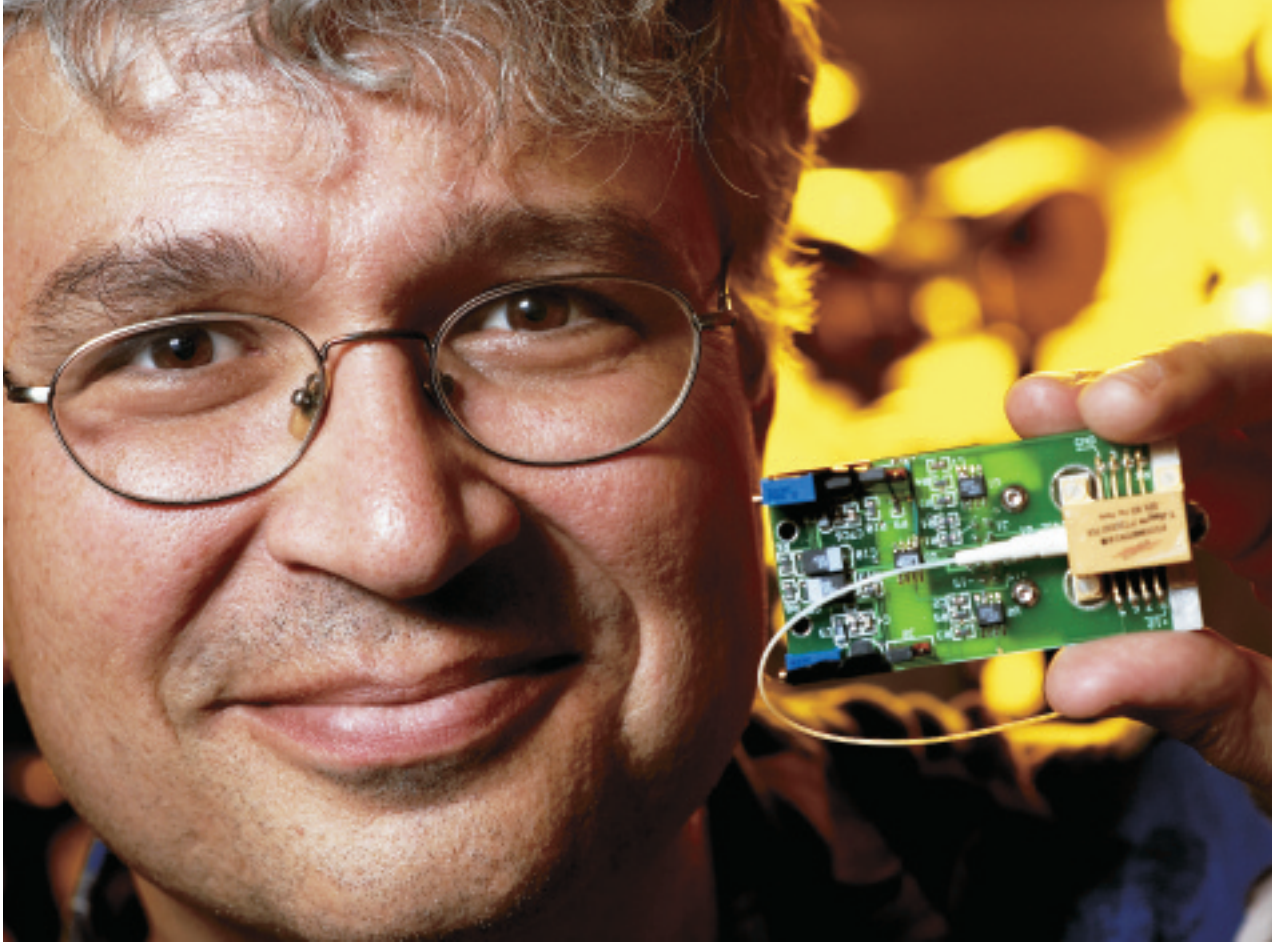
the challenge:
Improve national rankings in research and intellectual property development.

the progress:
The university's research expenditures have grown dramatically over the last decade, from just over $29 million in FY 1994 to nearly $75 million in FY 2004. Five new U.S. patents awarded to NJIT faculty brought the total of patents assigned to the university to 75, and enabling 20 licensure agreements.



investigative advancement

Anti-Terror Technology

One of the most significant spurs to the growth of NJIT's research program has been the university's emphasis on technologies to assist in homeland security. NJIT is home to New Jersey's Homeland Security Technology Systems Center. The center works to identify faculty expertise as well as technologies under study within the university that have potential to assist in the nation's security programs and to facilitate partnerships with local, state and federal agencies for homeland security initiatives.

In one of the most promising homeland security initiatives, university researchers continue to develop applications that utilize terahertz (THz) electromagnetic radiation to detect and identify explosives and biological agents. A team of researchers led by John Federici, professor of physics, received a patent for a terahertz imaging system that could be used in airports to detect potentially harmful materials even if they are concealed in clothing, sealed packages, or suitcases. The team also has funding from the Army Research Office, and their industrial collaborator, Picometrix, Inc., of Ann Arbor, Mich., a manufacturer of high-speed optical receivers and ultrafast instrumentation, has a Phase II Small Business Innovative Research (SBIR) grant to develop the system. Above, Federici displays one of the homodyne modules developed by Picometrix that will collect data for the system.

Other projects related to homeland security include:

- With NSF funding, **Haim Grebel,** professor of electrical and computer engineering, is developing new concepts for producing infrared filters based on intergrated circuit microstructure technology. His group plans to develop and test filters for all types of spectral sensors applied to a broad range of monitoring and detection systems from the visible to the THz region.

SAFER MALLS AND SCHOOLS

One of the first projects undertaken by the Homeland Security Technology Systems Center was smart camera surveillance system at the Garden State Plaza Mall in Paramus, directed by Donald H. Sebastian, the university's senior vice president for research and development. The system, developed as a national prototype, uses mall security cameras in combination with special software designed to search for suspicious objects or behavior and alert local authorities. With special funding from Acting Governor Richard Cody, a similar model system has been installed at the Beatrice Gilmore School in West Paterson. NJIT has funding from the N.J. Department of Law and Public Safety to protect schools and shopping malls.

- **Michael Recce,** associate professor of information systems, received a patent for the biometrics-based grip recognition system that would prevent unauthorized users from operating a weapon, or to prevent unauthorized access to a vehicle or building. The technology is the basis of the university's smart gun initiative. **Dentcho Ivanov,** director of NJIT's Microelectronics Fabrication Center, was awarded a patent for the sensor array underlying the smart gun technology.
- **M. Ala Saadeghvaziri,** professor of civil and environmental engineering, has received start-up funding from the Multidisciplinary Center for Earthquake and Engineering Research at the University of Buffalo to develop proof of concept for an innovative water-based protective technology that could be used to mitigate the effects of explosions or earthquakes on public buildings such as schools and hospitals.
- **David Mendonca,** assistant professor of information systems, is investigating how training in improvisation can help improve the tactical response to large-scale emergencies like the 2001 World Trade Center attack. With a prestigious NSF Faculty Early Career Development award, he hopes to develop software that can help emergency response personnel to make the right decisions under pressure.

In Other Research Initiatives

NJIT WAS DESIGNATED AS THE HOST INSTITUTION *for a research collaboration designed to advance stem cell therapies. Led by New Jersey Stem Cell Research & Education Foundation, partners include NJIT, the Center for Applied Genomics of the Public Health Research Institute, the University of Medicine and Dentistry of New Jersey's New Jersey School of Medicine, and the Coriell Institute for Medical Research.*

TREENA LIVINGSTON ARINZEH, *assistant professor of biomedical engineering, received an NSF Presidential Early Career Award for Scientists and Engineers (PECASE) award, the highest national honor for young scientists and engineers, for her research with adult stem cells. She is currently collaborating with Sheldon Lin, MD, an orthopedist at the University of Medicine and Dentistry of New Jersey on a technique that uses stems cells to regenerate and repair bone tissue in diabetic patients. The study is supported by Musculoskeletal Transplant Foundation.*

CHAIYA CHANDAVASU '01 *received a patent for a technique for preparation of microporous polymer films by melt processing and stretching. The process, which will yield new polymeric material structures with potential as membranes for a variety of separation applications, was developed while he was a doctoral student at NJIT along with his advisors,* **MARINO XANTHOS,** *professor of chemical engineering and director of the Polymer Engineering Center;* **KAMALESH SIRKAR,** *distinguished professor of chemical engineering; and* **COSTAS GOGOS,** *distinguished research professor of chemical engineering and president emeritus of the Polymer Processing Institute at NJIT.*

JOHN LISKOWITZ, *distinguished professor emeritus of civil and environmental engineering, received a patent for a process that prepares fly ash – an industrial waste product – for use in concrete and mortar for high compressive strength.*