telluride nanoparticles onto a Teflon-coated silicon wafer. When an electric field was applied to the droplet, the researchers observed a strong change in the angle at which the droplet contacted the wafer. This change was much higher than that observed in liquids without the nanoparticles when tested under the same conditions.

"You use the same electrical field, but you get more change in shape with the nanofluid. We know the nanoparticles are critical in this process because without them the effect is much less strong," Borca-Tasciuc says.

The ability to easily change the contact angle of droplets of nanofluids has potential applications for efficiently moving liquids in microsystems, creating new methods of focusing lenses in miniature cameras, or cooling computer chips. Borca-Tasciuc also envisions the research enabling new fully integrated micro- and nanoscale heat transfer systems that will not require a pump.

LALLY SCHOOL OF MANAGEMENT & TECHNOLOGY

BusinessWeek Ranks Lally Among Top Business Programs

BusinessWeek has ranked the Lally School of Management & Technology 26th in the nation among the magazine’s 2008 list of top 50 undergraduate business programs. The Lally School also is ranked as one of the top five in the Northeast, and the program came in at number 19 on the list of private institutions offering students the biggest return on their investment. BusinessWeek also ranked Lally as number one in the area of corporate strategy.

Last year, the Lally School was one of nine new schools to be named to BusinessWeek’s list, making its debut at number 40.

"The Lally School is proud of its continued ranking among the elite 50 universities in the nation," says David Gautschi, dean of the Lally School. "Our undergraduate program creates leaders who are actively sought after by a wide variety of business organizations, and many of our graduates start their own businesses. This recognition demonstrates that the Lally School competes with the very best business schools in the world."

To identify the best undergraduate business programs, BusinessWeek used nine distinctive measures, including surveys of nearly 80,000 business majors at 127 schools and more than 600 corporate recruiters. The rankings measure schools in several areas, including teaching quality, student services, recruitment of graduates, salary offers, number of graduates each program sends onto the pre-eminent MBA programs, and quality of academic programs, among others.

Recently, the Lally School launched the M.S. in Commercialization of Technology, in collaboration with Albany Law School. Students come mainly from Rensselaer’s undergraduate programs in management; biomedical engineering; materials science; architecture; computer science; design; innovation, and society; and cognitive psychology. Upon completion of at least 30 graduate credits, students have the option of taking their new technologies to market as start-up entrepreneurs, pursuing Albany Law’s M.S. degree in Legal Studies—Concentration in Technology Transfer, or working for 12 months in a technology-related industry and then returning to Rensselaer for another year to earn an MBA.
HIV Peptide’s Possible Pathway Into Cells

By analyzing two years of biocomputation and simulation, two theoretical physicists at Rensselaer have uncovered what they believe is the long-sought-after pathway that an HIV peptide uses to enter healthy cells. Their discovery could help scientists treat other human illnesses by exploiting the same molecules that make HIV so deadly proficient.

For the last decade, scientists have known that a positively charged, 11-amino-acid chain of HIV (HIV-1 Tat protein) can do the nearly unthinkable—cross through the cell membrane, carrying with it a cargo. Its unique cell-puncturing ability has been the subject of hundreds of scientific articles investigating the type of materials that can piggyback on the peptide and also enter the cell.

Researchers have proposed using the peptide to deliver genes for gene therapy and drugs that need to be delivered directly to a cell. But despite many potential medical applications, the actual mechanism that opens the holes in the cell remained undiscovered.

Through analysis, Rensselaer researchers have revealed a surprisingly simple mechanism by which the protein fragment penetrates the cell membrane. Positively charged HIV peptides are drawn to negative charges, and when an HIV peptide cannot satisfy itself with the negative charges available on the surface of the cell membrane it is directly attached to, it reaches through the membrane to grab negatively charged groups in the molecules on the other side, opening a transient hole in the cell. This hole allows the flow of water and other material into the cell. Once all the peptides have been neutralized, the reaction stops and the hole closes, leaving behind a healthy, viable cell.

“What we saw in our computer calculations wasn’t at all what we expected to see when we began,” says Angel Garcia, co-lead author of the paper and senior constellation professor of biocomputation and bioinformatics. “The mechanism for entrance in the cell was clear in one simulation, but in some instances simulations show one result and you never see that result again. Then we started doing other simulations and it kept happening again and again.”

Garcia collaborated on this research, which was published in the Proceedings of the National Academy of Sciences, with postdoctoral researcher Henry Herce.

For the paper, the researchers reported a dozen different simulations run through a high-powered cluster of computers. Garcia’s computer cluster is now running simulations on the use of antimicrobial proteins which will open a pore in the cell and keep it open, killing the cell. Garcia hopes to harness the power of Rensselaer’s Computational Center for Nanotechnology Innovations (CCNI). The CCNI will allow him to compile two years’ worth of data on his normal cluster in just 10 to 20 days.
Biochip May End Animal Testing

Biochip technology could eliminate animal testing in the chemicals and cosmetics industries, and drastically curtail its use in the development of new pharmaceuticals, according to new findings from a team of researchers at Rensselaer, the University of California at Berkeley, and Solidus Biosciences Inc.

The researchers have developed two biochips, the DataChip and the MetaChip, that combine to reveal the potential toxicity of chemicals and drug candidates on various organs in the human body, and whether those compounds will become toxic when metabolized in the body, all in one experiment without the use of live animals.

Traditional toxicity testing involves the use of animals to predict whether a chemical or drug candidate is toxic. However, with the large number of compounds being generated in the pharmaceutical industry, and new legislation stipulating that chemicals undergo toxicity analysis, there is a rapidly emerging need for high-throughput toxicity testing.

"We looked at the issues facing companies and realized that we needed to develop something that was low-cost, high-throughput, easily automatable, and did not involve animals," says co-lead author Jonathan Dordick, the Howard P. Isermann '42 Professor of Chemical and Biological Engineering and co-founder of Solidus Biosciences Inc., the company working to commercialize the chips.

"We developed the MetaChip and DataChip to deal with the two most important issues that need to be assessed when examining the toxicity of a compound—the effect on different cells in our body and how toxicity is altered when the compound is metabolized in our bodies."

When the biochips are used together the result is a promising and affordable alternative to animal-based toxicity screening and a direct route to developing safe, effective drugs, according to Dordick. Currently, detailed toxicity screening does not come into the drug discovery process until later in the development, when significant time and money have been invested in a compound.

New Greek Life Directions, Opportunities Discussed

Members of the Division of Student Life recently joined students, alumni, faculty, and staff to discuss updates to the "New Directions—New Opportunities" strategies developed to enhance the role of Greek life as a critical element to the undergraduate experience. The primary goal is to elevate Greek life to the forefront of student life by building a Greek system that serves as a national model of excellence, according to Eddie Ade Knowles, vice president for student life.

Beginning in spring 2006, Rensselaer administration, undergraduate members, and alumni began to review a set of strategies, viewed as a means to restore the Greek life community to its founding values of brotherhood and sisterhood. The outcome of this process was a stronger link between Greek life and Rensselaer's undergraduate plan, an improved vision for new member recruitment (rush) and new member education process (pledging), and a revised Rensselaer Alcoholic and Other Drugs Policy aligned to Greek life.

The plan also addresses the consequences for non-compliance that include a minimum two-semester suspension of chapter recognition and function, and an additional stipulation of a ban on alcohol and a live-in house director when the chapter is again recognized following the suspension period.

Other significant outcomes of this effort included the implementation of a Rensselaer Good Samaritan Policy, a Fraternity and Sorority Social Management Manual, and a process for Reinstatement to Full Recognition of a Fraternity and Sorority. Lastly, it was also determined that it is neither feasible nor cost efficient to mandate a live-in house director for on- or off-campus chapter houses, as originally proposed.

In keeping with the goals of The Rensselaer Plan, specifically noting retention and graduate rates, members of fraternities and sororities have higher retention and graduation rates than non-Greeks, and they also exceed the Institute rate. Factors that contribute to this effort include participation in leadership, philanthropy, community service activities, independent living opportunities, and strong connections with alumni.

"New Directions—New Opportunities" is an outcome of 14 months of work in collaboration with undergraduate fraternity and sorority chapter members, the Interfraternity Council and Panhellenic Council leadership, the Alumni Inter-Greek Council, the dean of students, assistant dean of students, Office of Fraternity & Sorority Affairs, a project manager representing the Rensselaer Alumni Association, the Student Health Center, and a few national/international directors, according to Knowles.
Lemelson-Rensselaer Winner Develops New LED

Martin Schubert, a doctoral student in electrical, computer, and systems engineering, has developed the first polarized LED, an innovation that could vastly improve LCD screens, conserve energy, and usher in the next generation of ultra-efficient LEDs. Schubert's innovation has earned him the $30,000 Lemelson-Rensselaer Student Prize.

Schubert's polarized LED advances current LED technology in its ability to better control the direction and polarization of the light being emitted. With better control over the light, less energy is wasted producing scattered light, allowing more light to reach its desired location. This makes the polarized LED perfectly suited as a backlighting unit for any kind of LCD, according to Schubert.

Schubert first discovered that traditional LEDs actually produce polarized light, but existing LEDs did not capitalize on the light's polarization. Armed with this information, he devised an optics setup around the LED chip to enhance the polarization, creating the first polarized LED.

The invention could advance the effort to combine the power and environmental soundness of LEDs with the beauty and clarity of LCDs. Schubert expects that his polarized LED could quickly become commonplace in televisions and monitors around the world, replacing widely used fluorescent lights that are less efficient and laden with mercury.

"In our community of innovators, the Lemelson-Rensselaer Student Prize recognizes our most inspired and dedicated students for their ingenuity and deep understanding of the greater global implications of their innovations," says Rensselaer President Shirley Ann Jackson. "Martin Schubert is both a talented engineer and inspired entrepreneur. He launched his innovation not only because he had the engineering prowess, but because he also has a remarkable understanding of the technological, environmental, and energy saving outcomes his enlightened innovation will bring."

Schubert is the second recipient of the $30,000 Lemelson-Rensselaer Student Prize. The prize is awarded to a Rensselaer senior or graduate student who has created or improved a product or process, applied a technology in a new way, or otherwise demonstrated remarkable inventiveness.

Schubert is the son of the senior chair of the Rensselaer Future Chips Constellation, E. Fred Schubert.

New Book Examines Early “Off-Broadway”

Founded on the Lower East Side of Manhattan in 1915, the Neighborhood Playhouse—one of the nation's first "off-Broadway" theaters—inaugurated the North American Little Theater movement, an era that gave rise to a number of small theaters focused on experimental drama.

The Life of the Neighborhood Playhouse on Grand Street (Syracuse University Press), written by John Harrington, dean of the School of Humanities, Arts, and Social Sciences, provides the first full-length study of the Neighborhood Playhouse's remarkable history, detailing the theater's notable productions, as well as its gradual shift in mission and the tensions between art and social work from 1915 through 1927. The company was especially notable for administration throughout its history by an all-female group of directors.

The book has been nominated for Theatre Book of the Year, an award given by the Theatre Historical Society of America, and the Barnard Hewitt Award for Theatre History given by the American Society for Theatre Research.

Built on Grand Street by sisters and philanthropists Alice and Irene Lewisohn, the Neighborhood Playhouse was home to an amateur repertory company until 1920, when the ensemble turned professional. The company was disbanded in 1927 after outliving its more famous contemporary companies, the Provincetown Players and the Washington Square Players.

Among its many accomplishments was the creation of the "Grand Street Follies," which was an annual satire of theatrical trends. Harrington is the author of several books including The English Traveller in Ireland and The Irish Beckett, also published by Syracuse University Press.
PIPELINE TO THE FUTURE

NSF Grant To Recruit Minority Students Into STEM Fields

The National Science Foundation has awarded $3 million over five years to an alliance of upstate colleges and universities—including Rensselaer—to enroll and graduate more minority students from science, technology, engineering, and mathematics (STEM) degree programs.

In response to pressing local needs and national goals, the Upstate Louis Stokes Alliance for Minority Participation (ULSAMP) was formed to attract and maximize the potential of students from African American, Latino American, and Native American (AALANA) populations.

President Shirley Ann Jackson has long warned of what she has dubbed a "Quiet Crisis" in America—the threat to the capacity of the United States to innovate due to reduced support for research and the looming shortage in the nation’s STEM workforce.

The impending workforce shortfall results from a record number of retirements on the horizon in the STEM fields, and not enough students in the pipeline to replace them.

"Our demographics have shifted in the United States," President Jackson says. "The 'new majority' now comprises young women and the racial and ethnic groups which, traditionally, have been underrepresented in STEM disciplines. It is these 'nontraditional' young people to whom we also must look for our future scientists and engineers."

The ULSAMP program will achieve its goals through a two-pronged approach—implemented across the alliance—that includes enhancing recruitment of both first-time freshmen and transfer students, and by providing new opportunities to enhance the graduation rate of the targeted populations. In addition to Rensselaer, member institutions include Clarkson University, Cornell University, Monroe Community College, Onondaga Community College, Rochester Institute of Technology, and Syracuse University.

"We need to prepare today's students for the 21st century economy with a technological focus in mind," says Kenneth Durgans, vice provost for institute diversity at Rensselaer, who also serves as one of the principal investigators for the project. "Effectively using technology in the 21st century is important for full participation in America's economic, political, and social life. The goals of the grant will provide students, particularly minorities who are underrepresented in the fields, with the programs and mentoring opportunities that will inspire them to pursue careers in science and technology."

Rensselaer will receive $420,000 over a period of five years. The funding will support a comprehensive array of academic, research, and support programs for undergraduate students.

EM PAC

“Light Above The Hudson”

Residents in and around the Capital Region could see Rensselaer's Experimental Media and Performing Arts Center (EM PAC) glowing in the night sky for three weeks in January.

EM PAC commissioned acclaimed lighting designer Jennifer Tipton to illuminate the building using recent innovations in lighting. The installation, which was curated by EMPAC's Time-Based Arts Curator Kathleen Forde, turned the construction site into a dynamic light sculpture that could be seen from near and far.

Called “Light Above the Hudson,” the commissioned work featured a range of lighting technologies to produce illumination on the EMPAC building that changed color and shape throughout the production.

A renowned lighting designer for dance and theater, Tipton has been awarded two "Bessies" and a Laurence Olivier Award for work in the field of dance, which includes lighting Mikhail Baryshnikov's "The Nutcracker." She also is a two-time Tony Award winner for her work with Broadway theater.

Tipton was on hand to talk with bystanders during the kickoff event, which drew a crowd from the Rensselaer campus and surrounding community.

Rensselaer will celebrate the opening of EMPAC with three weeks of events beginning in October 2008.
More than 11,000 high school students filed applications to attend Rensselaer this fall, according to the Institute’s Office of Admissions. The record number of applications for 2008 is up 10 percent from the previous year, and it is more than double the number received just three years ago in 2005.

“Could not be more pleased to see such a broad spectrum of talented applicants from across the country and around the world,” says James Nondorf, vice president for enrollment and dean of undergraduate and graduate admissions.

“Over the past several years, we have seen an expansion of the national and international profile of the student body, as well as a significant increase in applications from women, underrepresented minorities, and those who are interested in new areas of Rensselaer’s expanding curriculum.”

Rensselaer Admissions received 11,200 total applications. This record number is a more than 10 percent increase over the previous year and represents a growth of 100 percent since 2005, when the Institute received just over 5,500 applications.

Over the last three years, applications from female and underrepresented minority students have increased by 300 and 650 percent, respectively, and international student applications to Rensselaer have increased by more than 1,100 percent.

Additionally, applications from students interested in science and biotechnology have increased by more than 250 percent, and applicants interested in the arts, humanities, and social sciences have grown by over 900 percent.

The academic quality of applicants also continues to rise. The Class of 2011, which started classes in fall 2007, had an average SAT score up almost 20 points from the previous year, and more than 65 percent of the students came from the top 10 percent of their high school classes.

And applicants have been showing a greater interest in opportunities for undergraduate research, Nondorf says.

The Class of 2011, which started classes in fall 2007, had an average SAT score up almost 20 points from the previous year, and more than 65 percent of the students came from the top 10 percent of their high school classes.

A growing number of students have been involved with research projects in high school, and they see Rensselaer as a place to continue pursuing discovery with faculty who are at the top of their fields. Expanding participation in undergraduate research is a key part of The Undergraduate Plan, which calls for challenging, engaging, and highly relevant academic programs that combine theory with experiential learning.

“Over the last three years, we have seen a significant increase in applications from women, underrepresented minorities, and those who are interested in new areas of Rensselaer’s expanding curriculum.”

Rensselaer researchers have developed a new set of modeling tools that could enable safer, more accurate, and more effective radiation therapy and nuclear medicine imaging procedures for pregnant women.

Radiation is a doubled-edged sword: It holds the power to cure cancer, but if used improperly it can also cause serious damage to the human body. The situation is even more critical with pregnant females, as any errant radiation could severely harm and impede the growth of the fetus.

“The human body is a particular challenge to model because of its wide variety of organs, each with a complex and unique shape,” says X. George Xu, professor of nuclear and biomedical engineering at Rensselaer, who is leading the project. “Pregnant females are even more difficult to model using current methods, so we took an entirely new approach.”

Physicians use advanced computer simulations to determine the correct dose of radiation to administer to patients. These computer simulations are based on sophisticated virtual models of the human body. About 30 of these models, sometimes called “phantoms,” have been developed worldwide.

The data needed to build such models, however, requires extensive X-rays and computed tomography scans. Since pregnant patients are prohibited from undergoing X-rays or other imaging procedures, there has never been enough data to create an accurate phantom of a pregnant woman.

Conventional methods of phantom creation simply cannot account for the rapid changes of a pregnant woman’s internal physiology as her organs shift to accommodate the growing fetus. So Xu and his team turned to boundary representations (BREP) tools, which are more flexible and feature a more robust toolbox for manipulating the surface of model components. They created 3-D models of pregnant females at various gestational stages: three months, six months, and nine months.

“These new models should be extremely useful for understanding the risks of radiation, and for better planning radiation imaging and treatment for pregnant women,” Xu says. “The tools we have developed for this research should also open up several new avenues for improving the field of radiation dosimetry.”
Susan Gilbert: Leveraging an Interdisciplinary Environment

"I WANT TO GET OUR BIOLOGY students excited from day one," Susan Gilbert says. As the new head of the Department of Biology, Gilbert wants to enhance the undergraduate experience through increased involvement in undergraduate research and an increasing focus on interdisciplinary curricula and inquiry-based learning. She wants to ensure that all Rensselaer biologists, young and old, successfully operate in an increasingly cross-disciplinary research world. And although her vision begins with undergraduate students, her overall goals for the department encompass graduate and postdoctoral students, faculty, and researchers. She even has plans for involving K-12 students and teachers in the research being conducted in her department.

For students within the department, Gilbert wants to foster their success after graduation. "We need to teach our graduates a more universal language because the days of the traditional, insulated biologist are gone," Gilbert says. "We have begun to leverage the interdisciplinary environment at Rensselaer to give our students the opportunity to engage in different types of research, learn about different aspects of science and society, and try on different hats to find their personal career path."

She explains that this interdisciplinary path can also increase Rensselaer research success and funding. "The National Institutes of Health and other federal funding agencies view interdisciplinary research teams as a mechanism to accelerate the transition from basic research to application," she says. "I am encouraging the continued development of relationships between department faculty and other disciplines." This includes expanded involvement with research centers at Rensselaer such as the Center for Biotechnology and Interdisciplinary Studies, the Nanotechnology Center, and the Darrin Fresh Water Institute. The department already has growing collaborations on issues of national importance such as stem cells, cancer, and Alzheimer's disease as well global climate change and water resource management.

Gilbert comes to Rensselaer from the University of Pittsburgh where she served on the faculty of the Department of Biological Sciences for the past 12 years. During her time at Pittsburgh, she was a member of the Molecular Biophysics and Structural Biology Graduate Program and the University of Pittsburgh Cancer Institute. She received a bachelor's in chemistry from Randolph-Macon Woman's College and a doctorate in cell biology from Dartmouth College.

Gilbert is excited to continue her research, teaching, and mentoring while she works to build the core strengths of the department. Gilbert is widely recognized in the field of cell motility for her research on molecular motors that drive movements within our cells. She studies a family of motor proteins known as kinesins that interact with microtubules, which act as interstate highways of the cell. Understanding the role of different kinesins in the body offers scientists the opportunity to target drugs to a specific type of kinesin. Gilbert is working to understand the kinesins that function in cell division as cell division drives the spread of cancer in the human body. "If specific kinesins can be targeted and disrupted by drugs, chemotherapy of the future could become highly effective and more comfortable for the patients," she says.

Gilbert's overarching goal is to develop a top-ranked biology department that draws researchers and students from around the world to come together with the rest of the Rensselaer community to develop research that will truly change the world. "Biology is at the center of some of this century's most difficult challenges, from cancer to global warming to infectious diseases such as malaria, tuberculosis, and HIV," she says. "I want our biologists at the center of global efforts to solve these and related issues of importance to the health of all human beings and the planet on which we live."
SHENGBAI ZHANG, a quantum physicist renowned for his computational modeling and research in semiconductor defects, has been named senior chair of Rensselaer’s Gail and Jeffrey L. Kodosky ’70 Constellation in Physics, Information Technology, and Entrepreneurship. The first to hold the constellation position, Zhang is also a professor in the Department of Physics, Applied Physics, and Astronomy. Earning his bachelor’s degree from Jilin University in China and his master’s and doctorate in physics from the University of California at Berkeley, he is a fellow of the American Physical Society. Zhang joined Rensselaer from the National Renewable Energy Laboratory and has received other prestigious awards such as the Chunky Bullet Award, the Outstanding Performance Award, and the Director’s Award from the U.S. Department of Energy/Basic Energy Sciences.

KIM BOYER, a renowned computer vision expert, has joined the faculty of Rensselaer as head of the Department of Electrical, Computer, and Systems Engineering. Boyer, whose research interests range from advanced heart imaging and human eye modeling to eye-in-the-sky satellites, joins Rensselaer from the Ohio State University where he was a professor and director of the school’s Signal Analysis and Machine Perception Laboratory. Along with being a published author, he also brings 30 years of experience in academia and the private sector with a robust research program.

JACOB FISH, the Rosalind and John J. Redfern ’33 Chaired Professor of Engineering and director of the Multiscale Science and Engineering Center, has been elected a fellow of the American Academy of Mechanics. He earned his bachelor’s and master’s degrees from Israel Institute of Technology and his doctorate from Northwestern University. Fish became a full professor in 1998 and director of Rensselaer’s Multiscale Science and Engineering Center in 2005. Fish is a prolific author, including being the founder and editor-in-chief of the International Journal of Multiscale Computational Engineering.

ASSAD OBERAI, an associate professor in the Department of Mechanical, Aerospace, and Nuclear Engineering, has won the 2007 American Society of Mechanical Engineers (ASME) Special Achievement Award for Young Investigators in Applied Mechanics. The ASME award recognizes Oberai’s fundamental developments in solving inverse problems and problems with multiple spatial and temporal scales. Oberai joined Rensselaer in 2005 after earning his bachelor’s degree from Osmania University in India, his master’s from the University of Colorado at Boulder, and his doctorate from Stanford University.

DAVID DUQUETTE, a corrosion expert in the Department of Materials Science and Engineering, has been named John Tod Horton Distinguished Professor in Materials Engineering, one of the highest honors bestowed on a Rensselaer faculty member. He is a world leader in the field of corrosion, electrochemical phenomena and processing, and through his academic career, has won numerous awards and recognitions for breakthrough research. After four years as a commissioned officer in the U.S. Coast Guard, he earned his doctorate from Massachusetts Institute of Technology and came to Rensselaer in 1970. Duquette served as head of the Department of Materials Science and Engineering from 2000 to 2007, and graduated more than 40 doctoral students and 40 master’s students.

ACHILLE MESSAC, a design optimization pioneer and professor of mechanical, aerospace, and nuclear engineering, has been elected a fellow of the American Institute of Aeronautics and Astronautics (AIAA). Messac was a pioneer of control structure integrated design in the 1980s and has continued his current research while inventing the physical programming method. He joined Rensselaer in 2000. Messac earned his bachelor’s, master’s, and doctoral degrees from Massachusetts Institute of Technology. Along with receiving prestigious awards and serving on editorial boards, Messac is one of the few engineers worldwide elected to both the American Society of Mechanical Engineers and the AIAA.

E. FRED SCHUBERT, the Wellfleet Senior Constellation Professor of the Future Chips Constellation, and doctoral student Brian Schulk, have been named to the 2007 “Scientific American 50,” an annual list that recognizes research, business, and policy leaders who have played a critical role in driving key science and technology trends over the past year in biotechnology, microelectronics, energy, genetics, and other fields. Schubert was named a Research Leader in the list’s Light Manipulation category for his work over the past year on non-reflective coatings. Schulk, a doctoral student in physics and winner of the prestigious Lemelson-Rensselaer Student Prize in 2007, was included for his work on terahertz imaging.

TOH-MING LU, the R.P. Baker Distinguished Professor of Physics, has been named a lifetime fellow of the Materials Research Society (MRS). The MRS has recognized Lu for his contributions to the advancement of materials research, specifically his “seminal contributions to the fundamental understanding of thin film morphological evolution.” Lu joins a distinguished group that includes 34 researchers selected for their outstanding contributions to the field. A nanomaterials expert, Lu strives to develop new, high-performing nanostructures that can be used in integrated electronics, semiconductors, and energy storage devices. Lu is a fellow of the American Association for the Advancement of Science, the American Physical Society, and the American Vacuum Society. He is author of more than 400 technical papers and holds nine patents related to his research.

ROBERT DOREMUS, emeritus professor, died Jan. 30. A prolific writer and esteemed materials scientist, Doremus published several books and more than 250 publications over the course of his career. His research entailed glass science, ceramics, crystal growth, bone implants, the growth of kidney stones, and the optical properties of metallic particles and film. Doremus held the title of New York State Science and Technology Foundation Professor of Glass and Ceramics until his retirement. He was also a member of the Materials Research Society, American Association for the Advancement of Science, and a fellow of the American Ceramic Society. He received several awards including the Outstanding Educator Award from Rensselaer in 1978, Outstanding Educator Award from the American Ceramic Society in 1995, and the Trustees Teaching Award from Rensselaer in 1997.
Untangling the Web
Where will the next Google come from? Rensselaer researchers are creating powerful new technologies for the World Wide Web, making it easier for everyone—from scientists to casual Internet surfers—to find information online.

**LOOKING FOR A CHEAP PLANE TICKET** to San Francisco? Want to read a transcription of a human genome? Would you like to find other people interested in bird watching? Or are you just seeking a good place to buy red wine in Troy, N.Y.?

The Internet has put so much information at our disposal that a quick search can turn up hundreds, thousands, or millions of answers to these kinds of simple queries.

Whether or not those answers are correct—or useful—is another matter. Many Google searches oriented around the human genome, for instance, will turn up more than a million answers, making it hard to identify the most useful pieces of information. A Google query for “red wine + Troy New York,” meanwhile, turns up a flower-delivery service and a Honda dealership among its top 10 results, but no liquor store.

As much as the Web has changed the way we live in ways unimaginable 15 years ago, it still is an imperfect system. By changing the way data is encoded into Web pages and transmitted among them, we may soon develop highly reliable, efficient new ways of locating useful information. These tools would not replace the Internet search engines we use so often, but would add a new dimension to our ability to find things online. In fact, that’s the goal of the Rensselaer Tetherless World Research Constellation. The constellation, which formally launches this year, aims to revamp the entire Web’s ability to handle information in ways that would benefit everyone from casual browsers to leading-edge academic researchers.

The Tetherless World constellation will guide research on technologies that will support a Web-accessible world in which personal digital assistants, cameras, music-listening devices, cell phones, laptops, and other devices converge. The constellation will encompass multidisciplinary teams of senior and junior faculty, graduate students, and undergraduates in information technology, computer science, and cognitive science, and will reach out to the entire campus for support and collaboration.

“When you look at the Web you might just regard it as this great big network,” says James Hendler, senior professor in the new constellation, who joined Rensselaer last year. “But we want to keep it moving and growing, keep building it, and always ask what it needs.” BY PETER DIZIKES
The main vehicle for this work is the Semantic Web, a concept shaped several years ago by the World Wide Web's founder, Sir Tim Berners-Lee, and developed by an expanding group of academic researchers, including Hendler and Deborah McGuinness, another highly regarded computer science professor who joined Rensselaer's emerging constellation last year. In a seminal article in *Scientific American* in 2001, Berners-Lee, Hendler, and Ora Lassila of the Nokia Research Center in Cambridge, Mass., wrote that the Semantic Web will function so that "information is given well-defined meaning, better enabling computers and people to work in cooperation." Thus, they concluded that computers will better "understand" the information in Web pages and produce better results.

"Ultimately we would like the Semantic Web to be invisible to users," says McGuinness. "You never have to think about the fact that you turn a light switch on and electricity flows. Similarly you don't want to have to think about the Semantic Web, but its intelligent agents will just work for you, and do background tasks for you. You give them operating instructions, and they act on your behalf."

Constructing the Semantic Web is only one of a number of projects the Tetherless World constellation has on the drawing board. It also plans collaborations with a number of interdisciplinary initiatives that can apply the principles of the Semantic Web to specific research projects. The group also aims to develop the field of "Web science," studying the ever-evolving structure and use of the Web. As the constellation name implies, the group also has a vision of a smarter Web leading to a more efficient flow of information that will improve the capabilities of mobile and wireless devices.

"The Semantic Web will enable the less tethered world that we all can live in," says McGuinness. "We're going to have a much more tetherless society in the future, where you're not required to be next to a large computer to do intelligent tasks. Today, you can kind of do some of that with your cellphone and PDA, from hotspots. But the best you can do is send Rensselaer a center of excellence in the field."

**The hunt is on**

The Web can be fooled by keywords. A search on "Troy," for example, could bring up results ranging from ancient Troy to a university in Alabama to the Troy on the Hudson River. The founders of the search engine Google made a clever end-run around the problem is designed to extract information from a wide variety of Web pages, by analyzing the nature of the information in those pages.

So if the goal is to find data on the growth in air freight cargo from the United States to China over the last five or 10 years organized by industry or airline, a well-crafted Semantic Web query could link together similar pieces of data from disparate sources. A rich collection of data could quickly be assembled in one place, rather than extracted from a series of painstaking searches. And you probably wouldn't have to worry about a computer confusing "United," as in the airline, with "United," as in "the United States," among other problems we now face.

"Google is phenomenal, don't get me wrong," says Hendler. "And none of this would put Google out of business. What we're doing with the Semantic Web is building a new link space on top of the old one, so we can link the concepts, not just the documents. So instead of guessing, the minute someone puts that information there, everybody can take advantage of it."

From this perspective, the Web would become, in Berners-Lee's often-cited phrase, a "Web of meaning," akin to one giant global database that can be searched, rather than its current form, which is a bit more like one giant pile of file folders to flip through.

**Weaving the threads**

Making the Semantic Web a reliable, smoothly functioning tool will take several parallel developments. One involves the creation of robust computing tools capable of handling information in a way that mimics the intricacies of everyday human language. Web pages also will have to be encoded in a manner that makes (at least some of) their meaning explicit.
A Semantic Web application can link together pieces of data from a variety of sources. A user researching a vacation, for example, could type in a query and receive information about all aspects of his or her trip at one time, instead of conducting separate searches for flight, hotel, and car rental information.
Today, there are about 2.1 million Web pages encoded in Semantic Web formats, and companies such as IBM, Oracle, Adobe, and Northrop Grumman have begun to use the technology.

Currently the Semantic Web is decentralized, like the Web itself. A number of slight variations of it are being developed around the world and must be able to communicate with each other, so that a Semantic Web program created at the Institute could be linked to one at IBM.

Given the broad range of competencies involved in developing faculty already working with the constellation include Sibel Adali, an associate professor of computer science studying the relationship between databases and the Semantic Web; Boleslaw Szymanski, director of the Center for Pervasive Computing and Networking; and Selmer Bringsjord, chair of the Department of Cognitive Science.

Both Hendler and McGuinness have made their reputations in the research community through their work on the Semantic Web. Many of Hendler’s articles, both in the popular press and in academic circles, have functioned as road maps for the computer science community. He is currently the editor of IEEE Intelligent Systems, one of the main journals in the field, and he is the first computer scientist to have been on the board of reviewing editors of Science, the largest scientific publication in America.

McGuinness’ work included co-authoring an influential Semantic Web standard known as the OWL Web Ontology Language, which has been recommended by the World Wide Web Consortium, the group Berners-Lee helped found to ensure that the Web maintains globally compatible formats so it remains a truly worldwide network. The pair collaborated on a widely cited 2000 article in IEEE Intelligent Systems, on applying these principles within the U.S. Defense Advanced Research Projects Agency (where Hendler once served as chief scientist of the Information Systems Office).

The hiring of Hendler and McGuinness has been recognized by researchers at other institutions as major “gets” for Rensselaer. “Jim Hendler is one of the most significant figures in getting the Semantic Web to where it is today,” says Jeff Heflin, a computer scientist at Lehigh University, who has collaborated with Hendler in the past. “I’m not sure where we would be right now without his work.” Similarly, McGuinness “has been crucial in the development of the description logic, and the Ontology Web Language we use,” says Heflin, who got to know McGuinness while she was co-directing Stanford University’s Knowledge Systems Lab, which she left to join Rensselaer.

Wei Zhao, dean of the School of Science and a computer scientist himself, says the team will have far-reaching impact both in its specific field and across the Institute. “We have a lot of potential here in this group, which the community can leverage and use to expand their own work,” he says.

Berners-Lee agrees. “The whole constellation should be a great success,” he says.

At the moment, further refining OWL will be an important task for the Semantic Web community. An ontology is a description of what exists in the world around us. In Web terms, that means a set of definitions pertaining to a particular subject area, plus a set of rules about how computers should read and handle the information in those documents. Health-care companies—one place where the Semantic Web is gaining traction—may develop their own ontologies, while financial services companies may do the same. But it’s clear to researchers that interoperable systems would benefit all fields of inquiry.

OWL provides a more powerful set of rules, and a more flexible structure, than had previously existed, although, as McGuinness notes, it is by its nature a work in progress. “You never really want to have a system only one person can maintain,” says McGuinness, who emphasizes that OWL, like particular ontologies, is a work in progress. “I build languages that allow people to create ontologies, and I want to build environments that allow those ontologies to evolve.”
**Power tool**

While the commercial promise of the Semantic Web is obvious, the technology also is rapidly taking off among academic researchers, particularly in the sciences. About five years ago, McGuinness noticed her work was finding a new audience. First a geologist at another university asked if she could help direct his searches for data. Soon after, another request for assistance came from a government computational scientist. Then a well-respected immunologist had a similar request. "I kept being contacted by scientists in radically different domains," she says.

They were all after the same thing: a better way to find and distribute research information.

At a time when science is expanding globally, it is increasingly difficult to keep track of all the relevant research in a field the old-fashioned way by looking through journals or even by the more recent method of checking online collections of papers. Complicating the situation is the increasingly interdisciplinary nature of contemporary research, which means scientists are not always sure where to look for information in the first place.

"The nature of scientific research is changing," says McGuinness. "In the old world, projects had a single lead researcher who was very well-school ed in a single discipline. But now people are finding they need expertise from another sub-discipline in which they're not expert, or from another discipline not that closely related to theirs. If you try to take on a problem like global warming, no single expert scientist is going to solve that. Instead, you need to collaborate across disciplines and share data."

For these reasons, the Semantic Web holds the promise of discover where that data is, and can use that expertise to help professors in any area," he says.

Berners-Lee also sees the potential for connecting multiple disciplines. "The whole Semantic Web will never be totally consistent," he says. "But some global data sets will be very solid. In the life sciences, or in financial reporting, we will have a few central concepts shared internationally."

McGuinness now is involved in a pilot project called the "Virtual Solar-Terrestrial Observatory," a Web site serving as a repository of data for solar and atmospheric science means a variety of researchers—in bioinformatics or chemical informatics, for instance—could be open to collaboration on future projects that would help them better crunch through their data.

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**Semantic Web**

*I know what was meant*

- Understands term meaning and user background
- Interoperable (can translate between applications)
- Programmable (thus agent friendly and operational)
- Explainable (thus maintains context and can adapt)
- Capable of filtering (thus limiting display and human intervention requirements)
- Capable of executing services

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And then there are some projects that might seem surprising for a group of computer scientists to undertake, but are very much on the constellation's agenda, like a collaboration with the Experimental Media and Performing Arts Center, in which the constellation hopes to lend its expertise to help design projects and installations. "Interdisciplinary Web science is a great starting point for that," says Hendler.

With a fertile field of possible research collaborations ahead, the Tetherless World constellation is already in the business of connecting the world.
After more than 25 years in business, the Rensselaer Technology Park continues to attract major tenants and launch innovative companies ready for the global economy.

ON A COLD JANUARY DAY, backhoes pulled endless loads of dirt from the site being carved out of the Rensselaer Technology Park. Concrete pylons sketched out the beginnings of a 33-acre project, the Albany skyline in the background. GE Healthcare is the new tenant on an aggressive schedule to complete its $165 million 150,000-square-foot facility that will produce digital X-ray devices that will significantly improve breast cancer detection.

"At some point soon, GE is going to meet Rensselaer—physically," says Karl Lampson, manager of financial and business operations at the Tech Park, one of the first research parks in the nation owned by a university. "We’re going to build a road to tie them together."

In the coming months, the Tech Park has to extend the infrastructure, including an access road and bridges that pass over protected wetlands. The entire process, from permits to construction, might have taken considerably longer were the tenant not on such an ambitious timetable to potentially save lives.

"Every month we don’t put a system out there is a month that hospitals don’t have the technology available for women, and cancers could be missed," says Thomas Feist, manager of the thin films lab at GE Global Research, which developed the X-ray technology. "RPI had the best combination of a high-tech presence and infrastructure availability," Feist says. "But if they’d said we’d need to wait a year to sign a lease, we would have vetoed it. They didn’t. They said they’d do whatever it takes."

General Electric’s debut into the Tech Park brings together two Capital Region powerhouses that have collaborated for more than a century. Tech Park Director Michael Wacholder said the proximity of university to corporation is the exact scenario Rensselaer planners envisioned 30 years ago when they began to conceive the idea of the park.

"This is the first time in many years GE has decided on a major facility in the region and it’s being built right here," says Wacholder. "I think it signals two things: the value of relationships between a great corporation and a great research institution and, also, the way the region has redefined its economy and turned its focus to technology."  BY JANE GOTTLIEB
GE Healthcare is the new tenant on an aggressive schedule to complete its $165 million 150,000-square-foot facility at the Rensselaer Technology Park. General Electric’s debut into the Tech Park brings together two Capital Region powerhouses that have collaborated for more than a century.
THE RULES OF (BUSINESS) ATTRACTION

Today, about 70 companies—with staff ranging from two to more than 400 employees—occupy more than one million square feet in 23 buildings in the Tech Park under agreements that include owner-occupied and Rensselaer-owned properties. The current occupancy rate stands at close to 100 percent. But Wacholder, who has been involved in the park since working on the early feasibility studies, says it is not just the number of businesses that is notable, it’s the quality and variety of the portfolio developing on those wooded acres that stretch from Route 4 to the Hudson River.

Just two months before the first shovels went in at GE, for instance, the Tech Park welcomed the world’s most powerful university-based supercomputer when the Computational Center for Nanotechnology Innovations (CCNI) began operation. Housed in an unassuming brick building filled at this point with more hardware than humans, CCNI represents a $100 million collaboration among Rensselaer, IBM, and the state of New York.

With the supercomputer, capable of processing 70 trillion calculations every second, the center’s partners hope for nothing less than a major jolt for the local economy and a global reach that will draw a new wave of Tech Park tenants.

For the last two years WMHT Educational Telecommunications has also called the Tech Park home. In its first custom-built headquarters, the regional PBS affiliate is planning, among other things, its switch to all-digital broadcast. CEO Robert Altman says the setting is no coincidence.

“We’re all about the intersection of communication, education, and technology, which is certainly the same space that RPI occupies,” says Altman. “Particularly since so much of what we hope to do is in partnership with other kinds of institutions, it’s that much easier if we’re all in the same place.”

Other developments include the arrival in 2005 of the Children’s Museum of Science and Technology, formerly the Junior Museum of Troy. Occupying about 12,000 feet, the museum guides visitors through a circular route designed to entice without overwhelming.

At the other end of the continuum at 210,000 square feet is MapInfo, which has become a global leader in what the company calls “location intelligence solutions.” The company grew from the concept developed by four Rensselaer undergraduates in a technological entrepreneurship class to a multinational corporation with expertise in desktop mapping software that recently was purchased by Pitney Bowes for more than $400 million.

Rising like a giant silvery igloo, its second Tech Park location, Pitney Bowes Software, as it is now called, might be considered the “anchor.” This year its workforce is expected to grow to between 500 and 600, prompting the addition of a self-contained medical clinic. Recent success, ironically, is also measured in those fledgling businesses that have grown up and left the nest under the Rensselaer aegis. Among these is Vicarious Visions, the video games developer also created by Rensselaer students that first located in the Incubator. While a Tech Park tenant, the company grew from 12 to 110 employees and produced some of the most popular video games in the industry. In 2006, Activision bought Vicarious Visions and moved it into a new building across the river in Menands. The company credits the Tech Park with mapping out space that allowed expansion.

“To an extent, success is measured by how we contribute to the growth of the technology sector of the Capital Region,” says Wacholder. “If a company came to the park and later went to Saratoga or Latham or Albany, that’s an incredible success. We’re not building a project just so RPI can hold on to it. We are helping to build a technology focus for the regional economy.”

Pitney Bowes MapInfo President Michael Hickey says the positive image of business growth in Tech Valley, which encompasses the Capital Region and the Hudson River Valley, has helped his company to recruit people from outside the region.

“Now the image has really changed. I travel all over the world and people are impressed when I tell them where I am from, and they want to locate here,” says Hickey.

Meanwhile, strong investment by New York state has included $33 million for the supercomputer, $10 million for the GE Healthcare plant, and $500,000 for WMHT’s digital broadcast center.

Wacholder points out that these positive developments might not have been leveraged so well if not for the involvement of Rensselaer’s president. He credits President Shirley Ann Jackson for cultivating industrial partnerships that have created support for ambitious initiatives like CCNI. “She has brought powerful players such as IBM and GE to the table,” says Wacholder. “She was the driving force behind both deals.”

VISION TAKES ROOT

A stalled economy and a skeptical public did not deter Rensselaer from allocating $3 million in 1981 to begin developing on a 1,200-acre parcel six miles from campus in North Greenbush. Plans for the Tech Park were launched in the late 1970s with then President George Low’s idea to start a research park at Rensselaer that would bring together government, business, and academia.

But the idea of forging such off-campus links was met with skepticism, says Wacholder. The economy was in a downturn and the Capital Region had not yet begun retooling from its faded industrial past. Universities were still largely detached from community life.

But the Institute was committed to merging learning opportunities with business, an early step toward fostering town-gown relationships. By 1981, Rensselaer trustees proceeded. Two years later the park welcomed its first tenant, an optoelectronics facility operated by National Semiconductor Corp. Soon, the park greeted the early wave of software developers, much as Silicon Valley, nurtured by Stanford University, had embraced and was named for the new-wave technology of that time.

Ever since, the park has captured a representation of the newest innovations. But the site also tells the story of national
Pitney Bowes MapInfo (top and bottom left) has been a park tenant since 1993; public television station WMHT joined the park two years ago; Mike Wacholder, Rensselaer Technology Park director, (below) has been with the park since its founding.

"The proximity of university to corporation is the exact scenario Rensselaer planners envisioned 30 years ago when they began to conceive the idea of the park."
economic slowdowns. In the early 1980s it was recession. Following the 1990s boom, the growth came to a standstill, as the dot-com bubble burst and the economy reeled after the terrorist attacks of Sept. 11, 2001.

MapInfo struggled through seven tough years by making workforce reductions, discontinuing projects that would produce no immediate results, and cutting back costs. The company survived in part by taking steps that would reflect a permanent change, rather than behaving as if the world would once again right itself. The park did not lose any large tenants during that period. But Wacholder says that he "worked with" a few, which can involve making difficult judgment calls.

Challenges to the park also include remaining financially self-sustaining without straying from its mission of providing a mix of high technology, cultural, and educational tenants. Wacholder says the standards have been loosened at times, but never enough to skew the character.

A WALK IN THE PARK

As GE Healthcare broke ground, global demand for digital mammography was growing at a startling 25 percent or more a year. GE was the first with digital mammography; it had taken nearly 20 years to develop at its Global Research headquarters in Niskayuna. The machine improved greatly on film, enabling physicians to pinpoint breast cancer far earlier and save thousands of lives every year. Now, competitors were catching up and it was impossible to keep up without a facility in which to produce them.

The optimal solution would be to find a site within 15 miles of Niskayuna so that the engineers and researchers could accelerate the technology to its next level. About a dozen candidates emerged, some in farm fields without the proper infrastructure or zoning in place; others in brownfields, where a protracted permitting process was practically a guarantee. A few urban spots also were considered, says GE's Feist. But these would have limited expansion opportunities or force a facility to be spread across different sites.

The Tech Park became a leading candidate because the landlord would be responsible for many of the logistics—dealing with wetlands, whose presence was of concern to the Army Corps of Engineers, permits from the Town of North Greenbush and the state, and the grueling timetable GE had set for itself.

Feist was impressed by the Tech Park's working relationship with the town and a concern with detail one would associate with Rensselaer. "The RPI team put in long hours working through the potential environmental concerns," he says. "They addressed these things more deeply than any other owner we have leased from."

Wacholder and his staff of four provide what businesses, including those run by newly minted Rensselaer graduates, have called a "security blanket," stepping in to help line up a phone carrier or suggest where to buy furniture.

Another plus was Rensselaer's longstanding relationship with GE, where so many alumni work, including Mark Little, now a Global Research senior vice president, who earned his Ph.D. from Rensselaer in 1982. Proximity to Pitney Bowes MapInfo, CCNI, and the Troy campus added to the appeal. GE also wanted a home that was more high-tech than industrial and near attractive buildings and nature, not warehouses and traffic.

The neighborhood also was a draw for WMHT, which was moving from an industrial park in Rotterdam. Like all public broadcasters, the station struggles against competition from cable networks. It is eager to capture a younger audience, including the demographics represented by the Rensselaer community. "If we're going to be around in five or 10 or 20 years, we need to be not just pleasing people but making a difference in the community we're engaged in," says WMHT's Altman. "You can call it economic development, call it whatever you want, but building a sense of community is crucial. We'd like to see our relationships with RPI itself grow and share the wider world of things that are going on."

Pitney Bowes MapInfo's Hickey says the setting, near other providers of technology and education—"birds of a feather" he calls them—is important to the message and morale of the company.

C O N N E C T I O N S W I T H C A M P U S

On the southern edge of the Tech Park is the blue-frame home called ARCH House, which Rensselaer architecture students designed and built as a project that examined affordable, prefabricated housing.

In the center of the Tech Park, thousands of visitors to the Children's Museum take in the Molecularium, the globally distributed animated show developed and patented by Rensselaer researchers that tells the story of life in a planetarium format.

"Rensselaer's Lighting Research Center has done a number of projects out here. LRC students are going to analyze how to use LED street lighting, on the new (GE) road," says Wacholder.

Over the years, scores of Rensselaer students have interned and have been mentored in offices at the Tech Park. A notable segment of MapInfo’s workforce came straight from the Troy campus. That’s in addition to the concepts born in Rensselaer classrooms that moved to the commercial marketplace via the Tech Park, such as Pitney Bowes MapInfo and BullEx, the patented fire extinguisher training system used worldwide that originated in Rensselaer’s Inventor's Studio course and continues to maintain its headquarters in the Tech Park.
With biomedicine, supercomputing, digital broadcast, and the myriad ventures they spawn now unfolding in North Greenbush, there are even more plans to join the park with the campus.

"People like me absolutely have to take this as a responsibility. There's nothing that stops any of us from taking the initiative," says David Gautschi, dean of the Lally School of Management & Technology. "Michael Wacholder has done a terrific job. Now we have to take a more deliberate look at insinuating ourselves into the activities at the Tech Park. Let's face it; we have to be able to promote our value to them. When businesses go through a large evolution they aren't necessarily thinking about how they can make connections to us."

The challenge is heightened somewhat by the six miles between the Institute and Tech Park. Business-university ventures more typically share the same terrain. One such model is Sophia Antipolis, a technology park in the south of France where tech-university students work directly in government labs. More typical in the U.S. is Stanford Research Park, the nation's first, which developed as Stanford University made its adjoining land available to businesses. The results were university and industry enterprises now largely indistinguishable from one another.

Wacholder says Rensselaer's Tech Park was located in North Greenbush because land was not available next to the urban campus. "In the best of all possible worlds you'd have the next 80 acres to build from," he says. "But in some respects it's a blessing, too. We're right in the center of the Capital Region, across the river from downtown Albany and the legislative chambers. We have the ability to preserve the environment in the center of the region."

Also in the works, Gautschi says, are efforts to build stronger ties between the Tech Park and the Rensselaer Incubator and Severino Center for Technological Entrepreneurship. Already in place is a "dark fiber connection" between WMHT and EMPAC, which will allow live simulcasts between the two locations. Rensselaer's supercomputer also provides a high-tech connection. A degree program in finance is being planned, Gautschi says, that may involve a major financial information company that works at the CCNI.

The Lally dean's office is also working to place students into internships and co-ops in the Tech Park, some at the master's level.

"I said to Mike [Wacholder], please take me and introduce me to all the businesses that are coming in," Gautschi says. "He said he would not only take me to the companies, but also bring the companies to the campus."
IN 2003, POLITICAL THEORIST LANGDON WINNER was invited to testify before the U.S. House of Representatives' Committee on Science. Nanotechnology, a field of science based on manipulating matter at the scale of the nanometer, had gained growing recognition as an emerging technology with revolutionary potential, and Winner was called to Washington to participate in a discussion about its possible societal implications.

Winner acknowledged nanotechnology's bright promise, but also urged committee members to consider what factors could influence the successful adoption of this—and other—new technologies into society, and to think about what questions should be discussed during the research and development phase to help minimize the potentially disruptive impacts of powerful technological developments.

Today, Winner continues to study the ways in which technological breakthroughs ranging from computing to communications will positively or negatively impact society. He is hailed by the Wall Street Journal as "the leading academic on the politics of technology." He is also one of more than 100 academics in Rensselaer's School of Humanities and Social Sciences (H&SS) who are investigating and exploring how technology functions in relation to culture.

For over a half century, H&SS has been building bridges from the liberal arts to the disciplines of engineering and science through the study of technology's role in society. This year it celebrates 50 years of granting degrees on the Rensselaer campus, as well as the adoption of a new name that better articulates its academic strengths.

Now called the School of Humanities, Arts, and Social Sciences, the school continues to build upon its strengths in arts and design—valuable dimensions of interdisciplinary work in the humanities and social sciences—while always anticipating the expanding role of the humanities in the 21st century.

H&SS took shape in the mid-1950s under the guidance of Dr. Ronald A. H. Mueller, who later became the school's dean. A standardized core of liberal arts was formed shortly thereafter to ensure students were being provided with a well-rounded science and technology education enhanced with a strong grounding in the humanities and social sciences. All students were required to take a minimum of eight "general studies" classes ranging from English and philosophy to history and social sciences.

By 1958 the school's mission had transcended simply providing core courses for engineers and scientists to offering its own unique degree programs in language and literature, philosophy, psychology, and economics. The Department of Language, Literature, and Communication pioneered the study of technical communication (or technical writing), offering the nation's first degree in the field.

Father Thomas Phelan—a Troy native who came to Rensselaer in 1959 as the resident Catholic chaplain—was appointed dean of the School of Humanities and Social Sciences in 1972. "I certainly was not shocked when the Institute appointed Father Tom as dean of H&SS," says Rensselaer board member Judge Art Gajarsa '62, who says Phelan had a "direct impact on my life." Gajarsa is a circuit judge on the United States Court of Appeals for the Federal Circuit.

As a sophomore engineering student, Gajarsa was contemplating switching universities to obtain a broader education when Phelan convinced him to finish his undergraduate degree at Rensselaer and provided him with a reading list and books about history, literature, and economics so he could supplement his engineering studies with a grounding in the humanities.

"Rensselaer knew how to educate great engineers and great scientists," says Gajarsa. "Father Tom could take those engineers and scientists, educate them about the humanities, expose them to various aspects of culture—such as music and the arts—and set them on a path to becoming CEOs, directors of research, and leaders in industry. He was an advocate for broadening horizons and as dean of H&SS he did just that for countless students."

Phelan served as H&SS dean until 1994 and as Institute Dean and Historian until his death in 2006. Under his leadership, the school moved into the Russell Sage Laboratory—which is celebrating its 100th anniversary this year. Three of the school's five departments continue to be housed in the building today. BY AMBER CLEVELAND
Marking its 50th anniversary, the School of Humanities, Arts, and Social Sciences has come into its own—launching pioneering programs that have drawn national recognition and a growing number of talented and diverse students.
“H&SS used to be viewed as the school students had to pass through to get on to their engineering classes,” says Dean John Harrington. “Now many come to Rensselaer specifically for the H&SS offerings.”
By populating its faculty with academics whose research connected to science and technology, Phelan helped focus the school into a humanities and social sciences institution specifically designed to fit within the context of a technological university.

"Tom Phelan had a wonderful talent for bringing people together from diverse backgrounds and supporting them in innovative projects both on campus and in the surrounding community," says Winner, who has been a member of the school since 1985 and currently holds the Thomas Phelan Chair. "His understanding of the ethical and spiritual dimensions of scholarship helped create academic programs in which the underlying human values are strongly emphasized."

The school grew considerably during Phelan's unprecedented 23-year leadership as dean. The faculty increased by 30 percent; two departments—the Department of Arts and the Department of Science and Technology Studies—were created; and four additional degree programs were added.

"When I arrived on the Rensselaer campus, H&SS had just completed a bold reorganization," says Winner. "Crucial to these changes was a commitment to excellence in faculty research and its close connection to improvements in undergraduate and graduate education."

Shortly after joining the arts department, Professor of Arts Neil Rolnick worked with his colleagues and department head Larry Kagan to develop Rensselaer's integrated electronic arts graduate program.

"Our biggest goal was to create an academic program that set Rensselaer apart from what other schools were offering, in order to attract serious artists," says Rolnick. "Many other universities taught different facets of electronic arts—music, video art, computer imaging—as separate disciplines, so our emphasis was on teaching them as different faces of the same discipline."

Today the master of fine arts in multimedia/video communications program is ranked 6th in the nation, according to the 2008 U.S. News & World Report guide to "America's Best Graduate Schools." In the fall of 2007, the school admitted the first students into its new Ph.D. program in electronic arts—one of only a few doctoral programs in the United States.

"The School of Humanities and Social Sciences was originally created to provide a service to Rensselaer's engineering and science students, in the form of a core curriculum in the humanities," says John Harrington, the school's current dean, a position he has held since 2002. "Tom Phelan helped it to evolve into a school with the academic strength and curricular diversity to stand on its own."

"A Destination Unto Itself"

Today, under Harrington's leadership, the school offers a doctoral degree in each of its five departments—the arts, cognitive science, science and technology studies, economics, and language, literature, and communication—and has added a variety of new degree programs.

In addition to the recently implemented Ph.D. program in electronic arts, a doctoral program in cognitive science was announced in early 2004, with an emphasis on developing next-generation "intelligent" systems. Researchers in the program largely focus on human perception, attention, motor control, memory, language, problem solving, and reasoning to model, enhance, predict, and measure human intelligence and performance.

A new undergraduate degree program in games and simulation arts and sciences equips graduates with a suite of the integrated skills necessary for leadership in the game development industry.

Students enrolled in the program work in interdisciplinary teams to complete required classes such as Experimental Game Design, Interactive Narrative, and History & Culture of Games that challenge them to push the boundaries of present-day genres and technologies. They also have the opportunity to concentrate in one of several disciplines—computer science, cognitive science, arts, and human-computer interaction, among others—directly related to existing or emerging career paths in the games and simulation or entertainment industry.

Additionally, the school's Department of Science and Technology Studies, along with the School of Engineering and the School of Management, administers Rensselaer's internationally recognized Product Design and Innovation program, which helped the Institute recently earn a title as one of the 60 "most forward-thinking design schools in the world," according to BusinessWeek magazine.

The multidisciplinary studio-based curriculum, which focuses on the design of innovative products, services, and systems that address the social and environmental needs of the 21st century, has been so successful that the Institute launched an official bachelor of science degree in design, innovation, and society in fall 2007.

"H&SS used to be viewed as the school students had to pass through to get on to their engineering classes," says Harrington. "Now many come to Rensselaer specifically for the H&SS offerings." The school, says Harrington, has become "a destination unto itself."

Sponsored research annual expenditures, which stood at less than $1,000 in the year 2000, have increased dramatically to an annual average of $2.5 million during Harrington's tenure.

The school's students are 50 percent more female and 100 percent more diverse than the rest of the Rensselaer campus, according to Harrington, who attributes this to the diversity of program offerings. In addition, the rising prominence of its programs also has led to a 300 percent growth in applications over the last three years.

Support Grows for "Digital Humanities"

At a time when technological advancement is accelerating, the potential for the humanities to shape the world is ever more apparent, and support for research projects that explore where the discipline intersects with technology is becoming increasingly prevalent.

The National Endowment for the Humanities (NEH)—an independent grantmaking institution dedicated to supporting research, education, preservation, and public programs in the humanities—recently launched a new "digital humanities" initiative.

The NEH defines the "digital humanities" as the melding of digital technologies and humanistic research—and the resulting creation of new methods for humanists to conduct research, conceptualize relationships, and present scholarship.

The funding organization is fostering the growth of the new field of study by supporting projects that study the impact of technology on the humanities and projects that digitize important materials to increase public access to humanities information, among others.
Other organizations, such as the John D. and Catherine T. MacArthur Foundation, are funding projects to analyze how growing up in the Information Age has changed the ways today's youth view, use, and interact with technology in order to develop new methods of capitalizing on technological tools as academic resources.

An independent funding organization, the MacArthur Foundation has launched a $50 million digital media and learning initiative to investigate the role and impact of digital technology in the lives of young people.

"Let us be clear: we do not believe that digital media tools will replace the book, paper and pen, face-to-face interaction, or all the other ways that we socialize, learn, and communicate—not anytime soon," says Jonathan Fanton, president of the MacArthur Foundation. "But they are taking their place alongside these other means and modes of learning and communication. MacArthur's new initiative aims to help all of us understand the possible shape and consequences of these changes."

H&SS joined the digital humanities research community in 2007 when it launched The Humanities Center at Rensselaer, a research center that seeks to identify ways in which the humanities can form more constructive partnerships with science and technology in the 21st century.

"The Humanities Center is dedicated to capitalizing on the opportunities brought to humanities disciplines by digital tools for research and communication," says Harrington. "Today we have immediate electronic access to nearly anything we might need in hard copy—and even some additional resources that only exist in the digital domain. And the Internet is just one of many electronic mediums that are shaping the future of the humanities."

The center provides a network to help faculty members make connections with people and places outside the Institute, and Harrington says it has potential to become a future conduit for research grants, as well as an entity that brings external fellows to campus.

**Humanities for the 21st Century**

As the Information Age continues to press forward, the presence of scholars to consider and forecast the ways in which pioneering technological advances and innovations do and will function in relation to people and society is increasingly important—and building bridges between the two cultures to unite the liberal arts with the technological disciplines is imperative for mutual progress on both fronts.

That bridge-building process starts for every student—whether an engineer, a scientist, an economist, a game designer, or a mathematician—in the School of Humanities, Arts, and Social Sciences, which helps provide a cultural grounding for all graduates.

As it did in the 1950s, the school continues to provide required courses to all undergraduates at Rensselaer. Referred to as the "Humanities Core," the requisite consists of 24 credit hours or six courses.

The goal of teaching the humanities and social sciences to future engineers, scientists, mathematicians, architects, and business leaders, according to Harrington, isn't to convert them to literature majors or history buffs.

It's to instill in them a "cultural sophistication" that exposes them to different cultural norms, ideas, and influences, as well as questions about what technology means in the human and societal context.

"We want all students to leave Rensselaer with fundamentals in subjects like history, science, the arts, and cognition so that they are fully prepared to enter the workforce in a global economy that requires intellectual versatility, flexibility, and the ability to approach problems in new ways and interact with others from multiple points of view," says Harrington.

Students from the other four schools on campus appreciate the educational opportunities H&SS affords, says Winner, remarking on changes he has noticed over the years.

"Today the school's faculty is far more demanding and most students not only appreciate the significance of their studies in H&SS, but insist upon the very best knowledge we have to offer, precisely because they plan to put that knowledge to work in their careers," Winner says.

Gajarsa agrees.

"Today, more than ever, the importance of a grounding in the liberal arts is apparent," says Gajarsa who, in addition to being a Rensselaer trustee has served as a member of the school's advisory board. "The global workforce demands that we develop the total person in each of our graduates. It's not enough for students to just have great ideas; they need to be able to present them, communicate them, and educate others about them."

Harrington expects the school to become another kind of bridge builder—one that will facilitate student involvement in the Institute's forthcoming Experimental Media and Performing Arts Center (EMPAC).

"I see the School of Humanities, Arts, and Social Sciences as the interface between the academic curriculum and EMPAC," he says. "Because all students pass through our hallways and classrooms, we'll be particularly dedicated to developing courses that will involve aspects of EMPAC."

Since the award of its first academic degrees 50 years ago, H&SS has been on a transformational path moving toward its current prominence both nationally and internationally. It continues on that path today, evolving into a more dynamic school with ever more dynamic faculty members, academic programs, and degree offerings in the synthesis of science, technology, and the humanities.

"This is the humanities for the 21st century. It's about moving away from the old way of doing things and being fully engaged with what's new—that's what sustains the humanities," says Harrington. "And I'm certain that Stephen Van Rensselaer and Amos Eaton would be delighted with what we are doing because it follows their original mission on access to technological culture."
Judging on American earn from pay planting job.
Reunion 2008: Old Friends, New Experiences

Rensselaer’s Reunion program has come a long way in the last 10 years. Many old favorites, such as the Parade of Classes and Picnic, remain, but many new events have been created to add an educational component to the weekend, and to allow families to enjoy the program together.

An admissions program will take place on Saturday that will allow families with college-age children to get advice from Rensselaer’s admissions staff on navigating the tricky college admissions process. The program includes basic information sessions, and a campus tour and individual interviews for those who are interested.

A variety of tours, seminars, and demonstrations will allow alumni to experience some of the cutting-edge technology being pioneered by Rensselaer’s students and faculty. Have lunch with the dean of your school, and hear President Shirley Ann Jackson’s “State of the Institute” address. An extraordinary leader in the technology industry, Ed Zander ’68, chairman of Motorola and a Rensselaer trustee celebrating his 40th Reunion, will be the special guest speaker.

There are plenty of opportunities to kick back and relax with your classmates, too. On Friday, enjoy a Hawaiian luau and fireworks. The classes of 1953, 1958, and 1968 will also have class dinners that evening. Saturday night is the Red & White Reunion Bash at the Union for the Classes of 1978-1998, while the remaining classes and the 50 Year Club will enjoy special class dinners celebrating their milestone Reunions.

Add in a pool party, a dinner cruise, golf at Troy Country Club, and more, and it’s a weekend you won’t soon forget. Come for an afternoon, or spend the whole weekend, whatever fits your schedule. For complete details, visit www.alumni.rpi.edu/reunion.

Members of the Class of 2003: your 5th Reunion will be celebrated during Homecoming Weekend, Oct. 17-19. Get in touch with the planning committee at committee@rpi2003.com if you’d like to get involved.

ALUMNI PROGRAMS IN YOUR HOMETOWN

This summer, an alumni chapter near you is planning a program to allow you to network, socialize, meet new graduates in your area, and in some cases, welcome incoming freshmen to Rensselaer. For a complete list of all the summer alumni events being planned, including many professional affinity events, visit @RPInet at https://arplnet.rpi.edu/events.

RAA WORLDWIDE TRAVEL PROGRAM: 2008 TOURS

Tours this year include several geared specifically for younger alumni. Visit exciting and beautiful destinations with people who share your interests—fellow Rensselaer alumni. Visit www.alumni.rpi.edu/service/travel, or contact program coordinator Michael Wellner ’64 at captmike46@alum.rpi.edu or (212) 486-3064 for details.

SUMMER@RENSSELAER OFFERS FOUNDATIONS OF LEADERSHIP®

Foundations of Leadership (FOL)® is a three-day leadership development workshop, offered on the Troy campus June 17-19, designed to assist the development of emerging leaders and managers by increasing their personal awareness, interpersonal effectiveness, and managerial abilities. FOL is offered by Rensselaer at Hartford under specific license from the Center for Creative Leadership (CCL®). Visit www.ewp.rpi.edu/hartford/rcpd/ccl/fol_new.html.

ALUMNI CAREER RESOURCE

“Experience,” an exclusive network offering job opportunities to graduates of the nation’s top universities. Rensselaer alumni receive free, unlimited access to Experience, which is geared to the needs of young and mid-level professionals, at rpi.experience.com. Contact Laura O'Donnell at (518) 276-3757 or bedfoi@rpi.edu with questions.

E-MAIL NEWSLETTER

Stay up-to-date with a compilation of Rensselaer news items of particular interest to alumni, sent to you via e-mail. Sign up at www.alumni.rpi.edu/intouch/alumni_news.html.
**MAY**
17 Commencement 2008. Rensselaer's 202nd Commencement exercises. Speaker will be David Gergen, political analyst and author. 9:30 a.m. Harkness Field, Troy campus. www.rpi.edu/academics/commencement

**JUNE**
5 Reunion 2008. Classes ending in 3 or 8 will celebrate milestone Reunions. Enjoy the Parade and Picnic, dinners with classmates, President Jackson's State of the Institute Address, and special alumni guest speaker Ed Zander '68, chairman of Motorola. (The Class of 2003 will celebrate its 5th Reunion in the fall, during Homecoming in October.) Visit www.alumni.rpi.edu/reunion for details.

**AUGUST**
17 The RAA Worldwide Travel Program presents an Aspen Adventure. Choose a long weekend or a full week in the storied playground of the rich and famous. Enjoy an outdoor concert, hiking, rafting, biking, and more. Contact Mike Wellner '64, RAA Alumni Travel Director, at (212) 486-3064 or captmike46@aol.com, or visit www.alumni.rpi.edu/service/travel for more information.

19 Legacy Move-in Day Reception. Legacy families are invited to a special reception at the Rensselaer Union from 11 a.m. to 3 p.m. Grab a snack, take a break from moving, and meet other Rensselaer Legacies. For information, contact Michael O'Neill at oneilm2@rpi.edu or (518) 276-8719.

19 RAA Welcome Barbecue. Alumni volunteers are needed to welcome new students to campus at the traditional RAA Barbecue, held at the Commons Dining Hall from 4-6 p.m. For information, contact Geoff Seber at seberg@rpi.edu or (518) 276-2324.

24 Class of 2012 Convocation. Rensselaer's newest class is officially welcomed into the community at this annual campus event. '86 Field. For information, contact University Events, (518) 276-6608.

**OCTOBER**
3 EMPAC Grand Opening. Rensselaer will host three weekends of concerts, performances, interactive artworks, presentations, and film screenings to celebrate the grand opening of EMPAC. A colloquy also will be held, featuring discussion on the nexus of arts and science. For more information, visit http://empac.rpi.edu/

17 MusicFest 2008. Former Rensselaer musicians will gather at Homecoming to reprise the successful 2006 event. Events will include dinner and a sing-along, a Joel Dolven Recognition Program, EMPAC tours, and a performance of the national anthem at the hockey game Saturday night. To be sure you are on the list to receive more information, contact Peter Pedone at pedonp@rpi.edu or (518) 276-6061.

17 THE RENSSELAER POLYTECHNIC 125th Anniversary Celebration. Alumni who worked on THE POLY will celebrate the publication's 125th anniversary at Homecoming. If you worked on THE POLY as a student, send an e-mail to poly@rpi.edu or to Peter Pedone at pedonp@rpi.edu with the years you were involved and the position(s) you held to be included in the registration mailing.

18 Young Alumni Council (YAC) Meeting. For information about the YAC and the programs they plan for alumni who have graduated within the last 10 years, contact Michael O'Neill at oneilm2@rpi.edu or (518) 276-8719.

18 Legacy Reception. Join other Legacy families for a special afternoon reception at the Heffner Alumni House. For information, contact Michael O'Neil at oneilm2@rpi.edu or (518) 276-8719.
Class Notes

Class Notes Deleted for Privacy Concerns
Education for Innovational Leadership

EMPAC provides limitless opportunities to inspire future leaders | BY JOHN KOLB '79

The Brooklyn Bridge. The Ferris wheel. The Apollo human space flight program. E-mail. Guided always by our motto of “knowledge and thoroughness,” Rensselaer has a long history of educating the people whose innovations revolutionize the world.

In the 19th and 20th centuries, when Rensselaer was helping to define modern technological education, “knowledge and thoroughness” generally meant flooding students with as much information as possible, and hoping they’d retain most of it.

Today, as the world seeks global leaders with the ability and creativity to solve unprecedented problems, imparting “knowledge and thoroughness” requires a new approach to education, one that encompasses critical thinking, technical knowledge, interdisciplinary inquiry, technological innovation, and experiential learning.

Through a firm commitment to foster creativity and inventiveness, multidisciplinary collaboration, and the communication skills necessary to express vision, Rensselaer is once again defining what a technological education should be. A clear illustration of that point is the Experimental Media and Performing Arts Center (EMPAC), which will open in October.

A world-class performing arts venue and state-of-the-art platform for research, EMPAC will bring together artists, scientists, engineers, and designers under one roof, forging an intellectual community that has never before existed.

An incubator for innovation, EMPAC will create unprecedented opportunities for artists and scientists to encounter and to inspire each other in seemingly limitless ways. An acoustics researcher attending a musical performance in the concert hall in which various sounds are projected from the stage, from the balcony, and from a device hanging above the audience might suddenly be inspired to consider the human auditory system in a new way, and to collaborate with the musicians on a new method to aid the hearing impaired.

Similarly, an artist passing by a studio in which a scientist is using motion capture technology for perception research might be inspired to develop an experimental dance piece with the researcher using the technology to explore how interactivity between the virtual and real worlds might elicit different audience response.

A focus on interdisciplinary collaboration, design, and creativity has always been an educational keystone in Rensselaer curricula, evident in courses such as Introduction to Engineering Design, the senior engineering capstone course held in the Multidisciplinary Design Laboratory, and the undergraduate degree program in design, innovation, and society. EMPAC will extend that emphasis to all Rensselaer faculty, staff, students, artists, and researchers.

I have seen very few neatly packaged real-life problems that can be solved with a simple equation. In fact, the most interesting problems usually cross disciplinary boundaries and include aspects of culture and people. Certainly some components can sometimes be solved analytically, but there are also needs for creative approaches. Sometimes we can become too focused on finding “the right answer.” If our educational processes are overly focused on analytics, then we may be missing the importance of ensuring that we are addressing the “right problem.” To compete in the evolving global economy, it will not only be necessary to produce smart engineers and scientists—we must produce innovative technological leaders.

EMPAC provides an opportunity for us to remain on the leading edge of innovation education, by creating unmatched opportunities to meld the creativity of the arts with the discovery and discipline of the sciences and engineering.

A fully realized education is much more than a classroom experience. It is exposure to research laboratories, campus life opportunities, and informal interactions with members of a diverse intellectual community.

As President Jackson has said, “science and technology are the concern of all our citizens... society therefore needs scientists and engineers who are able to speak out, guide the public, establish policy—in short, to serve as leaders. They must be not only technically brilliant but also articulate, broad-minded, and humane. EMPAC will help our students grow into such leaders.”

Exposure to EMPAC—its facilities, artistic performances and exhibitions, and people—the researchers, scientists, and artists who will collaborate there—is essential to forging the “innovative problem-solvers, interdisciplinary thinkers, team participants, and skilled leaders” that The Rensselaer Plan describes.

Fostering innovation at the nexus of the arts, sciences, and technology to produce the inventors and inventions that will continue to change the world is a radical but imperative mission. What a great time to see Rensselaer once again leading to define the future of technological research and education.

John Kolb '79 is vice president for information services and technology and chief information officer of Rensselaer.
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As president emeritus of Rensselaer, Roland Schnutt knows exactly how important endowment gifts are to the financial strength of the Institute. That's why he and his wife, Claire, decided to endow a professorship through a charitable remainder annuity trust. This versatile financial planning tool provides a fixed annual income to the Schmitts while allowing them to fulfill a major charitable goal.

To learn more about ways to support Rensselaer, go to www.rpi.edu/waystogive.