WHAT IS WATSON?

DAVID FERRUCCI '94 AND HIS TEAM APPLY DEEP QUESTION-AND-ANSWER TECHNOLOGIES TO DRIVE ADVANCES IN COMPUTING
Each spring, the Holocaust Remembrance Committee—a group of students dedicated to raising awareness, commemorating, and providing a forum for the Rensselaer community to reflect on the Holocaust—places colored flags on campus to represent and remember those who were lost in the Holocaust. The 5,632 flags represent 13 million people killed.
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Rensselaer's Games and Simulation Arts and Sciences program is providing students with a more sophisticated way of looking at games.

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From a television game show to the doctor's office, IBM's Watson leads the way.

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Alumni Hall of Fame members Frank and Kenneth Osborn engineered the 100-year-old Fenway Park and many of America's most-loved baseball stadiums.

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David Ferrucci, Ph.D. '94, principal investigator for the IBM Watson project. Photo by Mark McCarty.

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Spring Career Fair

Job market news looks positive for Class of 2012 graduates, according to a new survey conducted by the National Association of Colleges and Employers (NACE). This year, employers who took part in NACE’s Job Outlook 2012 survey plan to hire 9.5 percent more new graduates in 2011-12 than they did in 2010-11.

This good news came just in time as the Center for Career and Professional Development (CCPD) hosted its annual Spring Career Fair. More than 2,000 undergraduate and graduate students as well as recent alumni attended the event, which provided them with an opportunity to meet and talk with more than 370 representatives from more than 150 public and private-sector employers.

In its 11th year, the annual fair is designed to help students think ahead to potential full-time, co-op, internship, or summer employment opportunities.

“The mission of the CCPD is to be a catalyst in the development of Rensselaer students to become world leaders in a technologically based global economy,” says CCPD Acting Director Colleen O’Byrne. “Beyond planning the annual career fair, our goals are to provide programs and services to assist students in discovering and clarifying career choices, and to teach them to manage their careers effectively. We are also committed to cultivating and advancing partnerships with students, faculty, staff, alumni, and employers to carry out our mission.”
Rethinking Robotics

The next generation of robots will require investment and collaboration

A few months ago, President Barack Obama announced an Initiative on Advanced Manufacturing. This initiative is an outgrowth of recommendations of a report released by the President’s Council of Advisors on Science and Technology (PCAST), based on a PCAST study led by Eric Schmidt of Google and myself. The President’s Advanced Manufacturing Initiative has pointed toward areas that are rich in possibilities for creating jobs and building prosperity. Novel materials, nanotechnology, and smart environments are new enough that they often need to be explained. But one area, robotics, is already part of our culture. In some ways, that makes the discussion easier because we have a common starting point. But it also can lead to confusion with lay audiences, who imagine the articulate humanoids of science fiction.

In most cases, examples—auto factory robots, robots that support surgeons, and even robots that vacuum your house—help to clear things up. But having discussions with business people can bring a different set of misunderstandings. Many remember a few decades ago when robotics research in the United States provided great promise of a domestic industry. They saw the innovations from U.S. labs find their ways into overseas factories and watched as the opportunities and the jobs went to other countries.

Thanks to miniaturization, advanced sensors and actuators, algorithms that allow more subtle movement, and wireless networking, a new wave of robots is on the way. New opportunities are available thanks to improvements in cost/performance of key components, “learning,” mobility, and improved safety design. These have created the potential for widespread, intensive use of a new generation of robots that can serve, protect, and support. With new kinds of robots on the horizon, there is a second chance at leadership.

Success will come to those who go beyond providing function to those who work at the nexus of science, technology, and psychology to bring the benefits of robotics into our everyday lives. The first generation of robots provided efficiencies and did hard and dirty work, but these devices had limited flexibility, could work only in defined workspaces, and, often, were too dangerous to work side-by-side with humans. The next generation of robots—currently in development—will be adapted more easily to changing requirements, be able to complete a wide range of tasks in undefined workspaces, be safer for the humans they will be working with (or nearby), and be more user-friendly.

Early, broad application is likely to be in areas where society is facing difficult (and often costly) challenges. In health care, robots can augment the mobility of an aging population and provide muscle power to those who have become frail. Robots already are being used to assist in physical therapy and to help people get out of bed. A key design point is encouraging trust, and that requires a better understanding of how robots can gain the confidence of people.

In transportation, robot-assisted driving has the potential to reduce accidents and improve the efficiency of highway systems. Cars already are warning people about potential dangers, and Google recently patented a driverless car. But, as anyone who has been misdirected by their car’s GPS system knows, we have work to do on reliability and acceptability before we can realize the envisioned benefits of robotic cars.

We also can foresee applications that promise to improve security through better surveillance and handling of threats (such as bombs and toxic chemicals). All security is, necessarily, a complex process that balances freedom, privacy, and convenience against potential danger. The social aspects of improving safety are critical to adoption of any such technology.

Finally, robots are likely to be integrated more fully into industrial processes, adding new capabilities and providing help with logistics (such as automated delivery of parts). Here, there is the potential to adapt quickly to changes in products, in production processes, and use of space. The ability to add or subtract workers on a production line where direct collaboration with robots is enabled will allow manufacturers to lower costs and respond more rapidly to changes in the market. But this means that workers will need to be comfortable sharing space with robots. Workers will need to help the robots to learn and adapt. To get full value, the human-robot interrelationships will need to go beyond complex programming by allowing more natural communications.

The next generation of robots will enter a domain that reaches more directly into our lives, but it also will be more complex. Creating this new industry will require investment, patience, and effective collaboration across a variety of disciplines.
Entrepreneurship Across the Curriculum

I want to compliment you on your lead article in the Winter 2011-2012 Rensselaer magazine featuring entrepreneurship (“Taking Care of Business”). The article provided an excellent overview of the Office of E*ntrepreneurship’s campuswide program and the significant progress we have made through our Entrepreneurship Across the Curriculum Program.

The success of our program depends upon the cooperation of too many people to mention. However, I would like to single out one person, without whom we would not have succeeded: Mike Herman ‘62, Rensselaer trustee. Mike’s early vision and generous grant has supported the program financially for the past five years and besides being our biggest donor, he has also been our biggest booster.

While we have achieved many significant accomplishments that are mentioned in the article (over 100 courses complemented with entrepreneurial content across all five Rensselaer schools, nearly a third of the students and 20 percent of the faculty engaged, the Exemplars Program, etc.), I’d like to mention two recent developments that are indicative of our success that occurred after you went to press: 1) we were recently singled out as one of the eight best practice, non-business school entrepreneurship programs in the world by a major Australian government study; and 2) two of our Exemplars Students, James Davis ‘12 and Nathan Pankowsky ‘13, recently won the Regional Semi-Finals of the Wal-Mart Business Plan competition. They beat out teams from Yale, MIT, Princeton, and more. James, who was featured in the article, was the first student to earn enough points to be awarded a Certificate of Achievement in Entrepreneurship. Nathan also has recently earned an Exemplars Certificate. Both were winners of our Change the World Challenge competition last semester with their idea.

ROBERT CHERNOW
Vice Provost for Entrepreneurship, Troy, N.Y.

Thanks for highlighting the Emerging Ventures Ecosystem (EVE) program in your recent article “Taking Care of Business.” While the program has certainly seen significant growth and you can feel the momentum on campus, EVE is still in its infancy. An increasing number of students, faculty, and alumni have found their way to the EVE office located in the Rice Building at 216 River Street, Troy, N.Y.

We recently held a business plan competition on campus with over 24 student companies participating. A number of these companies have commercially viable ideas that we will feature on the Severino Center and EVE websites. We asked four companies to prepare a brief (five- to eight-minute) video presentation. The purpose is to showcase these companies and to see if we can get alumni support as mentors and possibly angel investors.

There are over 30 companies in the EVE program. Not all of them are investable at this time. However, we’d like to develop a program to provide seed funding for some of our companies. EVE is also working with some alumni to develop an Angel Network called RAIN (Rensselaer Angel Investor Network), to seek funding and mentors for EVE companies. We want to expand the number of video presentations we have on our website to showcase all of our EVE companies.

The alumni talent pool is deep with experience. We want to tap into that network and hope that some of our alumni will get excited enough about these companies to consider helping move the company along the path to full commercialization.

If you are interested in learning more about the companies, mentoring, or investment opportunities, contact me at freder2@rpi.edu or call (518) 276-2917.

RICHARD FREDERICK
EVE Director, Troy, N.Y.

Applying Technology to Society in New Orleans

After reading the article on engineering and society (“Technology + Society,” Fall 2011), I am happy to report that I am working along similar lines on the revision of the New Orleans noise ordinance. The soundscape of New Orleans is filled with many sounds: trolleys, traffic, parades, club and street music, insects, birds, the Natchez steamboat calliope, trains, and above all else, people. These are the things that make the city a vibrant and desirable place.

The social-cultural issues dominate all aspects of the city where music, entertainment, perpetual tourism, festivals, and residents all are packed like sardines, and the challenge is to have a simple, objective ordinance that is enforceable.

That being said, the New Orleans Police Department has its hands full with many other issues—points to educating people about noise and creating a shift in consciousness so that there is some degree of self-regulation, as well as using engineering in the mix to figure out the simplest methods acceptable by the public to reduce the noise footprint of the various sources, and determining subjectively/objectively what constitutes a nuisance in the middle of all these sounds.

A positive attitude of cooperation, awareness, and being a good neighbor is critical in this case, as enforcement of unpopular, complex, or unachievable regulations is nigh impossible. New Orleans may be one of the most complex cities of the country, in terms of the city recovering from Katrina and its burgeoning music and tourism scenes, in tandem with the redevelopment of residential areas and efforts to retain identity from before the storm. Residents, busi-
nesses, musicians, law enforcement, and government all have a stake in the outcome.

DAVID WOOLWORTH '92
Oxford, Miss.

EDITOR'S NOTE: To read about another alumnus who is applying technology to society, see One Last Thing on page 64.

RPI Science vs. Creationism

Setting aside the untestable nature of the suggested origin of life proposed by Steve Coleman '83 in his Winter 2011-12 letter on Dr. Watson's research (“Plotting the Journey to Life,” Spring-Summer 2011), I suggest we revisit the second law of thermal as taught to me by the Rensselaer chemistry faculty in the 1960s and 1970s.

The suggestion that chemical complexity could not arise at the surface of the Earth because entropy must always increase in a chemical process is fallacious when one considers the Earth plus the lithosphere is an open system in which local entropy decreases are in fact likely when considering the actual temperature, chemical, and reaction gradients that exist at present between the Earth’s core/mantle and space.

The synthesis of complex molecules from simple compounds not only in fact occurs (see the Miller-Urey 1953 experiment and hundreds of more recent, explicit variations) but also is predicted since the heat transport to space is significantly greater given the large increase in the degrees of freedom (and heat capacity) of the diffusing molecules. Eric Schneider and Dorion Sagan provide a beautiful description of this nonequilibrium process in their recent book Into the Cool: Energy Flow, Thermodynamics, and Life. The possibility even exists that living systems, with their molecular and ecological/network complexity, ensure the maximal rate of energy transport and the most rapid conversion to the “heat death” uniform state for the closed system of the Earth-Lithosphere-Space as required by the second law (and noted by Mr. Coleman). There is, however, no violation of the second law.

Finally, Mr. Coleman’s second law argument has been a hallmark of creationism proponents for 20 years. While Genesis is a beautiful story about the myths that structure life, it is not a scientifically relevant one.

BRUCE MORRISSEY ’64
Wilmington, Del.

I regret to see that the “letters” section has apparently been so dull of late, that you felt compelled to print the circular ramblings of a fundamentalist lunatic. According to Mr. Coleman, “Genesis...is the account of the origin of life given by the only eyewitness.” Really? And what authority or experiment shows us that the Bible is correct in this assertion? Why, the Bible itself, of course.

In the fall of 1989, I was privileged to perform in the RPI Players’ production of Inherit the Wind, a dramatic retelling of the Scopes “Monkey trial.” I can think of no finer rebuttal than these lines from the play:

Matthew Harrison Brady: “How dare you attack the Bible! It is the revealed word of the Almighty. God spake to the men who wrote the Bible.”

Henry Drummond: “And how do you know God didn’t ‘spake’ to Charles Darwin?”

WILLIAM CHARLES ROTH ’77
Ann Arbor, Mich.

Who is C.J.M., Class of ’39?

In the late 1950s when I was in high school, my family lived in Latham, N.Y. RPI had a big sale of excess furniture from the old “Wyk,” and my father bought a wooden four-drawer dresser for my room. When I was moving it around a few years later, I discovered an envelope taped on to the back of the dresser.

The paper is obviously not acid-free and has become very fragile, but the emotions come through loud and clear.

“Placed here on the 15th day of July in the year of our Lord 1939. War is pending in Europe.” The note is signed “C.J.M., Class of ’39.”

This young student couldn’t have imagined how prophetic his concerns were at that time. Within months after placing this note, the world exploded into World War II.

I have often wondered who is C.J.M., Class of ’39, and what happened to him. Perhaps, with publishing in the Rensselaer magazine, this mystery can be solved.

WES HAINS ’62
Santa Ana, Calif.

Connecting Campus to Downtown

I read with interest the article in the winter edition titled “New Graduate Student Housing Unveiled in Troy.” I work in Troy and I think the city has such great potential, but sometimes there appears to be a real disconnect between the campus on the hill and the downtown area.

I have a vision for building a funicular on the hill that would connect the RPI campus to downtown Troy. After walking up the Approach steps, I was reminded of a visit to Quebec City where the lower city is connected to the upper city with steps, a few streets, but also a funicular (sort of a tram) to transport people. What a difference the funicular makes because it makes movement up and down the hill so easy.

My idea is this: why not put out a challenge to your engineering department to design a funicular that would connect the RPI campus with downtown Troy. It not only would give the students and staff easy access to all of the restaurants and shops downtown, it also would spur further development to the many vacant storefronts on Fourth Street and Market Square. I’m sure that the funicular would be welcome to students and staff alike. It also would conceivably reduce traffic downtown.

I think the idea of a funicular is even better now since the new housing has opened and the renovated hotel site into a dormitory on 6th Street is now finished.

PAUL SHATSOFF
Slingerlands, N.Y.
BIOTECHNOLOGY

High Technology Uncovers an Ancient Habit

Dmitri Zagorevski, director of the Proteomics Core in the Center for Biotechnology and Interdisciplinary Studies at Rensselaer, and Jennifer Loughmiller-Newman, a doctoral candidate at the University at Albany, have discovered the first physical evidence of tobacco in a Mayan container. Their discovery represents new evidence on the ancient use of tobacco in the Mayan culture and a new method to understand the ancient roots of tobacco use in the Americas.

In recent years, archaeologists have begun to use chemical analysis of residues from ancient pottery, tools, and even mummies to piece together clues about ancient civilizations. Many vessels served multiple purposes during their lives, resulting in muddled chemical data. Once the vessels were discarded, natural processes such as bacteria and water destroyed the surface of materials, erasing important evidence.

To make their discovery, the researchers had a unique research opportunity: a more than 1,300-year-old vessel decorated with hieroglyphics that seemingly indicated the intended contents.

The approximately two-and-a-half-inch wide and high clay vessel bears Mayan hieroglyphics reading “the home of his/her tobacco.” The vessel, part of the large Kislak Collection housed at the Library of Congress, was made around A.D. 700.

Zagorevski used the technology at Rensselaer to analyze the contents of the vessel for the chemical fingerprint of tobacco. The technology included gas chromatography-mass spectrometry and high-performance liquid chromatography-mass spectrometry. Both are analytical chemistry techniques that combine the physical separation capabilities of gas or liquid chromatography with the analysis capabilities of mass spectrometry.
BIOMEDICAL ENGINEERING

Doctoral Student Awarded Fellowship

Doctoral student Rebecca Wachs has been awarded an American Association of University Women (AAUW) American Dissertation Fellowship to support her research on lower back pain and the development of electronic sensors to monitor patients’ response to orthopedic surgery.

The fellowship recognizes exceptional scholarship and a commitment to advancing opportunities for women. It provides support for women who are completing their doctoral dissertations. Wachs expects to earn her Ph.D. in biomedical engineering this summer. She is one of 58 women nationwide to receive an AAUW American Dissertation Fellowship for the 2011-2012 academic year.

Her research focuses on two related issues: understanding the role that muscles play in increasing the load on the spine, and developing a small, electronic sensor that could monitor loading patterns in patients who have undergone orthopedic surgery such as spinal fusion or total joint replacement.

The sensor would be implanted during surgery, as a component of the orthopedic device. Once installed, the sensor would wirelessly transmit real-time data on load, strain, motion, temperature, and pressure. This information could then be used to assess patients’ progress and develop treatment plans.

“The work that Becky is doing is phenomenal. It’s very technical and very translatable, and we’ve already seen a lot of interest from both the engineering and the medical communities,” says her adviser Eric Ledet, assistant professor of biomedical engineering and head of Rensselaer’s Musculoskeletal Mechanics Laboratory.

Wachs, who holds a master’s in biomedical engineering from Rensselaer, returned to pursue a Ph.D. after three years as an advanced imaging microscopy specialist with Carl Zeiss, Microimaging. Her goal is to go back to the commercial arena, but at the “interface of research and industry,” where she can play a role in advancing discoveries that can improve the quality of life for orthopedic patients.

LALLY SCHOOL OF MANAGEMENT AND TECHNOLOGY

Entrepreneurship and Innovation in North Africa

Last year, an uprising in Tunisia over unemployment and the soaring cost of living ended years of dictatorship. For nearly five years, a team of management professors from the Lally School of Management and Technology and the Institut des Hautes Etudes Commerciales (Institute of Advanced Business Studies) in Tunisia have been working to develop a road map that will support sustained high economic growth in the region known as the Maghreb, specifically Tunisia, Algeria, and Morocco.

The professors have released the publication “Entrepreneurship and Innovation in the Maghreb,” which provides current and aspiring entrepreneurs with practical tools and strategies needed for the creation of successful new enterprises in emerging markets.

“In the Maghreb, support systems for startup companies are newer and weaker than in developed countries, but social and business networks are often stronger.”—Pier Abetti

The project has been part of an ongoing effort to foster international education partnerships, entrepreneurship, and technological innovation in developing countries,” says Pier Abetti, a faculty member in the Lally School for nearly 30 years, who served as the lead coordinator for the project.

“An Italian proverb Chi ben comincia è alla metà dell’opera, which is equivalent to the English proverb Well begun, half done, describes where we are right now in terms of the project,” Abetti added. “The startup phase of a business is difficult, particularly for new entrepreneurial companies whose founders have little business experience, and for innovative companies that face higher technological, market, and financial risks. In the Maghreb, support systems for startup companies are newer and weaker than in developed countries, but social and business networks are often stronger.”

Additional Lally School faculty include Jeffrey Durgee, associate dean for academic affairs and associate professor in the Lally School; and Iftekhar Hasan, formerly the Cary L. Wellington Professor of Finance, and co-director of the International Center for Financial Research at Rensselaer.

“As a business school, we recognize that highly focused, multinational business teams are working in North America, Asia, and Europe around the clock as the requirements of staying competitive necessitate nonstop innovation,” says Thomas Begley, dean of the Lally School. “In leading this partnership, the Lally School has been particularly adept at providing individuals with the valuable resources to address the multiple challenges that they may encounter on a global stage. We look forward to helping the Maghreb countries develop a foundation to stimulate businesses in the region and beyond.”
Graphene “Nanowiggles” Have Tunable Functionality

Electronics are getting smaller and smaller, flirting with new devices at the atomic scale. However, many scientists predict that the shrinking of technology is reaching an end. Without an alternative to silicon-based technologies, the miniaturization of electronics will stop. One promising alternative is graphene—the thinnest material known to man. Pure graphene is not a semiconductor, but it can be altered to display exceptional electrical behavior. Finding the best graphene-based nanomaterials could usher in a new era of nanoelectronics, optics, and spintronics.

Scientists at Rensselaer have used the capabilities of one of the world’s most powerful university-based supercomputers, the Computational Center for Nanotechnology Innovations (CCNI), to uncover the properties of a promising form of graphene, known as graphene nanowiggles. What they found was that graphitic nanoribbons can be segmented into several different surface structures called nanowiggles. Each of these structures produces highly different magnetic and conductive properties. The findings provide a blueprint that scientists can use to pick and choose a graphene nanostructure that is tuned and customized for a different task or device.

“Graphene nanomaterials have plenty of nice properties, but to date it has been very difficult to build defect-free graphene nanostructures. So these hard-to-reproduce nanostructures created a near-insurmountable barrier between innovation and the market,” says Vincent Meunier, the Gail and Jeffrey L. Kodosky ’70 Constellation Professor of Physics, Information Technology, and Entrepreneurship. “The advantage of graphene nanowiggles is that they can easily and quickly be produced very long and clean.”

Nanowiggles were only recently discovered by a group led by scientists at the research institute EMPA in Switzerland. These particular nanoribbons are formed using a bottom-up approach, since they are chemically assembled atom by atom. This represents a very different approach to the standard graphene material design process that takes an existing material and attempts to cut it into a new structure. The process often creates a material that is not perfectly straight, but has small zigzags on its edges.

Meunier and his research team saw the potential of this new material. The nanowiggles could be easily manufactured and modified to display exceptional electrical conductive properties. The team immediately set to work to dissect the nanowiggles to better understand possible future applications.

They found that the different nanowiggles produced highly varied band gaps. A band gap determines the levels of electrical conductivity of a solid material. They also found that different nanowiggles exhibited up to five highly varied magnetic properties. With this knowledge, scientists will be able to tune the band gap and magnetic properties of a nanostructure based on their application, according to Meunier.

By using CCNI, Meunier was able to complete the sophisticated calculations in a few months. “Without CCNI, these calculations would still be continuing a year later and we would not yet have made this exciting discovery. Clearly this research is an excellent example illustrating the key role of CCNI in predictive fundamental science,” he says.

Quick-Cooking Nanomaterials

Engineering researchers at Rensselaer have developed a new method for creating advanced nanomaterials that could lead to highly efficient refrigerators and cooling systems requiring no refrigerants and no moving parts. The key ingredients for this innovation are a dash of nanoscale sulfur and a normal, everyday microwave oven.

At the heart of these solid-state cooling systems are thermoelectric materials, which can convert electricity into a range of different temperatures—from hot to cold. Thermoelectric refrigerators employing these principles have been available for more than 20 years, but they are still small and highly inefficient. This is largely because the materials used in current thermoelectric cooling devices are expensive and difficult to make in large quantities, and do not have the necessary combination of thermal and electrical properties. A new study overcomes these challenges and opens the door to a new generation of high-performance, cost-effective solid state refrigeration and air conditioning. Professor Ganpati Ramanath led the study, in collaboration with professors Theodorian Borca-Tasciuc and Richard Siegel.

Driving this research breakthrough is the idea of intentionally contaminating, or doping, nanostructured thermoelectric materials with minute amounts of sulfur. The doped materials are obtained by cooking the material and the dopant together for a few minutes in a store-bought microwave oven. The resulting powder is formed into pea-sized pellets by applying heat and pressure in a way that preserves the properties endowed by the nanostructuring and the doping. These pellets exhibit properties better than the hard-to-make thermoelectric materials currently available in the marketplace.

“This is not a one-off discovery. Rather, we have developed and demonstrated a new way to create a whole new class of doped thermoelectric materials with superior properties,” says Ramanath, professor of materials science and engineering. “Our findings truly hold the potential to transform the technology landscape of refrigeration and make a real impact on our lives.”
“Dimesimeter” Named as Top Ten Innovation

The Scientist magazine unveiled the Top 10 Innovations of 2011, and coming in at number eight was the Dimesimeter, a circadian light and activity sensor developed by the Lighting Research Center (LRC) at Rensselaer through funding from the National Institute on Aging.

The Scientist invited members of the life science community to submit descriptions of exciting tools that made an impact in research.

The Dimesimeter is calibrated in terms of the spectral sensitivities of the visual and the circadian systems, as the circadian system is much more sensitive to short-wavelength (“blue”) light. Commercially available light measurement devices are only calibrated to measure light for vision.

“Biology is driven by circadian rhythms at every level, and light is the main stimulus for synchronizing the circadian system to the solar day. By quantifying an individual’s light/dark exposure pattern, we can prescribe ‘light treatments’ promoting circadian entrainment, thereby improving health and well-being,” explains Mariana Figueiro, associate professor, and principal investigator on the project.

Growing evidence indicates that circadian disruption by irregular light/dark patterns is associated with reduced quality of life and increased risk of disease. The Dimesimeter system—a combination of light monitoring and therapy prediction—has the potential to improve the lives of millions who suffer from circadian rhythm sleep disorders.

Persons with Alzheimer’s disease and related dementias (ADRD) suffer from erratic sleep cycles, nocturnal wandering, and associated daytime irritability, which can make it difficult for family caregivers to cope and maintain a safe, at-home environment. These sleep disturbances are due, in part, to the absence of daily, robust light/dark pattern exposures, says Figueiro.

The LRC has studied the implications of light/dark exposure on the circadian system both in the laboratory and in the field, including studies of ADRD sufferers. The lighting intervention is designed to effectively improve their rest/activity patterns and increase their sleep efficiency.

A new research program at Rensselaer seeks to define the next-generation of low-orbit satellites that are more maneuverable, cheaper to launch, easier to hide, and longer lived. Additionally, this research holds the promise of guiding dead satellites and other space debris more safely to the Earth’s surface.

Led by Riccardo Bevilacqua, assistant professor in the Department of Mechanical, Aerospace, and Nuclear Engineering, the research team is challenged with developing new theories for exploiting the forces of atmospheric drag to maneuver satellites in low-Earth orbits. Atmospheric drag is present up to 500 kilometers of altitude. Using this drag to alter the trajectory of a satellite alleviates the need to burn propellant to perform such action. Decreasing the amount of required propellant will make satellites weigh less, which reduces the overall cost of launching satellites into orbit.

Additionally, this new research holds the promise of using drag to control and maneuver dead satellites that are inoperable or have run out of propellant.

This project is funded by the Air Force Office of Scientific Research Young Investigator Research Program with an expected three-year, $334,000 grant.

“Using differential drag to maneuver multi-spacecraft systems in low-Earth orbit is a new, non-chemical way to potentially reduce or even eliminate the need for propellant,” says Bevilacqua. “Reducing the satellite’s overall mass at launch, by carrying less propellant, allows for easier, cheaper, and faster access to space. In addition, the ability to maneuver without expulsion of gases enables spacecraft missions that are harder to detect.”

Satellites experience drag while in low-Earth orbits, and this drag causes their orbits to decay—sending the satellites closer and closer to Earth. Bevilacqua wants to take advantage of this drag by attaching large retractable panels to satellites. When deployed, these panels would work like a parachute and create more drag in order to slow down or maneuver the satellite.

This type of system could be built into new satellites, or even designed as a separate device that could be attached to existing satellites already in orbit. The drag panel system would use electrical power—which can be recharged via solar panels—to perform its maneuvers. The system would not require any fuel or propellant. Bevilacqua says such a device could be attached to a dead satellite already in freefall, in order to help control where the satellite will land on the Earth’s surface.
Fazel Yavari has developed a new sensor to detect extremely small quantities of hazardous gases. The doctoral student harnessed the power of the world’s thinnest material, graphene, to create a device that is durable, inexpensive to make, and incredibly sensitive.

A student in the Department of Mechanical, Aerospace, and Nuclear Engineering, Yavari has developed a sensor that opens the door to a new generation of gas detectors for use by bomb squads and defense and law enforcement officials, as well as in industrial settings. For this innovation, Yavari has been named the winner of the 2012 $30,000 Lemelson-MIT Rensselaer Student Prize. He is among the three 2012 $30,000 Lemelson-MIT Collegiate Student Prize winners.

“‘Innovating solutions to the challenges of tomorrow requires a certain kind of individual—one who is ready and willing to take calculated risks and seize promising opportunities. These architects of change push forward the state of the art, and can affect progress on a global scale,’” said President Shirley Ann Jackson. “Fazel Yavari, with his creative exploitation of graphene to create a promising new gas sensor, is a stellar example of such an architect of change. We congratulate him, and applaud all of the winners and finalists of the Lemelson-MIT Collegiate Student Prize for innovating a bolder, brighter future.”

Yavari is the sixth recipient of the Lemelson-MIT Rensselaer Student Prize. First given in 2007, the prize is awarded annually to a Rensselaer senior or graduate student who has created or improved a product or process, applied a technology in a new way, redesigned a system, or demonstrated remarkable inventiveness in other ways.

“This year’s Lemelson-MIT Collegiate Student Prize winners and finalists from MIT, RPI, and UIUC are helping to fulfill the country’s need for innovation. These students’ passion for invention and their ideas will improve people’s lives around the world,” said Joshua Schuler, executive director of the Lemelson-MIT Program. “We applaud their accomplishments that will also undoubtedly inspire future generations of inventors.”

With his project, titled “High Sensitivity Detection of Hazardous Gases Using a Graphene Foam Network,” Yavari overcomes the shortcomings that have prevented nanostructure-based gas detectors from reaching the marketplace.

Detecting trace amounts of hazardous gases present within air is a critical safety and health consideration in many different situations, from industrial manufacturing and chemical processing to bomb detection and environmental monitoring. Conventional gas sensors are either too bulky and expensive, which limits their use in many applications, or they are not sensitive enough to detect trace amounts of gases. Also, many commercial sensors require very high temperatures in order to adequately detect gases, and in turn require large amounts of power.

Yavari has overcome these hurdles and created a device that combines the high sensitivity of a nanostructured material with the durability, low price, and ease of use of a macroscopic device. His new graphene foam sensor, about the size of a postage stamp and as thick as felt, works at room temperature, is considerably less expensive than current methods, and is still very sensitive to tiny amounts of gases. The sensor works by reading the changes in the graphene foam’s electrical conductivity as it encounters gas particles and they stick to the foam’s surface.

Yavari joined Rensselaer in 2009 as a member of the research group of Nikhil Koratkar, professor of mechanical, aerospace, and nuclear engineering and materials science and engineering. In his time at Rensselaer, Yavari has presented his findings at several international conferences, and he has been the author of several studies published in peer-reviewed journals including Nature Materials, Nano Letters, Scientific Reports and Small.

“Fazel is among the most talented and skilled experimentalists of all the graduate students I’ve had the pleasure of working with,” said Koratkar, who is Yavari’s academic adviser. “He is extremely innovative, and has a proven ability to develop unique and creative solutions to the most vexing problems.”

—Nikhil Koratkar
The Hyde Collection, an art museum in Glens Falls, N.Y., that contains historic furniture, books, paintings, sculptures, and pottery, recently featured the exhibit “Building Futures: Re-Envisioning the Hyde at Rensselaer,” which presents conceptual proposals for expanding the Hyde campus designed by faculty and students of the Rensselaer School of Architecture.

The exhibit showcased faculty-led student-developed ideas for expanding and unifying disparate buildings and sprawling grounds of the Hyde campus. Six of the concepts were generated during an intensive two-day design “charrette” in September 2011. Sixteen proposals are the product of the semester-long second-year design studio held in the fall 2011 semester.

As an exercise in analysis, each student was asked to root his or her design in a piece from the collection, says Andrew Saunders, assistant professor of architecture and coordinator of the Hyde design studio. “For the students, this is their introduction to analysis, which you can think of as design research,” Saunders says. “In a very simple way, it’s about being able to access thoughts, being able to analyze cultural artifacts beyond the literal. There’s a certain amount of interpretation; it’s not a formulaic process, it’s about understanding and building a discourse.”

Saunders says the design studio was an opportunity for students to practice the concept of “affects”—an idea proposed by French philosopher Gilles Deleuze—in aesthetic analysis.

“There are certain intensities that are transmitted by forms,” Saunders explains. “When transposed to architecture, what this means is that, rather than communicating with the assumption of a universally understood language of meaning—columns, walls, a syntactical language that we’re supposed to understand—affects speak to what architecture does.”

The students “mined” their painting for specific relationships of geometry, composition, materiality, lighting, color, nature, and the human body. The students then translated their “affects” through a series of drawing and modeling exercises, culminating in an architectural strategy for the Hyde campus.

“This studio was a huge eye-opener—before, it was all abstract,” Erica Barrows says. “I liked how we started with something so simple as a painting and looked at it, and made it into a module, and used that module to create a building that people can move around. It kind of opened my eyes to the idea that architecture can come from anything.”

Saunders says the sophomore design studio has become a vehicle for students to engage in their community’s cultural resources.

“The Hyde Collection is eclectic. It includes pieces from the Renaissance, Baroque, modern, contemporary—you get to see an evolution of art,” Saunders says. “By analyzing each piece for affects, we were able to approach the collection in a contemporary way.”

For more information, go to hydecollection.org.
HUMANITIES, ARTS, AND SOCIAL SCIENCES

New Degree Program in Sustainability Studies

Rensselaer has launched a new undergraduate major in sustainability studies through the School of Humanities, Arts, and Social Sciences. The new major, which results in a B.S. in science and technology studies (STS)-sustainability studies, is an option that crosses disciplinary boundaries.

“This program layers a rich liberal arts education on top of Rensselaer strengths in technical and scientific education,” says Kim Fortun, professor of science and technology studies. “It’s designed both as a stand-alone major that will provide new humanities and social science offerings and a degree, but also one that pairs really well with other fields like physics, computer science, and biology.”

Fortun says sustainability has emerged as a key public concern globally, nationally, and also at Rensselaer, where the growth of sustainability-oriented student clubs and initiatives on campus coincides with an increased demand for curriculum addressing issues of sustainability.

“This degree program provides an important set of conceptual and critical skills that are widely applicable beyond sustainability issues,” Fortun says. “And given the increasing importance of sustainability as a national and global concern, we need people who are well educated to provide leadership and coordinate the efforts to respond to that.”

The B.S. in STS-sustainability studies weaves together techniques and insights from the humanities and social sciences with knowledge from the natural sciences and engineering to address environmental problems. Students learn the history of environmental thought and law, and study current environmental controversies, sustainable pathways, and design. They also complete a “technical option”—a suite of four courses, in disciplines such as biology, geology, or physics, to develop technical expertise.

“This timely and cogent curriculum in sustainability studies will prepare students to be responsible leaders in an increasingly complex milieu of culture, economics, and the environment,” says Mary Simoni, dean of the School of Humanities, Arts, and Social Sciences.

Examples of research within the field include alternative systems of food production and distribution; causes and consequences of the 2010 Gulf of Mexico Deepwater Horizon disaster; factors shaping the global asthma epidemic; water rights in countries around the world; evaluation and regulation of toxic chemicals at the U.S. Environmental Protection Agency; causes and consequences of the global bee colony collapse; and the future of nuclear energy production in light of the Fukushima nuclear disaster.

The new sustainability studies program weaves together techniques and insights from the humanities and social sciences with knowledge from the natural sciences and engineering to address environmental problems.

RECOGNITION

President Receives Landmark Award

President Shirley Ann Jackson was the inaugural recipient of the Council on Competitiveness America Competes Award for Public Service. She received the award at a dinner celebration in March at the Plaza Hotel in New York City.

According to the Council, the America Competes Award for Public Service is given to “a leader who has worked tirelessly to improve the quality of life in America and abroad through public service and private sector outreach, and to those who show an extraordinary commitment to excellence and the American spirit. It is a rare individual who demonstrates this dedication by advancing the public dialogue across the worlds of scholarship, policy, and business.”

In accepting the award, President Jackson said, “I have a high regard for the value of public service. I also recognize the special obligations of scientists to bring their knowledge into the public arena. The key challenges of our times all have scientific and technological components. The only way that informed decisions can be made is if those of us who have the analytical skills, perspectives, and relevant facts participate at every level.”

Speaking about the importance of collaboration among business, academia, and government to address global challenges and to strengthen the global economy, she said, “We live in uncertain and, in many ways, difficult times, but I see great hope for our collective future, if we prepare the next generation, encourage investment in research, create cooperation across disciplines and sectors, and bring knowledge and thoughtful discourse to the challenges we face.”

General Electric Chairman and CEO Jeffrey Immelt also was honored by the Council, receiving the America Competes Award for Corporate Leadership. The award is given to an individual who, throughout the course of his or her life and career, has demonstrated a commitment to working across the lines of business, academia, and politics for the betterment of the local, national, and global community.
Members of a student club have created a unique 360-degree video chronicling a weather balloon’s 89,777-foot ascent into space.

The Rensselaer Students for the Exploration and Development of Space (SEDS) launched their high-atmosphere balloon in late January. Filled with condensed helium, the balloon carried a payload of three high-definition video cameras and GPS equipment. SEDS members retrieved the payload—which was carefully designed to withstand a significant impact—after the balloon popped at its peak altitude and fell to the Earth’s surface. All three video cameras were intact, and club members “stitched together” footage from the three perspectives into a single 360-degree video.

The goal of the project, SEDS members say, was to create a video that would reach younger audiences and help rekindle their interest in space, science, and engineering.

“We see our video as an extraordinary opportunity to bring viewers face to face with the wonder of space,” says aeronautical engineering major Orian Breaux ’12, founder of SEDS at Rensselaer. “That curiosity has fallen out of public consciousness, and grassroots projects like these will help restore that spark among younger generations.”

SEDS launched the balloon at 8:29 a.m. EST on Jan. 28 from the ’86 Field in the heart of the campus. The students used GPS to track the progress of the balloon, which immediately sped up and east. At 9:16 a.m. at an altitude of 29,039 feet, the balloon hit a speed of 246 mph—its fastest speed of the voyage. At 11 a.m., miles above Lake Winnipesaukee, N.H., the balloon reached its peak altitude of 89,777 feet and popped. The payload fell to the ground and eventually landed in Steep Falls, Maine—170 miles from Troy as the crow flies, or a 280-mile car ride.

“I never cease to be amazed by these students. They proposed the mission, they designed the system and the payload, they built it, and then flew it with absolute success,” says club faculty adviser Kurt Anderson, a professor in the Department of Mechanical, Aerospace, and Nuclear Engineering. “At many institutions students too seldom take their ideas beyond concept and design on paper. Not so with this group. They have gone from ideas to execution, achieved through their own hard work and initiative. In so doing, they have taken all of us to the edge of space through the extraordinary images the craft returned.”

View the video at www.rpi.edu/news/video/spaceballoon/. 

Out of This World!

RESEARCH ROUNDUP

Recent Breakthroughs

Grant Funds Research on How Chemicals Impact Stem Cells

Bioengineers at Rensselaer and the University of California, Berkeley, have been awarded a $2 million grant from the National Institutes of Health to study how chemicals in drugs and the environment impact stem cells. Leading the research effort for Rensselaer is Jonathan Dordick, director of the Center for Biotechnology and Interdisciplinary Studies and the Howard P. Isermann ’42 Professor of Chemical and Biological Engineering. The ultimate goal of the research is to develop a high-throughput and inexpensive system that manufacturers can use to quickly screen thousands of chemicals for their effects on stem cells.

Applying Computer Logic To Make Flight Safer

Computer scientist Carlos Varela has received seed funding from the U.S. Air Force to help make flight data as updated, active, and accurate as possible. Varela, part of the Data Science Research Center, will use the more than $100,000 grant to develop sophisticated computer logic programming to help create safer and more efficient flight technology. The new system will build on what is known in computer science as logic programming by extending a logic programming language to associate probabilities to knowledge. Varela hopes to create a new system that more easily deals with data streams and quickly admits new data. Such a system could be expanded to include unmanned flight systems and even fields beyond aviation.

Creating Technologies To Share and Preserve Sustainability Data

Rensselaer is a key partner in a new project to create better technologies for scientists and engineers to store, share, and preserve important scientific data related to sustainability research. Funded by a two-year, $2 million award from the National Science Foundation, the multi-university Sustainable Environment-Actionable Data effort is expected to receive a total of $8 million over five years. By pairing social networking technologies similar to Facebook, YouTube, and Flickr with leading-edge web science and network science, the project aims to hasten scientific discovery and innovation. It will enable researchers who study sustainability to share their data more easily than with current methods.
Controlling Protein Function With Nanotechnology

A new study led by nanotechnology and biotechnology experts at Rensselaer is providing important details on how proteins in our bodies interact with nanomaterials. In their new study, researchers developed a new tool to determine the orientation of proteins on different nanostructures. The discovery is a key step in the effort to control the orientation, structure, and function of proteins in the body using nanomaterials.

“To date, very little is known about how proteins interact with a surface at the nanoscale,” says Jonathan Dordick, director of the Center for Biotechnology and Interdisciplinary Studies, the Howard P. Jones ’42 Professor of Chemical and Biological Engineering, and co-corresponding author on the study. “With a better understanding of how a protein interacts with a surface, we can develop custom nanoscale surfaces and design proteins that can do a variety of amazing tasks in the human body.”

Researchers seek to use nanotechnology in a variety of biological and medical applications, ranging from biosensors that can detect cancer in the body to scaffolds that help grow new tissues and organs. Such technologies involve the interaction between biological cells and nonbiological nanoscale materials. These interactions are controlled in part by proteins at the interface between the two materials. At such a minuscule level, the tiniest change in the structure of a material can vastly change the proteins involved and thus alter how the cells of the human body respond to the nanomaterial.

In fact, proteins are among the most complex (and fickle) molecules in our bodies, rapidly changing their orientation or structure and thus their ability to interact with other molecules. Controlling their orientation and structure through their interactions with nanomaterials is essential to their reliable and safe use in new biotechnologies, according to Dordick.

“We have learned over the past decade to create nanomaterials with a wide variety of controlled structures, and we have discovered and begun to learn how these structures can positively impact cellular activity,” says Richard Siegel, the Robert W. Hunt Professor of Materials Science and Engineering, director of the Rensselaer Nanotechnology Center, and co-corresponding author on the study.

“By learning more about the role of the nanostructure-protein interactions that cause this impact, we will be able in the future to harness this knowledge to benefit society through improved health care. In addition to improved health care, this work will help enable the manufacture of a wide range of new hierarchical composite materials—based upon synthetic polymers, biomolecules, and nanostructures—that will revolutionize our ability to solve many critical problems facing society worldwide,” Siegel said.
Ulcer-Causing Bacteria Baffled by Mucus

Even the tiniest microscopic organisms make waves when they swim. In fact, dealing with these waves is a fact of life for the ulcer-causing bacteria H. pylori. The bacteria are known to change their behavior in order to compensate for the waves created by other bacteria swimming around in the same aquatic neighborhood. From the relatively simple actions of these individual bacteria emerges a complex, coordinated group behavior.

A new study by Rensselaer engineering researchers demonstrates how introducing certain polymers—like those found in human mucus and saliva—into the environment makes it significantly more difficult for H. pylori and other microorganisms to coordinate. The findings raise many new questions about the relationship between the individual and group behaviors of bacteria. The study also suggests that human mucus, saliva, and other biological fluid barriers may have evolved to disrupt the ability of harmful bacteria to coordinate.

“In the human body, microorganisms are always moving around in mucus, saliva, and other systems that exhibit elasticity due to the presence of polymers. Our study is among the first to look at how this elasticity impacts the collective behavior of microorganisms like H. pylori,” says lead researcher Patrick Underhill, assistant professor in the Howard P. Isermann Department of Chemical and Biological Engineering.

Underhill’s study, based on large-scale computer simulations, leveraged the power of the Computational Center for Nanotechnology Innovations, one of the world’s most powerful university-based supercomputers. These simulations involved creating a computer model of more than 110,000 individual H. pylori bacteria simultaneously occupying a small volume of polymer-infused liquid. The simulations captured all of the individual actions and interactions created as the bacteria swim through the liquid. The most difficult aspect of this kind of simulation, Underhill says, is to identify collective behaviors and extract relevant conclusions from the massive amount of data generated.

Students Visit Remote Medical Clinics in South Africa

BIOMEDICAL ENGINEERING STUDENTS FROM RENSSELAER TRAVELED TO SOUTH AFRICA IN January on a mission to identify the unique needs of remote, under-resourced medical clinics. The students will use these findings and field observations to inform the design and development of new medical technologies.

Led by Eric Ledet, assistant professor of biomedical engineering, the group of six students was hosted by Stellenbosch University, just outside of Cape Town in South Africa. From Stellenbosch, the students traveled to medical clinics in nearby towns and villages. Working with students and faculty from Stellenbosch, as well as the doctors and medical staff, the group was attempting to identify the specific needs of these clinics.

Upon returning to Rensselaer, the students planned to spend their spring semester developing and designing new medical technologies to help solve some of the particular needs of the visited clinics. This project will be part of the capstone design course for biomedical engineering seniors.

“This is an exceptional opportunity for our biomedical engineering students to sharpen their skills by working with clients, recognizing opportunities, and innovating solutions to very important, very tangible challenges,” says Ledet. “There’s no better way to learn engineering than seeing a problem with your own eyes, and then using your own smarts and your own hands to help fix it.”

Before leaving, one of the students traveling with Ledet to South Africa, Josh Peterson, said he was excited about the trip. He said students often hear about the use of mosquito nets to help combat malaria, but he was interested to learn more about the practical day-to-day needs of running a medical clinic in South Africa. Medical devices are usually designed for hospitals and facilities with a robust infrastructure, and as a result these devices often cannot be used at remote and under-resourced clinics.

“When most medical devices are designed, they assume end-users have access to plenty of money, water, and power. But this is not the reality everywhere. From the very inception of our project, we’ll be working directly to address the needs of the clinics, and directly within their budget and situational constraints,” said Peterson. “In this way, I hope we can really make a difference.”
SHIRLEY ANN JACKSON, president, has been chosen by the American Association for the Advancement of Science (AAAS), the world’s largest general scientific society, to receive its prestigious 2011 Philip Hauge Abelson Award. She is being honored by AAAS for her “extraordinary leadership of and contributions to the scientific community, government, universities, industries, and future generations of science and engineering professionals.”

DEEPAK VASHISHTH, a bone and tissue engineering expert who heads the Department of Biomedical Engineering, has been named a fellow of the American Institute for Medical and Biological Engineering. Vashishth was cited for “significant contributions to the field” and profession of biomedical engineering, and having “the leadership ability to play a transformational role in our field and in our society.”

KIM LEWIS, assistant professor of physics, applied physics, and astronomy, has won a Faculty Early Career Development Award (CAREER) from the National Science Foundation. Lewis will use the five-year, $575,000 award to study electronics at the molecular level. The research seeks to better understand how molecules are transported through advanced electronic systems. Along with educating undergraduates and graduate students in the areas of molecular and nano electronics and advanced atomic force microscopy, Lewis will use the funding to cultivate broader participation by underrepresented groups in science.

SUSAN GILBERT, professor and head of biology, and JAMES HENDER, senior constellation professor in the Tetherless World Constellation and head of the information technology and web science program, have been selected as fellows of the American Association for the Advancement of Science (AAAS). Gilbert was recognized for distinguished contributions to our mechanistic understanding of microtubule-dependent molecular motor ATPases involved in cell motility. Hendler was cited for fundamental contributions in artificial intelligence, including automated planning, and for the invention (with Tim Berners-Lee and Ora Lassila) of the Semantic Web—the next generation of the World Wide Web.

RYAN GILBERT, assistant professor of biomedical engineering, has won a Faculty Early Career Development Award (CAREER) from the National Science Foundation (NSF). Gilbert will use the projected five-year, $500,000 award to develop new biomaterials for the treatment of spinal cord injuries. The CAREER Award is given to faculty members at the beginning of their academic careers and is one of NSF’s most competitive awards, placing emphasis on high-quality research and novel education initiatives.

S. ARGEO ASCANI has joined the Curtis R. Priem Experimental Media and Performing Arts Center (EMPAC) as its new music curator. Ascani joins EMPAC from the Manhattan School of Music, and is a musician, educator, and curator focused on exploring the sonic unknown. He has performed internationally as both a soloist and chamber musician, and he has lectured at conservatories and universities on topics such as experimental compositional techniques and new music performance practice. Ascani has a master’s degree in music from the Manhattan School of Music.

JAMES NAPOLITANO, professor of physics, applied physics, and astronomy, and VINCENT MEUNIER, the Gail and Jeffrey L. Kodosky ’70 Constellation Professor of Physics, Information Technology, and Entrepreneurship, have been named fellows of the American Physical Society. Meunier was cited “for advancing the fields of nanoscience and nanotechnology through the application of innovative theory and advanced computation for the understanding of energy flow and storage mechanisms in nanostructured materials including carbons and metal oxides.” Napolitano was cited “for contributions to fundamental problems of nature through experiments in nuclear physics.”

LINDA SCHADLER has been named the Russell Sage Professor. A professor in the Department of Materials Science and Engineering, Schadler is also the associate dean for academic affairs for the School of Engineering. A prolific researcher, she is author or co-author on more than 120 peer-reviewed journal papers, and was co-author of the 2003 book Nanocomposite Science and Technology. Her research interests include the mechanical, optical, and electrical behavior of nanofilled polymer composites.

JEFFREY SCHANZ, assistant vice president for alumni relations and executive director of the Rensselaer Alumni Association, has been named the Council for Advancement and Support of Education’s District II Professional of the Year. The award recognizes a District II institutional advancement professional who has demonstrated “exceptional achievement in the development of an institutional advancement program or innovative execution of programs within an area of advancement.”

X. GEORGE XU, professor of mechanical, aerospace, and nuclear engineering, has been named program head of the nuclear engineering program. Xu is responsible for overseeing student recruiting, curriculum development, research, and faculty hiring. Additionally, he is tasked with promoting the program to external stakeholders, as well as seeking new funding, development, and partnership opportunities. Xu is an internationally recognized expert and leader in his field.

ANGEL GARCÍA has been named head of the Department of Physics, Applied Physics, and Astronomy. García is currently senior constellation chaired professor in the Biocomputation and Bioinformatics Constellation, and a professor of physics. His new role is in addition to his work as a leader in the constellation. García joined Rensselaer in 2005 from the Los Alamos National Laboratory. He worked at Los Alamos for 16 years and rose to become group leader in the Theoretical Biology and Biophysics Group Theoretical Division at the lab.

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Ben Chang and Lee Sheldon, co-directors of the Games and Simulation Arts and Sciences program, are exploring the potential of synthetic environments—such as the Chinese tea room pictured—as tools of research and education.
Rensselaer’s Games and Simulation Arts and Sciences program is providing students with a more sophisticated way of looking at games and their application to society.

By Mary Martialay

Got Game?

Last May, 20 undergraduates received a degree in Games and Simulation Arts and Sciences, the first full class of so-called “GSAS” graduates. With the addition of a few upperclassmen who slipped in under the wire—transferring into the program as soon as it launched—Rensselaer has now awarded 33 GSAS degrees.

The graduates have had a launch of their own, fanning out across the country in pursuit of success in the “real world.” And through their work, GSAS grads are infiltrating the synthetic world, making their mark on games and simulation from the fluidity of freelance and startup, where Yuting Lian is experimenting with alternate reality and educational games, to the establishment of Microsoft, where Jesse Natalie will cut his teeth on the development team for DirectX 12.

Even as these graduates brandish their new degrees, the program is finding its pace, growing and maturing from roots among a few pioneering alumni who strung together computer science and electronic arts classes to enter the industry, to a minor in 2004, and a full major in 2007. This spring, the Princeton Review ranked GSAS 20th out of hundreds of competing game design programs in North America.
entertainment: exploring the potential for synthetic environments as tools of research and education, and as a means of enriching the human experience.

“We’re aiming for a more sophisticated way of looking at games and what games can mean in our society,” Sheldon says. “We’re creating a program that does not focus on getting all of our students into triple-A title commercial games. We believe very strongly in serious games, and that the market has never been more open.”

Video games started out as a broad tent, embracing narrative-driven epics and cerebral quests. But for nearly two decades, the industry has been dominated by the “first-person shooter.” The proliferation of social games and the move away from consoles has re-opened doors, says Sheldon. “We have gone back to the beginning of the industry in terms of opportunities. We need our students to recognize that, and acquire the skills they need accordingly,” Sheldon says.

Some of the students who have best embraced this vision of GSAS are actually outsiders to the program. Students like MFA graduate Yehuda Duenyas, who used his time at Rensselaer to expand his knowledge of technology for application in experiential theater. Or Heidi Boisvert, a Ph.D. candidate developing hybrids of social justice messaging and popular games. Or Julian Volyn, an iEAR graduate who leveraged a few classes in game design and a stunning sense of aesthetics into his own business: RedCandy Games.

Such students accessed the assets of the GSAS program—faculty, classes, facilities, and connections—to fulfill their vision.
The GSAS program is extremely interconnected with other programs and the boundary is very permeable,” Chang says. “This is a prime example of the low walls at RPI. GSAS is a program that does offer a major, but more importantly, it’s a locus—a gathering of energy and interest around that field.”

The challenge is to convince students who gravitate toward game design in its current form to see the same possibilities that attracted non-majors like Duenyas, Boisvert, or Volyn.

“One of the things that you can say about games in comparison to other media—like books or film or theater—has immersive visualization technology with the power of good game design and narrative to develop programs from education and teaching through games, to evocative digital art experiences.”

With the Emergent Reality Lab on the horizon, Sheldon created a game environment for an experimental class to teach Mandarin Chinese. In this “dress rehearsal,” titled “The Lost Manuscript,” the class employed actors to stand in for synthetic characters—to immerse students in scenes they might encounter in Beijing, such as a traditional tea ceremony, a visit to the Forbidden City, and for the final exam, a police interrogation.

“Visually arresting” and possessing “the extemporaneous feel of a happening.”

The goal is not only to develop such tools at Rensselaer, but to teach Rensselaer students to think and execute on the same level necessary to assist research and create projects of their own. To achieve such ambitious goals, Sheldon and Chang are strengthening the academic side of the program.

Chang has overseen a review of the curriculum, aligning the existing “tracks” or concentrations within game design: computer science, electronic arts, human computer interaction, cognitive science, and management.

“We want students to progress in the study of game programming and game art in synchrony, so that collaborative team-based classes are effective,” Chang says. Sheldon is working on a new concentration in writing—elevating the importance of narrative in games—which may be the first of its kind in the nation. And they are adding faculty in critical areas such as animation, cognizant of the advantage it will give students.

The following stories of seven Rensselaer graduates and students illustrate the success—and potential—of GSAS.

Yehuda Duenyas ’11, MFA

For more than 15 years, Yehuda Duenyas has been creating interactive theatrical experiences—hybrids of theater and amusement ride—that defy categorization. In his 2007 installation “One Million Forgotten Moments,” Duenyas transformed a lower-Manhattan storefront into a 30-seat theater with the display window as proscenium, and the street as stage. On opening night, more than 100 performers passed before the storefront in a tapestry that included a poetry recital with iPod slide show, a singing cowboy, and a team of synchronized “swimmers” mimicking a water ballet.

The New York Times described the opening-night performance as “visually arresting” and possessing “the extemporaneous feel of a happening.”

Still, Duenyas felt he had more to learn. He arrived at Rensselaer looking for new possibilities. He sought out classes in disciplines to which he had had little previous exposure: Engineering Processes, Information Technology for the Arts, and, significantly, Experimental Game Design (EGD). “EGD opened my eyes to a new way of thinking, and gave me new tools I felt I could apply to my existing field,” Duenyas says.

He met fellow student and computer science major Michael Todd, and they "I want to make games that are more commercial, but I also want to change the gaming industry. There are serious games, which people consciously know are about an issue, or there are educational games, which are supposed to teach you things. And people who actually ‘game’ don’t play those games.”

Heidi Boisvert, doctoral candidate, Electronic Arts
worked together to build a physical video game interface that allowed players, suspended in a theatrical flying harness, to “fly” through a virtual world. As a grand finale, Duenyas created “The Ascent,” at the Curtis R. Priem Experimental Media and Performing Arts Center, an experience that links the fluctuations in brain waves during meditation to a set of sound, lighting, and rigging cues that lift participants, who are in a harness and wearing an EEG headset, as high as 35 feet in the air, depending on the depth of their meditation.

The project brought him to the attention of Walt Disney Imagineering, where he’s been contracting with various departments on next-generation experiences and attractions. Duenyas is also preparing “The Ascent” for international touring.

“I left RPI with the feeling that anything is possible,” Duenyas says. “RPI fundamentally expanded my vision and imagination.”

Heidi Boisvert, Ph.D. candidate

Heidi Boisvert, a new media artist, is the creator of several “serious” video games that promote social justice. Boisvert knows such games are often overlooked by devoted gamers, and that she would have a wider audience for her work if she created commercially successful games. But can she do both?

“I want to make games that are more commercial, but I also want to change the gaming industry,” Boisvert says. “There are serious games, which people consciously know are about an issue, or there are educational games, which are supposed to teach you things. And people who actually ‘game’ don’t play those games.”

Boisvert, a doctoral candidate in electronic arts, is experimenting with diverse fields—cognitive science, public relations, popular culture—to concoct a formula for popular games with a positive influence on consumers. Although not enrolled in the GSAS program, she is tapping into the expertise of GSAS faculty, including Sheldon, Chang, and Mei Si, a GSAS professor and assistant professor of cognitive science.
Julian Volyn ’11
founder, RedCandy Games

“I chose Rensselaer because of the cross-pollination between the departments and those ‘low walls’ between programs. I was able to take classes in business, in the arts, in computer science. Absent that ecosystem and the low walls, I don’t think that would have been possible.”

Julian Volyn ’11, iEAR graduate, founder, RedCandy Games

“Part of the reason I wanted to come to RPI was to create a sandbox environment for myself to work across disciplines, to move away from overt messaging, but still imbue my work with values and implicit messages,” Boisvert says. She credits formative experiences in political theater and documentary film, followed by the advertising industry—where she absorbed principles of public relations pioneered by Edward Bernays—with the origin of her current research interest.

Among her most recent credits are ICED (I Can End Deportation), a downloadable 3-D game about U.S. immigration policies, and America 2049, an alternate reality game for Facebook. Both were created for Breakthrough, a global human rights organization that uses media, pop culture, and community mobilization to press for social justice. Boisvert also designed Stitch, Cut & Die, a game noir about journalism and human trafficking in war-torn Iraq, as an installation commissioned for the Queen’s Museum Biennale.

Her work is not limited to video games; Boisvert also works in theater, video, photography, installation, and sound.

“A story or an idea will come to me and then I figure out what’s the best medium; whether it’s a play, a film, a mobile app, a game, or an animation,” she says. “But the main thematic through-line is how can I further abstract the message into something less recognizable that will quietly and surreptitiously change people’s attitudes and behaviors and, hopefully, actions.”

Julian Volyn ’11 won first prize at GameFest with Tic, which already has 800,000 impressions.

GSAS, Volyn made profitable use of its resources. He took GSAS classes, notably Experimental Game Design, and entered the 2011 GameFest, winning first prize with Tic, the founding product of RedCandy Games.

“The experimental game design course exposed me to the whole process of game development. That’s something you can’t get in an arts class or a technical computer science class,” Volyn says.

In August, RedCandy Games took second prize in the Microsoft Dream, Build, Play competition. He won $10,000, a shot at a publishing contract, and “a ton of attention.” Tic has racked up 800,000 impressions, and RedCandy Games popped up on video gaming blogs Joystiq and Kotaku.

Today, Volyn is shepherding a young company while pursuing a master’s degree in technology, commercialization, and entrepreneurship at the Lally School of Management and Technology.

“We are taking RedCandy to the next level,” Volyn says. “We’re in the process of seeking venture capital and angel funding, while expanding the business model to include not only our products and intellectual portfolio, but also creating games for others and licensing and exploiting our tools and technology.”
Matthew Nebel ’11, GSAS & CSCI graduate, quality engineer at Kixeye

Matthew Nebel spends his working hours “trying to break video games.” The 2011 GSAS graduate landed a spot out of college as a quality engineer with the San Francisco-based game designer Kixeye.

Nebel, a gamer from age 4, knew he wanted to be in the video gaming industry. A class in high school convinced him to try programming, and his college search centered on schools offering game design.

“I was looking for a four-year university that had a game design program; these were pretty few and far between,” Nebel says. “I also knew I wanted to go to a school that had a good computer science program but also had a game design program associated. At the time, RPI was one of three places where you could do that.”

Nebel says that—while he learned specific computer languages and principles of game design—GSAS’ team-based approach was the most critical aspect of his education.

“You have a year or two of programming on your own, then you have to do group projects and figure out how that works,” Nebel says. “On the game side, I learned how the different roles fit together—artist, programmer, designer—how the finer points of programming for games function, and how they differ from conventional programming.”

Nebel joined Kixeye as an intern but was hired permanently within two months. Nebel says his education has positioned him nicely to demonstrate a broad range of skills to his employers.

“We worked as a team creating several games over the course of the semester. That was an enlightening moment. I realized you can create a really awesome product that’s way better than doing it solo.”

Yuting Lian ’11, GSAS & iEAR graduate, freelancer

In 2011, Yuting Lian ’11 and her teammates created the first alternate reality game to be featured at Rensselaer’s annual GameFest. The game, called Feast, works on the Android phone operating system and allows players to aim an Android camera phone at a checkered game board, and play with synthetic characters the phone superimposed on the board.

Alternate reality (AR) is a fascinating prospect in technology and Lian was captured by its potential. “There’s a lot of potential in AR, especially with real-world applications,” she says. “If you wanted to fix a car yourself, maybe your phone could recognize the car you have, tell you the parts needed, pull the car apart, and show you what’s inside.”

But, as Lian found in Feast, the technology still hasn’t caught up to her imagination.

“It hasn’t gotten to that extent, to be able to recognize an image on the spot. The software kit we used recognizes basic shapes, but not color. A box it can recognize easily—six sides, hard edges; if you’re doing something that has a smooth surface, it will have trouble,” she says.

Lian is an artist. In choosing her career, she hoped to balance her passion for art with a skill she saw as more marketable. She transferred into Rensselaer to explore computer science, electronic art, and game design.

She had always had an interest in game design—in high school she studied programming languages Java and Maya, and even built a checkers game. At Rensselaer, her interest blossomed.

Since graduation, Lian has worked on contract for Dreamkind, an entertainment studio that produces mobile apps as well as websites and digital media, and worked freelance with Level 99 Games.

Lian says she would welcome a job in game design, but she may also choose to finance her independent work with a career in web design, IT, or applications development.

“A lot of my friends that I worked with at RPI are making their own projects, writing their own engines; we’re collaborating with one another,” Lian says. “As long as the small games that we make break out and get us enough money to make more games and support a company, that’s great.”

Bill Davey ’10, CSCI & GSAS graduate, 1st Playable

Bill Davey started out at 1st Playable, a video game company in downtown Troy, while still a student at Rensselaer, earning credit as part of a co-op. Two years after graduation, he has worked on four console games, and two gaming apps, and has created several in-house tools used by 1st Playable.
“The things I’ve learned are amazing, not only the academic side, but just the hands-on experience and the skills that I’ve picked up by working with other people who have similar interests.”

Jesse Natalie ’11

Davey grew up in a tech-savvy household. Both his parents work as software engineers; his father in telecommunications programming and his mother in information technology solutions. “I decided I wanted to be a programmer and games looked like a much more fun option than what my parents were doing,” Davey jokes.

While researching colleges, he heard Rensselaer was launching a game design program.

“At the time, there was a small handful of games design programs. I was looking at one where I could also get a solid computer science degree, just in case things didn’t go well,” Davey says.

When he arrived, the Rensselaer GSAS curriculum hadn’t been completed, but Davey consulted with professors in charge of the program and made sure he signed up for classes that would become requirements. He studied computer science, game design, game mechanics, game theory, discrete structures, and experimental game design, to name a few. In his sophomore year, he took Game Development I, a class that draws on all the knowledge he had accumulated in a team environment.

“They sat us down with two artists, two programmers, and two designers. We worked as a team creating several games over the course of the semester. That was an enlightening moment. I realized you can create a really awesome product that’s way better than doing it solo,” Davey says. “I like the environment because each person focuses on something they really care about and it enhances the product.”

Jesse Natalie ’11, GSAS graduate, Microsoft

After graduation, Jesse Natalie ’11 found himself in an enviable position. He earned his degree in December 2011, he had a job lined up at Microsoft in March 2012, and, during the weeks in between, he had no pressing responsibilities.

Natalie was hired onto the development team for DirectX, and will work on the next iteration of the Microsoft Windows application programming interfaces. A member of the team that creates the “look” of Windows, Natalie will play a role in games built on the Windows platform.

“A Night in Twistwyck Manor, created by Jesse Natalie ’11 and the UnPossible Games team, won an honorable mention at GameFest 2011."

“Getting into Microsoft is not only a great learning experience, it’s also a great career opportunity,” Natalie says. An avid gamer from childhood, Natalie wasn’t searching for a game design program when he first considered Rensselaer.

“I was looking at computer science programs, and a lot of people recommended that Rensselaer had a great computer science program,” Natalie says. “While I was visiting campus, someone mentioned that Rensselaer had a game design program and that pretty much sold me on the school immediately.”

Natalie credits experiences like a freshman class taught by Benny Raymond, a senior technical designer at Vicarious Visions, and his work on UnPossible Games—the company he founded with a group of like-minded students—with preparing him for the profession.

“The things I’ve learned are amazing, not only the academic side, but just the hands-on experience and the skills that I’ve picked up by working with other people who have similar interests,” Natalie says. “Just being able to interact with all these people who know so much more than I could has been a really great opportunity to pick up a lot of skills.”
David Ferrucci, Ph.D. ’94, is the principal investigator on the IBM Watson project.
One day, society will look back on a unique 2011 pop culture and science/technology demonstration and consider it a moon landing of sorts in the computer science arena. That three-day demonstration last February pitted IBM’s astounding Watson computer against the all-time champions of *Jeopardy!*, among the oldest and most popular of all TV game shows. It was also rich in connections to Rensselaer, the most notable of which is IBM scientist and Watson team leader David Ferrucci, Ph.D. ’94.

Watson was developed by a team of 25 IBM researchers and scientists over the last eight years at the company’s Hawthorne, N.Y., labs. Named for IBM founder Thomas J. Watson, the system represents advanced computer architecture that combines the best of natural language processing, computational linguistics, information retrieval, game theory, machine learning, and other computing disciplines. In short, Watson is smart and it talks our language—a theme echoed by the many journalists who covered the event last year.

The initial challenge of the team was to find a way for all those features to work together, often in less than a second, to respond to heavily nuanced *Jeopardy!* categories and answers with the right questions. The ultimate goal, however, was to unlock the door to a future where computer systems that are expert in “Q&A” can start to mimic us in listening, learning, and speaking and, more important, start acting as a critical, interactive “assistant” to us in areas ranging from health care to business. BY MARK MARCHAND

From a TV game show to the doctor’s office, IBM’s Watson leads the way.
“The area I’m most excited about is health care and medicine,” says Ferrucci, leader of the Semantic Analysis and Integration Department at the IBM T.J. Watson Research Center. “This is especially true in the areas of diagnosing diseases and other ailments, and then mapping out a treatment plan. The motivation for doing something in this area is tremendous: The technical alignment of the problem at hand—correctly and confidently diagnosing an illness—and the capabilities of Watson are very strong.”

Among the health-care challenges Watson is best positioned to solve, Ferrucci explains, is the vexing problem of how a primary care or other physician keeps current with the vast—and continually growing—body of scientific research, peer-reviewed papers, and other literature related to illnesses and drugs. “All of this information is, for the most part, kept in disparate formats—ranging from symptoms and illness databases to pharmaceuticals to medical research. Today the information is organized in a more traditional IT sense; you can’t just put in five symptoms and obtain a precise and confident answer, or range of answers. The vision here is to establish a scenario where doctors, caregivers, and patients themselves have access—on a collaborative basis—to the Watson technology, through which they can retrieve and apply all knowledge that’s out there to make a far more confident decision on diagnoses and other important questions.”

Ferrucci and his co-workers see a patchwork of database systems they feel is “brittle,” in that the information is constantly but unevenly updated. That’s where the ability for a computer such as Watson to understand our questions and answer them in the language we use is critical.

“Instead of us having to submit a query in, say, mathematical terms or by having to know the right keywords, we can advance the process much more quickly because Watson works with us in the format humans use to communicate most frequently,” he says.

Today, Ferrucci and his fellow researchers and scientists at IBM—who include Rensselaer graduates Chris Welty ’85 and Adam Lally ’98—are essentially “training” Watson in medicine to explore what it will take to make Watson successful in the medical arena. Working with universities such as Columbia University and the University of Maryland, as well as the Memorial Sloan-Kettering Cancer Center, they feel that from multiple viewpoints—ranging from business cases to direct, positive solutions for society—Watson can have an immediate impact.

Viewing the achievement at Rensselaer

For those who have spent a lifetime studying and teaching computer science and artificial intelligence, Watson does represent the type of advance IBM anticipated when it took on a “grand challenge,” similar to the 1997 chess match between the company’s “Deep Blue” computer and world champion Gary Kasparov.
The colorful avatar that represents the “face” of Watson belies the complexity embedded within. Watson contains 90 IBM Power 750 servers, hundreds of custom algorithms, 2,880 POWER7 processor cores, and 15 terabytes of RAM. The processors operate on a parallel basis to interpret questions and provide a range of increasingly confident answers—often in less than a second.
The Path to Watson

In the days following the whirlwind of publicity surrounding the historic Watson accomplishment, Ferrucci was often asked to reflect on the path that led him to what is also known as IBM's “Deep Q&A” project. The beginnings, he says, can be traced to the fictional, interactive computer on the original Star Trek series and a career-changing decision late in his undergraduate career. He readily admits the synthetic female voice of the Star Trek computer was the first time he thought about computers that could interact with us verbally.

It was during his studies as a biology/pre-med student at Manhattan College that Ferrucci began working with computers on a more serious level. He became involved with designing computer programs for ecology, physiology, and other labs. He also had a particular focus on ecological simulations and became so immersed in the topic that he opted to expand his studies to include artificial intelligence and medical expert systems. While his family still expected him to pursue the goal of becoming a medical doctor, computing captured his imagination. In his junior year he began thinking about studying computing and artificial intelligence full time in graduate school.

“I was taking the prep course for the MCAT test for medical school admission when it hit me that I really wanted to do something different,” he says. “The instructor was asking us to turn to a certain page when I told him I was done, and I wasn’t going to pursue being a doctor. He was a bit puzzled and he said I’d still have to pay for the course, something like $500. I told him that was a much smaller issue, paid him, and I never looked back.”

Ferrucci completed his undergraduate work by adding a minor in computer science and then launched a search for a school where he could pursue a doctorate. After visiting the Rensselaer campus with his father, he felt the school was open to accepting him even though he didn’t have the extensive computer science and mathematics background required at the time.

“Rensselaer was a real transition for me. As a student, in the beginning I quickly realized things here were done much differently and I was working with students who had been doing systems programming and building pieces of operating systems for years,” he says.

The realization led him to seek help from one of his Rensselaer professors. He called Mukkai Krishnamoorthy at home one evening. They spoke on the phone for a while, and then Prof. Moorthy, as he is known, drove to campus to speak with Ferrucci until late that evening.

“That single conversation with a faculty member who patiently listened and gave me good advice made all the difference in the world; the attention and care I received in that one instance got me over the hump,” Ferrucci recalls.

Moorthy, still on the faculty in computer science, remembers the conversation well.

“I have very fond memories of interacting with David that evening and throughout his work on his doctorate—he is personable, funny…and a very dedicated student,” he says. “One of the pleasures of being a faculty member at Rensselaer is that one gets to interact with extremely smart and dedicated students who will accept nothing less than perfection. Their perceptive questions add fuel to our mind and push our brains further. It is equally pleasurable in hearing from them after they graduate—especially someone like David—and finding out what great things they have accomplished.”

How Watson Works

The colorful avatar that represents the “face” of Watson for Jeopardy! viewers belies the complexity embedded within. Watson contains some 90 IBM Power 750 servers, hundreds of custom algorithms, 2,880 POWER7 processor cores, and 15 terabytes of RAM. Coupled with specially designed IBM Deep Q&A software, the processors operate on a parallel basis to interpret questions, research databases, and provide a range of increasingly confident answers—often in less than a second. And it “hears” our questions (actually, it reads them) and verbalizes the answers in audible, perfect English—via a friendly male voice.

As the anticipation built for the IBM Jeopardy! Watson...
Today, Ferrucci and his fellow researchers and scientists at IBM—including Chris Welty ’85 and Adam Lally ’98—are essentially “training” Watson in medicine to explore what it will take to make Watson successful in the medical arena.

Challenge last year, a common misperception was that Watson was linked to the Internet and all of the information available on the World Wide Web. How else, many wondered, could Watson interpret the Jeopardy! answers and deliver—almost all of the time—the right question so quickly? While that might make it easier to understand Watson’s intellectual prowess, it wasn’t true.

Watson was not connected to the Internet. Instead, its builders armed the computer with massive databases that ranged from the complete text of Wikipedia to millions of documents from dictionaries, encyclopedias, and other reference materials. Combined with a multitude of techniques to analyze resources and natural language, Watson blazed new trails in computing.

A unique feature of Watson is its ability to develop a range of answers, assigning an increasing “confidence level” to each. It’s this range of possible answers to questions that helps position Watson for widespread uses ranging from the doctor’s office to business. To a doctor trying to diagnose challenging illnesses, seeing those ranges of possibilities is a valuable asset.

One of the biggest challenges to achieving success with Watson lies in the use of language and linguistics. Ferrucci explains that, unlike the straightforward use of symbols in mathematics, the key to understanding language involves a factor known as “common experience.” The key to someone understanding a word or phrase comes from mapping common experiences and human cognition. The meaning of a word is instantly understood by someone who has dealt with it—or a related experience—before. The person’s previous experience gives them knowledge that allows them to relate the word to the experience and know exactly what the person with whom they are speaking is talking about. Absent any common experience or history, use of the word is rendered meaningless. This is a common problem with young children even as they develop strong language skills, Ferrucci says, because they have little or no storehouse of common experiences until about the time they enter fourth or fifth grade. Until then, children (with any luck) listen to parents and others in positions of authority and have faith in what they are being told or asked to do.

“Computers, however, don’t have that storehouse of common experience, so we have to provide a lot of help there,” he explains. “We basically have to equip it with enough information to allow the computer to see how a word is used in different contexts and circumstances, and to then quickly develop an appropriate interpretation and, ultimately, response to a question.”

What Else for Watson?

While health care is fertile ground for proving the potential for Watson—as well as providing the type of challenge that will help refine and improve the computer—Ferrucci and his colleagues at IBM are considering other future applications. They range from business and finance to legal research.

Ferrucci has also found inspiration for future Watson applications within his own home. As the parents of two young daughters, he and his wife, Elizabeth (Nappi ’93)—an Italian and ESL teacher at Somers Middle School, and a Vassar College (cognitive science) graduate who earned a master’s in communication from Rensselaer in 1993—have often discussed issues involving language and cognition as they relate to elementary education. He has even spent some time with a reading comprehension textbook, leading him to believe that Watson could help young people learn to better understand what they read and, even further, help teach critical thinking.

As he and his team help Watson become more fluent in the English language, Ferrucci suggests a scenario where Watson could be assigned to read a book and then “discuss” it with a student or young adult who has read the same book.

“While we haven’t spent a lot of time looking at this area, I truly believe Watson could absorb written material such as a novel and have the type of dialogue with a student where he or she could be challenged to think and talk about the major themes and characters in a book, helping them—longer term—to achieve a higher level of critical thinking,” Ferrucci says.

The realm of science fiction has provided us with some interesting looks at what future computing systems might do. All-time Jeopardy! champion Ken Jennings built on that with his playful “I for one welcome our new computer overlords” comment in his Final Jeopardy answer on the last day of competition against Watson. Based on what is happening at IBM and elsewhere, however, the consensus seems to be that Watson is a critical step forward in harnessing the power of computing to help us… not rule us.
Alumni Hall of Fame members Frank and Kenneth Osborn engineered the
THE GAME OF BASEBALL

can be easily stripped down to its constituent elements: a bat, a ball, four bases, and a squad of nine dusty athletes trying to outwit the other team.

But even the most cynical of naysayers cannot deny the game incontrovertibly adds up to far more than just the sum of its parts. Baseball means something. And more often than not, this meaning is grounded in the physical structure of the ballpark. In this regard, Rensselaer has left an indelible mark upon baseball’s grand tradition.

BY MICHAEL MULLANEY
For many of us, our first childhood trip to the ballpark was a monumental occasion. There was a moment when you walked up the stairs and time stood still as you finally saw the field with your own eyes—surely nothing greener could exist anywhere else. From the majesty of the scoreboard to the towering outfield bleachers to the players themselves, everything about the ballpark was larger than life. Our first ballgame is a rite of passage not soon forgotten.

Time moves forward, and we grow a few feet taller and settle into our adult vantage point. But the ballpark never loses its larger-than-life enormity.

This magic was not born of accident. Indeed, it was certainly not lost upon Rensselaer graduates Frank (Class of 1880) and Kenneth (Class of 1908) Osborn. The father-and-son team, both innovative civil engineers, played a significant role in building and crafting the character of many of America’s most beloved ballparks. In the early 20th century, their firm, Osborn Engineering, was the nation’s foremost designer of large sports stadiums.

Boston’s Fenway Park, home of the legendary Red Sox, is the oldest Major League Baseball park still in use and arguably the most famous of Osborn Engineering’s structural marvels. This year, the Red Sox celebrate the 100th anniversary of Fenway’s inaugural game on April 20, 1912. It is a milestone of which all past and future graduates of Rensselaer, the first university in the nation to issue a degree in civil engineering, should be proud. Sophomore Andrew Gray ’14 certainly is.

Gray is a lifelong Red Sox fan and has attended upward of 100 games at Fenway, yet he remembers his first visit to the ballpark with perfect clarity. It was just after his sister’s 11th birthday. Clouds and rain put a damper on the Sunday evening game, but Gray and his family (including his uncle and grandmother) were spared the downpour as their seats were sheltered by the right field grandstand. The Red Sox defeated the Athletics after catcher Jason Varitek hit a walk-off home run in the bottom of the 11th inning. Gray was 8 years old.

“There’s nothing like watching a game at Fenway. You feel like a part of the team, like you’re actually on the Red Sox, instead of just a fan in the stands. It’s just a cool, unique feeling to be part of it all,” says Gray, a civil engineering major, who has played baseball since he was a toddler and is an outfielder on the Rensselaer baseball team.

Running parallel to Gray’s passion for
baseball is the goal of one day making a living by building stuff—particularly big stuff. His interest in becoming a structural engineer manifested in childhood after accompanying his father on a business trip to Chicago and visiting the observatory on the 103rd floor of the Sears Tower (which has since been rechristened as the Willis Tower).

Intersections between these two constants in Gray’s life, baseball and structures, are rare. So his interest was piqued upon learning about the Fenway-Osborn-Rensselaer connection when applying for admission to the Institute.

“There’s no standard template for ballparks, so every baseball stadium is unique. But there’s just something about Fenway that sets it apart from the rest. It’s so iconic, with the Green Monster dominating left field, and a distinct lack of symmetry in the overall design of the park,” Gray says. “There’s really nowhere else like it in the world.”

**NUMBERS & TREASURES**

The history of Fenway’s home team, the Red Sox, like that of all baseball teams, is punctuated with numbers. The franchise was founded in 1901 and has won seven World Series championships—most recently in 2007. In his six years with the Red Sox, Babe Ruth pitched a total of 89 wins and 483 strikeouts. Nineteen-time All-Star left fielder Ted Williams retired in 1960 with a career batting average of .344 and 521 home runs. Eighteen-time All-Star Carl Yastrzemski won seven Gold Gloves, and is a member of the elite 3,000 hit club.

Upon being hired in 1911 to aid in the construction of Fenway Park, Frank Osborn and his company, Osborn Engineering, were also concerned with facts and figures—mostly project constraints. The team of contractors assembled by John I. Taylor (whose family had recently sold the Red Sox organization but who stayed on to oversee construction of the new ballpark) had an asymmetrical parcel of 9.5 acres with which to work. The land was bordered by Brookline Avenue, Jersey Street, Van Ness Street, and Lansdowne Street. The budget was estimated at $650,000, and the goal was to build a ballpark that could seat about 27,000 spectators. Because all games at the time were played in the daytime, the field needed to be oriented so the sun would not shine directly in the eyes of batters.

The resulting ballpark consisted of three primary structures: a block of wooden bleachers in center field, a pavilion of wooden seats along the right field line, and the main grandstand situated behind home plate. Osborn Engineering’s role likely involved designing and building the steel-and-concrete grandstand, along with the cement foundation and reinforced steel columns of the right field pavilion, according to sportswriter Glenn Stout, author of *Fenway 1912: The Birth of a Ballpark, a Championship Season, and Fenway’s Remarkable First Year*. It is not known exactly how Taylor connected with Osborn Engineering, but it almost certainly rested with the company’s sterling reputation as a bridge builder, along with its recent success in designing and rebuilding League Park, the wooden home of the Cleveland Indians, as a steel-and-concrete baseball stadium.

Osborn Engineering played a more significant role in the major renovations of Fenway Park in 1933 and 1934, Stout says, under the leadership of Kenneth Osborn. The facelift was already under way by new franchise owner Tom Yawkey when a fire struck on Jan. 5, 1934, and ravaged most of the ballpark’s wooden features. Following the fire, and now born of necessity, the planned renovations grew in scale and ambition. The burned wooden stands along the outfield were replaced with concrete structures and extended to and married with the grandstand. Osborn Engineering designed and built the project, and employees worked three shifts—in the midst of the Great Depression—to finish in time for opening day. This is when the ballpark began to take on the look and feel that most people today identify with Fenway Park, says Stout.
“Baseball fans don’t have an image of Fenway from 1912. Instead, the image most people have dates back to 1934. So I think it’s correct to say Osborn Engineering had a tremendous hand in creating the classic, celebrated Fenway Park look that to some degree still exists today,” he says. “The version of Fenway built in 1934 lived on untouched and unchanged—other than a few tweaks here and there—for 50 years.”

Perhaps the most remarkable feature of the 1934 renovation was the historic decision to replace the old 25-foot wooden wall in left field with a 37-foot, 2-inch concrete wall covered in tin. Originally a billboard of painted-on advertisements, it was dubbed “The Wall” by fans. In 1947, the Red Sox painted the wall green, and it eventually became known by a new name—the Green Monster. The scourge of right-handed batters, the Green Monster is infamous for transforming hits that would have been home runs in other ballparks into merely base hits.

Tim Wiles, director of research at the National Baseball Hall of Fame and Museum in Cooperstown, N.Y., says Fenway Park and Chicago’s Wrigley Field are the only two remaining “jewel box” ballparks. Temples of the “golden age” of baseball, Fenway and Wrigley are known for their green seats, richness of character, and an intimate coziness. The museum recently opened a new exhibit celebrating Fenway’s 100th anniversary, titled FENtennial: Fenway Park’s First 100 Years.

“Fenway, a jewel box of a ballpark, is filled with countless memories. It’s a treasure chest where the heroes, triumphs, and championships of the Red Sox are kept for safekeeping. It’s a place where Red Sox fans, year after year, pour their hopes and dreams,” Wiles says. “Fenway is a living piece of history, and I think all baseball enthusiasts are in love with the idea that they go there and see a game and sit in essentially the same seat as their grandfather or great-grandfather did 100 years ago.”

AMERICA’S BALLPARK

The reputation of Fenway as the classic all-American ballpark took some time to ferment and stick. After a jolt of success and winning four World Series championships between 1912 and 1918, the Red Sox seemed to fall out of favor with the cosmos. The team finished in last place every year from 1925 through 1930, and near the bottom in subsequent seasons. Year after year the team tried but fell short of meaningful accomplishments. Even with the bat of slugger Ted Williams, widely considered one of the greatest ballplayers of all time, the Red Sox couldn’t engineer positive outcomes. Journalists mockingly called the team “Ted Williams and the Seven Dwarfs.” The character and quirkiness of Fenway, and in turn Osborn Engineering’s skillful work on the ballpark, were lost in the shadow of the team’s underwhelming performance. In fact, a notion gained momentum in the 1950s and early 1960s to tear down Fenway and replace it with a new stadium.

But something happened in the spring of 1967. In Red Sox lore, the ’67 season is known as the “Impossible Dream.” Newly installed team manager Dick Williams vowed to “win more than we lose.” Win they did. Led by batting champ Carl Yastrzemski and ace pitcher Jim Lonborg, the Red Sox clinched the American League Pennant and went all the way to the World Series to face the St. Louis Cardinals. It was the first time since 1946 that the Red Sox had been in the World Series. Though the Impossible Dream was not fully realized and the Red Sox ultimately lost to the Cardinals in seven games, Boston’s “Cinderella Story” captured the hearts of Americans everywhere and introduced a new, younger generation of baseball fans to the Red Sox and Fenway Park. This was in no small part due to television.

“Watching the 1967 World Series on TV, it
was impossible not to see Fenway Park and directly contrast it with the modern, multipurpose stadium of the Cardinals,” Stout says. The same dynamic showed itself in 1975, when the Red Sox played the Cincinnati Reds in the World Series. “In 1975, it was even more dramatic, because Riverfront Stadium was this horrible multipurpose stadium with artificial everything, and Fenway was the exact opposite. This is when people really started to look at and appreciate Fenway as the unique, genuine, authentic ballpark it is,” he says.

Annual attendance at Fenway Park jumped from 811,000 in 1966 to 1.7 million in 1967. Ever since the Red Sox’s spectacular 1986 season, where they reached but again lost the World Series, tickets at Fenway have been a hot commodity and often tough to find. On Sept. 2, 2011, the Red Sox organization announced its 700th consecutive sold-out game at Fenway, the longest such record in all of baseball. With a seating capacity of about 37,000, this 700-game streak equals nearly 26 million spectators cheering, yelling, ordering hotdogs, and munching on Cracker Jack in the most famous ballpark built by Rensselaer graduates Frank and Kenneth Osborn.

“Today, you don’t have to live in Boston to be a Red Sox fan,” Stout says. “There are Red Sox fans all over the country, who watch Boston games online or on cable. When I’m traveling around on book tours, I hear a lot of people say they root for the Tigers, or they’re a fan of the Yankees, but that they love Fenway. There are a lot more of those people than there are Red Sox fans.”

The Red Sox organization may take exception with that notion, but there’s no denying Fenway is a major tourist attraction in Boston. About half the ticketholders at any given game are from outside Boston. And tours of Fenway are offered 364 days a year and attract nearly 300,000 people every year, says Dick Bresciani, vice president and historian for the Boston Red Sox organization.

“Fenway has become Major League Baseball at its finest. Even if you’re sitting in the top row of the grandstand or the bleachers, you’re still close enough to feel that proximity to the players and what’s going on in the field,” Bresciani says. “Also it’s a tradition-rich ballpark. People sit in the stands, look out at the field, and they envision Babe Ruth, and Ted Williams, Carl Yastrzemski, and the other great players who are now a part of the folklore of Fenway.”

FENWAY FACTS & FIGURES

Constructed: 1912
Rebuilt: 1934
First Game: April 20, 1912 - Red Sox 7, Highlanders 6 (11 innings)
Seating Capacity (Night): 37,493
Seating Capacity (Day): 37,065
EMC Club/Pavilion: 4,997
Box Seats: 13,650
Grandstand: 11,927
Bleachers: 6,448
Green Monster: 269
Right Field Roof Deck: 202

OUTFIELD DIMENSIONS
Left Field: 310 feet
Left-Center Field: 379 feet
Center Field: 390 feet
Deep Center Field: 420 feet
Deep Right Field: 380 feet
Right Field: 302 feet

HEIGHT OF OUTFIELD WALLS
Left Field: 37 feet
Center Field: 17 feet
Bullpens: 5 feet
Right Field: 3-5 feet

LENGTH OF LEFT FIELD WALL
231 feet (228 feet in fair territory)
FATHER AND SON

Years before connecting with the Red Sox organization to help build Fenway Park, Frank Chittendon Osborn graduated from Rensselaer in 1880 with a degree in civil engineering. He married Annie Paull the same year and their first son, Kenneth, was born in 1886. Osborn and Paull were both native Michiganders, but they bounced around from Louisville to Pittsburgh and in 1889 landed in Cleveland when Osborn took a job with King Bridge Company. In 1892, at the age of 35, he retired as chief engineer at King Bridge and founded The Osborn Company, Civil Engineers.

It was an entrepreneurial move for the young engineer. At the time, Cleveland was sleepless and thriving. The city was an important railroad hub, housed the nation’s largest shipbuilding port, served as the world’s primary center of oil refinery, and boasted the world’s biggest iron-ore market. Osborn’s risk paid off, and his company went on to provide structural engineering services for many of Cleveland’s most important buildings, factories, and other industrial facilities.

The Osborn Company, which eventually changed its name to Osborn Engineering, also differentiated itself as an innovative bridge builder, working with girder-and-truss bridges, lift bridges, masonry bridges, and other designs. Osborn documented all of the company’s jobs in a large, leather-bound ledger—a tradition the company upheld through 1970 when the book ran out of pages.

Along with running his firm, Osborn was something of a scholar and inventor. He penned the book Osborn’s Tables of Moments of Inertia, which served as the resource of record for structural engineers for nearly 40 years. He received a patent in 1915 for a new mechanism to lift bridges using cable links and rollers. Osborn even designed a left-handed drafting table for his son, Kenneth, who joined the company in 1916, eight years after graduating with a civil engineering degree from Rensselaer.

Though Osborn Engineering had previously dabbled in stadium and sports facility design, Kenneth Osborn propelled the company more directly at the opportunity. The move was a natural evolution for the firm, which housed so much resident engineering expertise in structural steel and cement. Plus the moment was right, as Americans’ interest in sports and attending sporting events was on a sharp incline.

Osborn Engineering went on to design and build Sportsman’s Park in St. Louis in 1922, Yankee Stadium in 1923, Philadelphia Stadium in 1924, and Chicago White Sox home Comiskey Park in 1925. Other notable stadiums include those on the campuses of Purdue University, Oberlin College, Notre Dame University, and many others. In fact, between 1909 and 1970, the firm designed and monitored the construction of more stadiums and ballparks than any other firm in the country.

Helen Dickey Curtis is the oldest of Kenneth Osborn’s 20 grandchildren. She has memories from the family’s cottage on Lake Erie where she would walk along the beach with him and build small structures with the driftwood they found. Curtis says her mother would often spend childhood Saturdays with Kenneth Osborn traveling to construction sites and checking the progress of the drying cement.

The Osborns were devout Cleveland Indians fans, and retained this love of baseball as the family dispersed across the United States, Curtis says. Over the years she toured Fenway Park and the old Yankee Stadium, and was delighted when tour guides and others knew of Osborn Engineering.

“I’m very proud of the heritage, and proud of all that they did,” Curtis says. “It’s neat to walk though a ballpark and know that my grandfather and great-grandfather had something to do with its design and construction.”

Jeff Schanz, assistant vice president for alumni relations at Rensselaer, says Frank and Kenneth Osborn are important members of the university’s Alumni Hall of Fame.

“We were extremely pleased to induct Frank and Kenneth Osborn into our Alumni Hall of Fame in 2007,” Schanz says. “They were entrepreneurs, innovators, opportunity recognizers, risk takers, and outstanding engineers. Their experience in structural steel and concrete enabled major cities and colleges

“Why? Why should the bond between a people and their baseball team be so intense? Fenway Park is a part of it, offering a physical continuum to the bond, not only because Papi can stand in the same batter’s box as Teddy Ballgame, but also because a son might sit in the same wooden-slat seat as his father.” —SPORTSWRITER TOM VERDUCCI IN SPORTS ILLUSTRATED, 2004
alike to provide modern, safe stadiums for a new era of professional and collegiate athletics. They’re an inspiration to us all, and their legacy of excellence shines brightly on all Rensselaer students and alumni.”

**TOMORROW’S CIVIES**

Just as Andrew Gray found inspiration in the 108-story Sears Tower, most students who choose to study structural engineering today are motivated by the buildings, bridges, and skyscrapers they see every day, says David Rosowsky, a structural engineer and dean of the School of Engineering at Rensselaer. After graduating and securing jobs, these students will face challenges similar to and far different from those faced by Frank and Kenneth Osborn.

Thinking first of the differences, many projects built today have significantly shorter functional lives than those built 100 years ago, Rosowsky says. Because of changing needs, pressures to retain or attract major league teams, and “big money” driving today’s professional sports, new stadium projects and large sports arenas last less than 25 years before being replaced, he says. (The Red Sox, on the other hand, said last year they plan to occupy Fenway for at least another 40 years—meaning the structure will be at least 140 years old before it is replaced.)

Also different is the financial model underlying these large construction projects. Generations ago, it was the norm for a visionary millionaire like former Red Sox owner John I. Taylor or Tom Yawkey to underwrite the entire endeavor. Today, any large infrastructure project is likely a public-private partnership and rests upon complex funding arrangements between

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dozens of stakeholders. Another difference is how today’s structural engineers work in close concert with architects, as opposed to generations past when the groups often operated independently and crossed paths only when necessary. Today, many of the nation’s leading structural engineering companies, including those that specialize in stadium structures, employ both architects and engineers.

Similar to Osborn Engineering, tomorrow’s structural engineers will find themselves working with two primary materials: structural steel and reinforced concrete. Though the recipes and properties of concrete and steel have evolved, over the past century, and ways to combine these materials and assemble structures have evolved,

> “You can sit around and compare ballparks all you want, but no park in baseball compares to Fenway. If you want to see ‘a baseball game’—that’s a generic term—and have a chance to see everything that baseball can provide, then Fenway is the place to see it.”

—HALL OF FAME CATCHER CARLTON FISK
The Rensselaer Alumni Association (RAA) exists to support Rensselaer and strives to engage and empower alumni and current students as lifelong partners with the Institute. We do this through the services and benefits we offer, the programs we sponsor, and the philanthropy we encourage and promote. Today, we count a total of 95,327 individuals as members of the RAA and we remain steadfast in our commitment to expand the alumni network, strengthen the Rensselaer community, increase student alumni involvement, and employ cutting-edge and innovative programs.

Global Footprint
In 2001, the RAA’s goal was to vastly expand the regional alumni footprint for programs and services. In large measure this has been accomplished, with regional chapter and club attendance growing nearly threefold. However, as The Rensselaer Plan calls for the Institute to be more global in its outreach, it is time to reignite our international chapters.

This is why alumni programs were initiated in China, Korea, and Paris over the last 18 months, and we have encountered alumni who are ready to serve and are excited about the prospect of re-engaging with Rensselaer. People like Peter Zhu ’99 in Beijing, Sung Min Hong ’88 in Seoul, Amin Ramli ’04 in Malaysia, and Mohsen Dajani ’04 and Ulrich Sihler ’83 in Geneva and Stuttgart, respectively, are prime examples of the energetic spirit that exists abroad. We have already begun to find new ways to keep these and the nearly 4,000 international alumni more involved with Rensselaer, including new attempts at adapting our successful RAA Travel Program.

With that said, there is no mistaking the outstanding achievement of our domestic chapters and clubs, which have done amazing work to ensure that our alumni are informed and involved. In October, we congratulated the Dallas/Fort Worth Chapter for their first-ever Craig T. Angell ’35 Chapter of the Year Award, recognizing their efforts in bringing out over 20 percent of the total alumni population in their region. The growth in activity is evident by the list of alumni events and programs that take place every day across the nation. It is truly breathtaking to see the hard work and commitment of our chapter presidents and their leadership committees.

Engaged Social Media
There is no better place to find technically sophisticated Rensselaer alumni than on social media. The RAA was among the first to adopt LinkedIn as a place for alumni networking and sharing in 2007. With nearly 12,000 members in the RAA LinkedIn group, it is now one of the best places to communicate to our alumni and receive almost immediate feedback from all those who belong to the RAA Group.

Our social media platform is being led by Michael O’Neill ’11, who has been exceedingly adept at keeping Rensselaer ahead of the curve. And it is important to point out that we received a CASE District II Accolade Award for the use of social media in connection with the Rensselaer Alumni Hall of Fame. Today, there are approximately 40,000 Rensselaereans on Facebook, and about 1,200 followers of @RPIAlumni on Twitter. These have all been valuable tools in maintaining positive communication about what is new at Rensselaer.

Building a stronger alumni network is our mission and we remain committed to growing the alumni community through innovative and creative programs aimed at strengthening ties with Rensselaer.
attempt at social networking and offers many of its services and products in one place.

Our alumni are early adapters of new technology, so we need to remain vigilant to what’s next in social media and be agile enough to move quickly in any direction.

"weR" Student Spirit

We had the good fortune to send many of our Red & White leaders to the Affiliated Student Advance-ment Programs (ASAP) Conference in Nashville last fall. This pro-gram was designed to help our students grow their individual leadership skills and to learn more about what it takes to build an effective student/alumni organization.

We are also in the final stages of development of a new student spirit group called “weR: The Spirit of Rensselaer Society” (spoken as “we are”). WeR aims to take our already successful student outreach efforts to the next level. WeR is open to all students at Rensselaer and seeks to build spirit on campus through unique, fun, and special programs. The organization will encourage student involvement and leadership, but also promote an overall sense that “Tradition Never Grad-uates.” WeR will be as diverse as its name and be uniquely Rensselaer in its approach to encouraging school spirit.

The Red & White student group and its associated Alum101 young alumni efforts continue to be effective for the RAA, with several pro-grams held throughout the past semester. Nearly 100 students attended the complement of Alum101 efforts designed to assist in the transition from students to young alumni. Red & White also hosted their annual “December Study Days @ the Heffner Alumni House” program with more than 600 students utilizing the space of the Heffner Alumni House to study for final exams. All in all, over 3,800 students have done something with the Office of Alumni Relations or Red & White since July.

Supporting the Endowment

The RAA is pleased once again to assist Rensselaer in the form of endowment support. The new Rensselaer Alumni Association Endowment Fund will be established with an initial gift of $250,000 to Rensselaer from the RAA trea-sury, and with individual gifts from alumni. The Endowment Fund is designed to support Rensselaer Alumni Association programs and carries with it a cash award to an upperclassman Red & White stu-dent. As this is an endowed fund through Rensselaer, all gifts are tax-deductible and count directly toward the donor’s philanthropy to the Institute.

The Travel Program continues to meet expectations with a vast array of programs and destina-tions in place through 2012. Over $20,000 in third-party revenue has been received by the RAA since July 1, and the expectation is that we will approach $30,000 by fiscal year-end.

The RAA Endowment Fund managed by Harvey Zeve ’52 and Associates currently stands at just above $900,000.

The RAA was saddened to learn of the passing of David Diliz ’38, vice president emeritus of the RAA Board of Trustees. David’s service to the RAA spanned nearly seven decades and we will miss his volunteerism, friendship, and sense of humor. The Rensselaer Alumni Association sends our condolences to Eileen, his wife, and his entire family.

There is so much more happening with your alumni association, and we invite you to learn more at alumni.rpi.edu, @RPIAlumni on Twitter, the RAA Facebook page, or the RAA Group on LinkedIn. In the end, building a stronger alumni network is our mission and we remain committed to growing the alumni community through innovative and creative programs aimed at strengthening ties with Rensselaer.

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* Deceased
weR: The Spirit of Rensselaer Society
New student group fosters school spirit, celebrates tradition

INSPIRED BY THE AFFILIATED STUDENT ADVANCEMENT Programs Conference in the summer, a group of student leaders has gathered together to create a new spirit group at Rensselaer. Titled weR: The Spirit of Rensselaer Society, the group says its mission is to foster school spirit by promoting student involvement, support, and unity through unique programming that embraces the existing culture in an effort to ensure that “tradition never graduates.” The group was created in association with the Office of Alumni Relations, and is taking Rensselaer’s already successful student outreach to the next level.

The organization is open to all students and aims to build spirit on campus by celebrating the talent, programs, and activities of the student population. The group will promote attendance at, support of, and participation in extracurricular activities, including performing arts, philanthropic activities, Greek life, and sporting events, as well as promoting positive relations between Troy residents and students.

The weR (pronounced “we are”) program formally kicked off at the Winter Carnival on Feb. 18, where the organization promoted a T-shirt exchange program. Attendees were invited to bring in an old shirt with another school’s logo on it, and exchange it for an RPI “Tradition Never Graduates” shirt. Exchanged shirts were donated to a local charity. This successful effort will be followed by events titled with the “weR” catchphrase: weR HOT (free hot chocolate at student performances), weR 188 (an RPI birthday celebration), and weR BRIGHT (a festival of lights during the holidays).

By sharing their enthusiasm for the rich tradition and history of Rensselaer, weR students hope to foster a culture of involvement, support, and unity, and promote a feeling of Rensselaer pride for students that will continue and grow as they become alumni.

For more information about weR, contact Geoff Seber at seberg@rpi.edu or (518) 276-2324.
Mars Rover Has Ties to Rensselaer

When the newest Mars rover, Curiosity, blasted off into space in November 2011, it did so with help from its many Rensselaer connections. Curiosity is a large mobile laboratory, nearly five times as heavy as its older sisters Spirit and Opportunity. Curiosity will travel farther on the Red Planet than any previous rover, seeking water, organic materials, and other indicators of habitability in Martian rocks and dust using a sophisticated payload of nine instruments.

Dean of Science Laurie Leshin recently joined Rensselaer from NASA, and as a leader in science and future human exploration, remains deeply involved in the development of tools to look for water and life on Mars. She is a member of the scientific team that envisioned and built the new rover.

The team at NASA who helped to construct and launch Curiosity, and those who will study the science related to the rover’s findings, includes several Rensselaer alumni: Kobie Boykins ‘96, staff mechanical engineer; Fred Serricchio ‘94, staff engineer; and Dr. Michael Meyer ’74, senior scientist, solar system exploration division.

Dean Leshin and members of the NASA/Jet Propulsion Laboratory team will be presenting a program during Reunion & Homecoming on Saturday, Oct. 6, to discuss not only the engineering behind the construction and launch, but also the science behind the study of the rover’s findings.

The event is open to the entire Rensselaer community, so mark your calendar and plan to attend this fascinating program.
Class Notes

39

I try to live my life a little different than what I have written in the past. It is about 10 years since I have been doing this column. I took over when Bill Normoyle became unable to do it due to illness. Bill was at RPI in a professorial role his whole life. He was a member of the Class of '39, as was I, and now I am the answer man for those who want to connect with our class. One of these is John Panek '39, whose daughter is also into photography and she is the first page of the Annapolis Capital. He is also a professor, and he made the front page of the Baltimore Sun when she was 12. John says that he keeps up with my column and enjoys reading what we "old" people do.

Eric Fuegel '42, MEE '47, contacted me by telephone, as he is a friend and fraternity brother (EKF) of Otto Miller '42, and they were on campus for other events. I am the answer man for those who want to connect with our class. One of these is John Panek '39, whose daughter is also into photography and she is the first page of the Annapolis Capital. He is also a professor, and he made the front page of the Baltimore Sun when she was 12. John says that he keeps up with my column and enjoys reading what we "old" people do.

Byron Forster '41, Rensselaer's Alumni Hall of Fame, is known for his contributions to medicine, and he was chosen as the chairman of the New College Foundation board. Howard, who is a member of the Class of '39, mostly during the Depression. We had many successful and leading business executives. We had many inventors, builders, and important business executives. Some of these are Dave Goodman, Rob Jenny, Howie Roy Scovill, Harold Brandt, Ed Lustbader, Dave Goodman, and Roy Scovill.

Now I am going to tell you about another graduate of RPI, Howard Isermann '41. Howard Isermann '41 reports that he still translates aircraft manuals into 18 languages. He was a financial consultant and lived in Hawaii, Long Island, and Dallas. He led a very active community in Dallas for 14 years. I am sorry to report that Howard passed away in June 2012. His daughter is also into photography, and she is the first page of the Annapolis Capital. She is also a professor, and she made the front page of the Baltimore Sun when she was 12. John says that he keeps up with my column and enjoys reading what we "old" people do.

We learned that Gus Beckos '42 passed away in June 2012. He was very successful in the recording industry and made a gift of any person in any class before '39. We were at RPI from 1935 to 1939, mostly during the Depression. We had many successful and leading business executives. We had many inventors, builders, and important business executives. Some of these are Dave Goodman, Rob Jenny, Howie Roy Scovill, Harold Brandt, Ed Lustbader, Dave Goodman, and Roy Scovill.

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The Class of '39 at RPI had many smart people, more than most classes. We had many successful and leading business executives. We had many inventors, builders, and important business executives. Some of these are Dave Goodman, Rob Jenny, Howie Roy Scovill, Harold Brandt, Ed Lustbader, Dave Goodman, and Roy Scovill.
Big Red Freakout weekend. Alumni worldwide wore Rensselaer gear and submitted photos showing their Rensselaer pride.
"Afghan Right"

Social and technical challenges collide in Afghanistan rebuilding | BY FRED GELLERT ’95


As I read the research insights in the article, my mind was filled with all the interconnected issues in building not only the police force but also the nation of Afghanistan. The state of progress and challenge is clear. Since 2001 in Afghanistan, electricity availability is up, more children are in school, life expectancy has increased, gross domestic product per capita has increased over 50 percent, and 71 percent of households have at least one cell phone. On the other hand, child malnutrition is up, environmental damage is increasing, and corruption and mismanagement continue nearly unabated. Simply travel a road in Kabul to see the progress and the challenges. Driving on a crowded street choked with cars and pedestrians, we pass a donkey cart and the driver is talking on a cell phone. Businesses are busy, trash litters the roadway, and the air is a gray-brown haze that irritates your throat. Progress, yes. Emerging problems, yes.

Governmental and nongovernmental, American and international, military and civilian organizations are all working to improve Afghanistan. Whether it is constructing roads and buildings for police stations, delivering and using petroleum products, installing communications infrastructure, educating police and citizens, or creating an electronic pay system, the effects to this society are practically incalculable. I am personally involved in the work of the U.S. military and I also recently visited the headquarters of a non-governmental organization (NGO) that serves orphans, youth, and severely injured people and has begun sponsoring Boy and Girl Scout troops. An NGO and the military are opposites in practically every way; however, I came to realize that both organizations are complementary and necessary for mission success. Each provides benefits to the people in the short term. The challenge is for all the efforts to be coordinated to provide the best possible long-term benefits without inflicting unintended consequences.

The studies being undertaken by Rensselaer’s STS department are clearly on the mark and I hope they can include the Central-Asian states in the future. The effort of the United States and our coalition partners in Afghanistan is fundamentally one of making this nation better so the world is more secure. As the nation-building continues, one cannot help but ponder some of the same questions asked by the STS researchers. What are the benefits versus consequences of our actions in Afghanistan for the long term? What is the interplay of technology, society, people, and government in deciding the actions to take in our mission here in Afghanistan and elsewhere in the world? Does an action today lead to a challenge in the future? The coalition working in Afghanistan has made significant progress over the last decade. Decisions for the future, informed by the results of the past decisions, will need to consider the confluence of benefits and consequences so we do not negate past progress with future challenges.

Of all the many phrases I have heard since deploying six months ago, the one that seems most significant is “Afghan right.” This means that the solutions we create here, whether the design of a building, the provision of fuel, or the delivery of medical care, must all be done so as to be proper and sufficient for Afghan needs. “Afghan right” can relate to cultural norms or it can relate to being good enough for the problem at hand. With lessons learned and education gained, we can improve our methods and make sure it is right for the long term.

Fred Gellert ’95 is a colonel in the U.S. Army with 27 years of service. He is currently deployed to Kabul, Afghanistan, as part of the NATO Training Mission. At Rensselaer, Gellert completed a master’s degree in physics. This article contains personal observations and opinions and is not an official presentation of the U.S. Department of Defense or the North Atlantic Treaty Organization.
EMPAC is Rensselaer’s international hub for contemporary art, performance, science, and technology. This dynamic center offers adventurous public events and performances in dance, theater, music, and the visual arts throughout the year. EMPAC is also a space where artists and researchers engage in new creative practice through its residency program.

For information on these and other upcoming events, visit empac.rpi.edu.
Rensselaer has come a long way since the 1939 *Transit* first mentioned “home-coming.”

Over 3,000 alumni, family, and friends joined us last year, and the number keeps growing. It’s an exciting, entertaining, and educational experience—worth the trip from anywhere.

Everyone is welcome. The following groups are hosting special milestone gatherings: Reunion Classes ending in 2 or 7, fraternities and sororities, athletic teams, and special interest groups, including the 40th Anniversary of the Arts Department and the 20th Anniversary of the Archer Center.

Alumni who were part of the team that built the Mars Rover and Rensselaer Dean of Science Laurie Leshin will be on hand for a special program, where they will share their stories about the engineering behind the project, and the science behind the study of its findings.

Come back and experience the amazing transformation at Rensselaer for yourself!

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**REUNION & HOMECOMING**

**October 5-7, 2012**

[alumni.rpi.edu/reunion](http://alumni.rpi.edu/reunion)