

PRESERVING DIGITAL ASSETS ~ LEMELSON AWARD INSPIRES INNOVATION ~ REUNION AND HOMECOMING

Alumni Magazine—Summer 2010

Rensselaer



**INTEGRATING
SPACE**

THE AWARD-WINNING WORKS OF PETER BOHLIN '58
REFLECT THE ESSENCE OF THEIR ENVIRONMENT



President Shirley Ann Jackson congratulated graduates at the 204th Commencement ceremony held May 29, where a total of 1,475 degrees, including 1,167 bachelor's, 240 master's, and 68 doctoral degrees, were awarded.

Rensselaer

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ON THE COVER: Apple Store Fifth Avenue in New York City; designed by Bohlin Cywinski Jackson. Photo by Peter Aaron/Esto.

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Kris Qua



Architecture students design lunar module for NASA. Page 9.

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Architect Peter Bohlin '58 has received the AIA 2010 Gold Medal for his influence on the theory and practice of architecture.



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A national task force is tackling the challenge of accessing and preserving valuable digital assets for future generations.



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The Lemelson-MIT Rensselaer Student Prize recognizes outstanding inventors and encourages sustainable solutions to real-world problems.

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Moving?

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SOCIAL COGNITIVE NETWORKS ACADEMIC RESEARCH CENTER

Investigating How Technology Impacts Social Interaction

OUR SOCIAL NETWORKS ARE STAPLE SOURCES of information, advice, and ideas. Add technology to the mix—Twitter, Facebook, cell phones—and the power of social networks balloons to a global scale. Harnessing that power is the work of the new Social Cognitive Networks Academic Research Center at Rensselaer.

Joining Jackson to launch the new center on May 4 were U.S. Representative Paul D. Tonko and U.S. Army Brigadier General Harold J. Greene '80. A scientific session followed opening remarks, with presentations by professors and thought leaders Albert-László Barabási of Northeastern University, Alex Paul Pentland of the Massachusetts Institute of Technology, Alessandro Vespignani of Indiana University, and Center Director and Rensselaer Professor Boleslaw Szymanski.

The new center, funded by a \$16.75 million five-year grant from the Army Research Laboratory, will join researchers from a broad spectrum of fields—including sociology, physics, computer science, engineering, and medicine—in exploring social cognitive networks. The center will study the fundamentals of network structures and how those structures have been altered

by technology. The goal will be a deeper understanding of social cognitive networks and a firm scientific basis for this newly arising field of network science.

"Social networks involve people who interact for various reasons—mentoring, friendships, rivalries," says Szymanski, the Claire and Roland Schmitt Distinguished Professor. "In the past, social networks were limited by the distance of possible interactions. Thus, they were limited in size and there was no easy way in which a network could become huge and fast. Technology—cell phones, Facebook, LinkedIn—makes it much easier to be involved in the lives of many people who could be very distant from each other. This brings new opportunities and new dangers to society."

To learn more about the center, go to <http://scnarc.rpi.edu/>.



U.S. Army Brigadier General Harold Greene '80, President Jackson, U.S. Representative Paul Tonko, and Center Director Boleslaw Szymanski at the May 4 opening.

"Rensselaer offers a unique research environment to lead this important new network science center," says President Shirley Ann Jackson. "We have assembled an outstanding team of researchers, and built powerful new research platforms. The team will work with one of the largest academic supercomputing centers in the world—the Rensselaer Computational Center for Nanotechnology Innovations—and the leading visualization and simulation capabilities within our new Experimental Media and Performing Arts Center. The Social Cognitive Networks Academic Research Center will bring together our world-class scientists in the areas of computer science, cognitive science, physics, web science, and mathematics in an unprecedented collaboration to investigate all aspects of the ever-changing and global social climate of today."

TECHNOLOGY COMMERCIALIZATION

Recent Breakthroughs

Nanosensors Improve Aircraft Life and Safety

A team of researchers at Rensselaer has developed nanosensors that can detect structural changes in aircraft components. The tiny nanotube array sensors provide continuous information on stress, strain, defects, thermal effects, and cracking that can be immediately analyzed on-board the aircraft, eliminating routine pre- and post-flight inspections. This invention ensures safety, decreases aircraft maintenance lifecycle costs, and increases aircraft useful life. The nanosensors can be used similarly to detect structural changes in vehicles, machines, and buildings.

Fast Growth of Semiconductor Crystals

New York State Center for Future Energy Systems researcher Partha Dutta has created an apparatus and method for fast, inexpensive, and reliable growth of semiconductor crystals for use in light emitting diodes, photovoltaic cells, and other optoelectronic applications. In his method, there are no layer interfaces or associated device leakage currents, making the semiconductor efficient. Dutta's method has a lower cost than traditional epitaxial growth technologies with the same speed and reliability.

Mixer Can Help Produce Stronger, Less Expensive Roads

A draft tube spout fluid bed mixer system has been invented that produces better particle size distribution in mixtures. It can be tailor-made and industrially scaled-up, and can be used for virtually any fluid-powder mixing operation. In this invention, the uniform treatment of the particles being mixed and the eliminated bubble voids within the mixture make construction pours, like roads, more durable. Since the particle flow rate and velocity in the mixer can be manipulated independently, this system can be used in instances where the particles are friable and the process must keep the particles from being broken. For example, in the construction industry where concrete is desired, the blended powder can be mixed with water on-site, which is advantageous when the ready mix plant is far from the site at which the concrete is to be used.

To learn more about these and other Rensselaer technologies, go to www.rpistechnology.com or contact Natasha Sanford at sanfona@rpi.edu.

CENTER FOR ARCHITECTURE SCIENCE AND ECOLOGY

Using Root Systems To Save Energy, Clear the Air

RESEARCHERS AT THE CENTER FOR ARCHITECTURE SCIENCE AND ECOLOGY (CASE) have developed a "green" system that uses plant roots and traditional heating, ventilation, and air conditioning (HVAC) systems to reduce energy consumption and improve air quality in buildings of all shapes and sizes.

A collaboration of Rensselaer and Skidmore, Owings & Merrill, one of the world's leading architecture, engineering, and urban design firms, CASE strives to push the boundaries of environmental performance in urban building systems.

The Active Modular Phytoremediation (AMP) system is designed to harness and boost the air purifying properties of plants. It consists of a collection of pods,



each of which is filled with hydroponic plants whose roots are left exposed. As air from the HVAC system circulates through the pods, microbial colonies in the root rhizosphere digest airborne toxins, feeding the plant and dramatically improving indoor air quality.

Large-scale plantings and green walls are making inroads, especially in commercial spaces. But few systems can match the air purification potential, energy savings, flexibility, and aesthetic appeal of the

CASE AMP system, which earned an R&D Award from *Architect* magazine.

"There are precedent systems, but we believe ours to be unique because it combines modularity and active phytoremediation in a hydroponic, aeroponic system," says Anna Dyson, director of CASE and associate professor in the School of Architecture. Dyson; Jason Vollen, associate professor; and Ted Ngai, clinical assistant professor, are the principal investigators for the AMP system.

A biomechanical hybrid, the AMP system draws on NASA research that found that forcing air through plant root systems can increase their air-cleaning capacity by more than 200 percent. That, in turn, can significantly reduce the need for heating and ventilation, which account for 40 percent to 50 percent of building energy costs and consumption.

"If we're cleaning the air within the building, we're expending considerably less energy to filter exterior air and bring it to room temperature," Vollen says. "We're improving air quality and, at the same time, dramatically reducing the carbon footprint of the building."

Among the most innovative features of the AMP system is its modular design. Because most green "walls" tend to be oversized, their use is limited primarily to atria and other large commercial spaces. But AMP units can easily be adapted for commercial and residential facilities. AMP units also can be retrofitted to work with existing HVAC systems.

The AMP system is scheduled to be installed in the Public Safety Answering Center II, a Bronx emergency response center scheduled to open within the next five years.

"There's a lot of talk, now, about greening the outside environment," Vollen says. "But we've found a way to green the environment from within."

LALLY SCHOOL OF MANAGEMENT & TECHNOLOGY

New Book Advocates Holistic Approach to Business

DAVID RAINEY, A CLINICAL PROFESSOR IN THE HARTFORD Department of the Lally School of Management & Technology, has written the book *ENTERPRISE-WIDE*

STRATEGIC MANAGEMENT: ACHIEVING SUSTAINABLE SUCCESS THROUGH LEADERSHIP, STRATEGIES, AND VALUE CREATION, published by Cambridge University Press.

The book shows how business leaders can take better advantage of their opportunities by taking a broader perspective of the world in which they operate.

In today's highly competitive and dynamic business environments, corporations can no longer

afford to rely on the static strategic management constructs of the past.

Rainey—who earned a master's in engineering science in 1977, a master's in management in 1981, and a doctorate in urban and environmental studies in 1993, all from Rensselaer—advocates a holistic approach to the business environment, arguing that managers must work with all stakeholders to create long-term success. Including numerous case studies featuring global corporations and small- and medium-sized enterprises, the book provides guidance and support in formulating, developing, and implementing business strategies and action plans.

It also includes advice on how to develop and deploy strategic management systems, management constructs, and organizational structures.

"Sustainable success depends on strategic positions, solutions, systems, and relationships that are comprehensive and interconnected—those that provide extraordinary value," Rainey says. "It is enhanced when the systems, solutions, and relationships are difficult for others to duplicate."

"As the basis for the solution moves from products and processes to systems, structures, and relationships, the solutions become more holistic and integrated, thus fully articulated; competitors and others have to follow suit if they wish to stay in the game."

