

TOWARD AN ENGAGED, INNOVATIVE, ENTREPRENEURIAL UNIVERSITY

The strategic planning process undertaken in 2003 identified NJIT's key characteristics as engaged, innovative, and entrepreneurial. While these attributes have been associated with the university almost since its founding in 1881, NJIT under President Altenkirch has escalated and expanded efforts in these areas, setting goals to become an agent of change for Newark, an engine of economic development for New Jersey, and a catalyst for the development of a highly-skilled and inclusive technology work force for industry.



Generating Regional and Global Impact

Owen Fitzgerald '08 and Allyn Luke of the Department of Civil and Environmental Engineering (*below*) were part of a team from the newly-formed NJIT Chapter of Engineers Without Borders that traveled to Haiti to assess the group's first hu-

NJIT's Division of Continuing Professional Education operates the **EmployMe!** program, an 18-week program funded by the Henry H. Kessler Foundation, to prepare adults with physical disabilities for entry-level and advanced jobs



in information technology. Some 62 percent of the first graduating class (*above*) have found employment with New Jersey firms.

Architecture student **Sara Nordstom** (*below*) and her fellow Wachovia/NJ DCA Housing Scholar **Melissa Licastro** spent their spring break in New Orleans 9th Ward



manitarian project, a water filtration system to provide the city of Milot with a clean water supply. The group plans to begin the distribution of water filtration devices to a concentrated area of the city and to develop more sophisticated water treatment methods for the long term.



helping to build the "first carbon-neutral community" in the nation.

Georgeen Theodore, assistant professor of architecture, and her student, **Tim Rupp**, were invited by Mayor Cory Booker to present an alternative housing design to the "Bayonne Box" for Newark (*left*). The resulting design concept, called "breaking down the box," was presented at a city-sponsored design symposium.

NJIT's National Center for Transportation and Industrial Productivity, directed by **Lazar Spasovic**, professor of civil and environmental engineering (*below*), took on a number of projects this year for the New Jersey Department of Transportation (NJDOT) to assist the state and its communities with transportation problems:

- NJDOT has established the Intelligent Transportation Systems (ITS) Resource Center at NJIT. For the traveling public, the ITS involves the use of advanced



technology such as roadway vehicle detection systems and Global Positioning Systems to monitor driving and traffic conditions so that accidents can be detected early, and drivers can be warned and safely re-routed around a congested and/or hazardous area. The rationale behind implementing the ITS leads to better management of traffic, which then translates into reduced congestion, increased throughput and increased safety of roadways. The center will be jointly directed by Spasovic and

Steven Chien, professor of civil and environmental engineering.

- NJIT transportation researchers developed an evacuation plan for Cape May County in the event of a major hurricane threat. The study determined how much time would be required to evacuate the county, as well as the effectiveness of the existing lane reversal plan on the NJ 47/347 corridor, and proposed improved traffic evacuation plans. Results showed that extending the current lane reversal plan further

south could dramatically reduce the time to evacuate the county.

- With major, multi-year, multi-phase construction planned in Jersey City on the access routes to the Holland Tunnel, NJIT was brought in by NJDOT to evaluate and redesign the construction stage-specific traffic mitigation plans for the area. Each stage of construction presents different impacts on traffic, and each state requires different mitigation techniques to minimize the construction im-

pact. Through the use of Paramics microsimulation software, some mitigation strategies were eliminated as they were shown not to be beneficial, while others were confirmed as improving conditions and were implemented in the field.

- In another NJDOT project, NJIT researchers were asked to devise a way to enable visualization of the projects included in the state's investment program through an internet browser. Leveraging on previous work developed for the Federal Highway Administration (FHWA), the research team built a mapping system to be embedded into NJDOT's official website. The system provides a customized mapping module that depicts the state's projects in relation to the transportation network such as roadways and rail lines, other physical features such as parks and waterways, jurisdictional boundaries such as counties and municipalities, and high-quality aerial orthophotography.

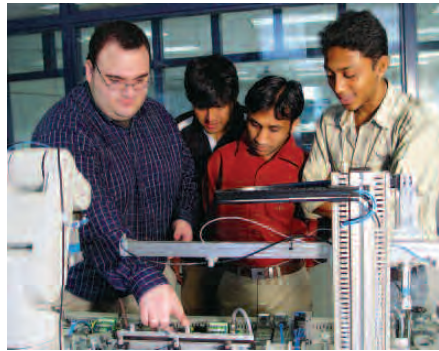
Herb Simmens, a Blue Moon Urban fellow at the Center for Architecture and Building Science Research, chaired a working group that published a report exploring ways of enhancing outdoor play and learning through more effective



schoolyard design. The report, "Schoolyard Planning and Design in New Jersey," was developed jointly by CABSR and the Newark-based Education Law Center at the request of the New Jersey Department of Education. Support for the project was

provided through a generous grant from the Geraldine R. Dodge Foundation.

Three Indian students from the Heritage Institute of Technology, Kolkata, India, spent the summer in New Jersey working in NJIT's new Vincent A. Stabile Systems Engineering and Management Laboratories. Working with Stabile Scholar **Frank Munoz** (left in photo above), a graduate student in engineering management, Soumik Chakrabarty, Saurabh Kumar, and Shipon Roy, came to NJIT for a rare opportunity to gain experience with the Stabile Laboratories' Festo System. This equipment gives students "hands-on" experience in solving practical problems using robotics for today's automated manufacturing.



Students **D.J. Rosenbaum** (left in photo above on right) and **Noah Melamed** are part of the SmartCampus team working to develop a national prototype of mobile, wireless campus community systems along with the software and protocols to support a wide range of location-based computing services. The team developed the MarkIt picture-phone game to help address the



challenge of place description for the mobile social computing test-bed. The aim was to provide users with a shared sense of community while they engaged in game play that centered on collaboratively identifying campus locations. Released and tested among several hundred students, MarkIt was a big hit on campus and a step forward for the SmartCampus project.

Developing Technologies for Security and Defense



NJIT has made a high priority of contributing to the nation's and the state's homeland security and defense efforts. NJIT's Office of Research and Development has forged partnerships with federal and state agencies for defense initiatives, and worked to identify faculty expertise as well as technologies under study within the university that have potential to assist in the nation's security programs.

Chengjun Liu, associate professor of computer science, is developing facial and iris-based biometric systems that can be used for verifying a person's identity. Funded by a grant from the National Institute of Justice, the system utilizes multiple dimensionality-increasing techniques and novel machine learning methods. He is currently building a fully automatic enhanced facial and iris-based biometric system by developing an integrated pattern recognition frame-

work that capitalizes on these new methods. The concept, which has applications for law enforcement, homeland and border security, access control at schools, courts, and correctional facilities, and government functions such as registered voter and drivers' license identification, has been tested and preliminarily shown to be effective for solving complex pattern recognition problems in the Face Recognition Grand Challenge (FRGC).

Professor of Physics **Gordon Thomas** and **Jim Zunino '02** (below), project officer for the Army Research and Development Engineering Center (ARDEC) at Picatinny Arsenal, demonstrate how the active coating technologies developed at NJIT are used on Army helicopters in Iraq. The system, which uses nanomachines and sensors to collect and analyze information about a vehicle's condition, can be used to detect corrosion is-



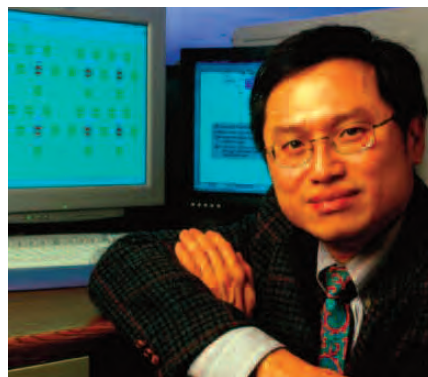
sues requiring maintenance, and also assess the condition of a combat helicopter under fire. The Smart Coatings team, led at NJIT by **Daniel J. Watts**, Panasonic Endowed Chair of Sustainability, and by Zunino for Picatinny, received a patent for the system. Also on the team are **Laura Battista '96, '97**, **Nelson Colon '89** and **Joseph Argento** at Picatinny, and **John Federici**, distinguished professor of physics, **Haim Grebel**, professor of electrical engineering, **Zafar Iqbal**, research professor of chemistry, **Hee Lim**, research professor of physics, and **Som Mitra**, professor and chair of chemistry and environmental science.

John Federici, distinguished professor of physics (right, top), has grant support from the U.S. Army to continue his research and development of applications that utilize terahertz (THz) electromagnetic radiation to detect and identify explosives and biological agents. A terahertz imaging system could be used in airports to detect potentially harmful materials even if they are concealed in clothing, sealed packages, or suitcases.



ubiquitous networks. The project, which is supported by the NSF, is studying ways to detect and prevent attacks on networks that may include cell phones, satellite networks and sensor networks along with traditional fixed networks.

Atam Dhawan (above, bottom), distinguished professor and chair of electrical and computer engineering, received a patent for a multi-level dynamic security system. The system is designed to protect data based on the Internet while allowing access to different levels of information by persons with different security clearances.



Nirwan Ansari (above), professor of electrical and computer engineering, is working with Japanese researchers at Tohoku University to develop advanced security technologies for next-generation

Preparing the Next Generation

As the need for technology professionals increases – NASA predicts a shortfall of two million science and engineering workers, and the U.S. Department of Education estimates a need for nearly 300,000 new math and science secondary school teachers – NJIT has expanded its efforts to enrich and strengthen high school curricula in science, technology, engineering and mathematics, particularly in the state’s urban centers.

NJIT was the only university in the New York Metropolitan region and one of only 24 in the country selected to host the ExxonMobil Bernard Harris Summer Science Camp. A two-week residential program, the camp offers innovative programs to enhance middle school



students’ appreciation for careers in science, technology, engineering and mathematics. Former NASA Astronaut Bernard Harris told 52 middle school youngsters from 36 school districts around New Jersey that “it’s okay to be a geek because geeks rule the world.”

Teachers Randy Sherry and Claire Kennedy of the Dwight Morrow School in Englewood, NJ, were among the 60 teachers trained this year in the Medibotics program directed by **Ronald Rockland**, interim chair of engineering technology. The NSF-funded project is designed to help middle and high school teachers launch a new program in which



students design and build robots to perform procedures modeled on biomedical applications. **Matthew Magnifico**, (above, center) graduate student in biomedical engineering, was the lead teaching assistant for the project.

The NSF-funded C2PRISM program pairs NJIT doctoral students, like **Nan Wang** (below, left) who is pursuing a PhD in electrical engineering, with high school teachers in the Newark School System, like Gerry Stricker, who teaches math at Central High. The graduate students, who use computational techniques for cutting-edge research in mathematics or the physical sciences, work with the teachers to develop curricula in mathematics, physics, chemistry and biology designed to teach students how to formulate significant questions, think analytically, and offer creative solutions.



NJIT once again played host to students from high schools and middle schools statewide competing in the New Jersey Science Olympiad (above), co-sponsored by the Research and Development Council of New Jersey. NJIT faculty and staff supervised and judged the day-long series of competitions designed in the formats of popular board games and TV shows. The Olympiad’s individual and team contests challenge knowledge and hands-on skill in biology, chemistry, computing, Earth science, and physics.

NJIT’s FEMME program was featured in a news segment on ABC-TV *World News*. Now in its 27th year, the inten-



sive five-week summer program is designed to help middle school girls from throughout New Jersey enrich their academic skills, while promoting careers in engineering, science and mathematics.