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**Instant access to medical records, genetically personalized therapy, better detection of traumatic brain injury – all promise to improve our quality of life in the 21st century. On campus and across New Jersey, NJIT faculty and alumni are working to realize the full potential of these and other advances for maintaining health and alleviating illness.**

# FOR YOUR **HEALTH**

## **ACCESSING CRITICAL INFORMATION**

A partnership with Newark Beth Israel Medical Center/Saint Barnabas Health Care System aims to innovate the exchange of medical information among patients, practitioners and treatment facilities. To be based on the NJIT campus, the initiative has three components.

One involves bringing together stakeholders from the health-care field, academia and industry to work on complex health-care problems and to create a technology showcase that demonstrates how resulting scenarios could be implemented in an integrated manner across the software platforms used in hospitals and doctors' offices. The New Jersey Healthcare Innovation Center will be the only one of its kind in the state.

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**HE HEALTH INFORMATION EXCHANGE WILL MAKE IT POSSIBLE FOR PATIENT RECORDS TO BE READILY AVAILABLE IN DIGITAL FORM AT ANY ACCESS POINT, THEREBY DELIVERING EFFECTIVE CARE MORE QUICKLY AND AT LOWER COST.**

This effort will also promote state-wide implementation of the Health-e-cITI-NJ Health Information Exchange (HIE) planned to link medical facilities in Essex, Passaic and Union Counties. The goal is to start with nine founding facilities while expanding across all the urban and underserved areas of the state. The HIE will make it possible for patient records containing emergency room, radiology and laboratory data to be readily available in digital form at any access point, thereby delivering effective care more quickly and at lower cost.

The third component is the creation of a grant Regional Extension Center to assist the state's 18,000 physicians and other providers in selecting, purchasing and implementing Electronic Medical Record (EMR) technology. This is in support of meeting the federal government's mandate that all physicians be up and running with EMR technology by 2015.

**KEY ALUMNI CONNECTIONS**

Alumnus Tomas Gregorio MBA '08 is one of the liaisons between the Saint Barnabas system and NJIT. He is chief information officer at Beth Israel Medical Center, part of the Saint Barnabas system, and co-architect of the relationship with NJIT, along with Interim Provost and Senior Vice President for Research and Development Donald H. Sebastian.

Gregorio, who teaches a course in health information technology at NJIT, is a leader in the practical utilization of such technology. His goal is to make the experience of patients much more positive through projects that include the installation of touch-screen "kiosks" in Beth Israel's emergency room.

"We see 100,000 people annually in an emergency room built for 45,000," Gregorio says. Patients used to come in, write their names on a form, sit down, and wait. Now they can use the kiosk to check themselves in, and to let us know what their problem is. The system prioritizes patients in the queue to ensure that the sickest are seen first." And if a person must be admitted for more extensive care, the process is entirely electronic – eliminating delays and paperwork from the time

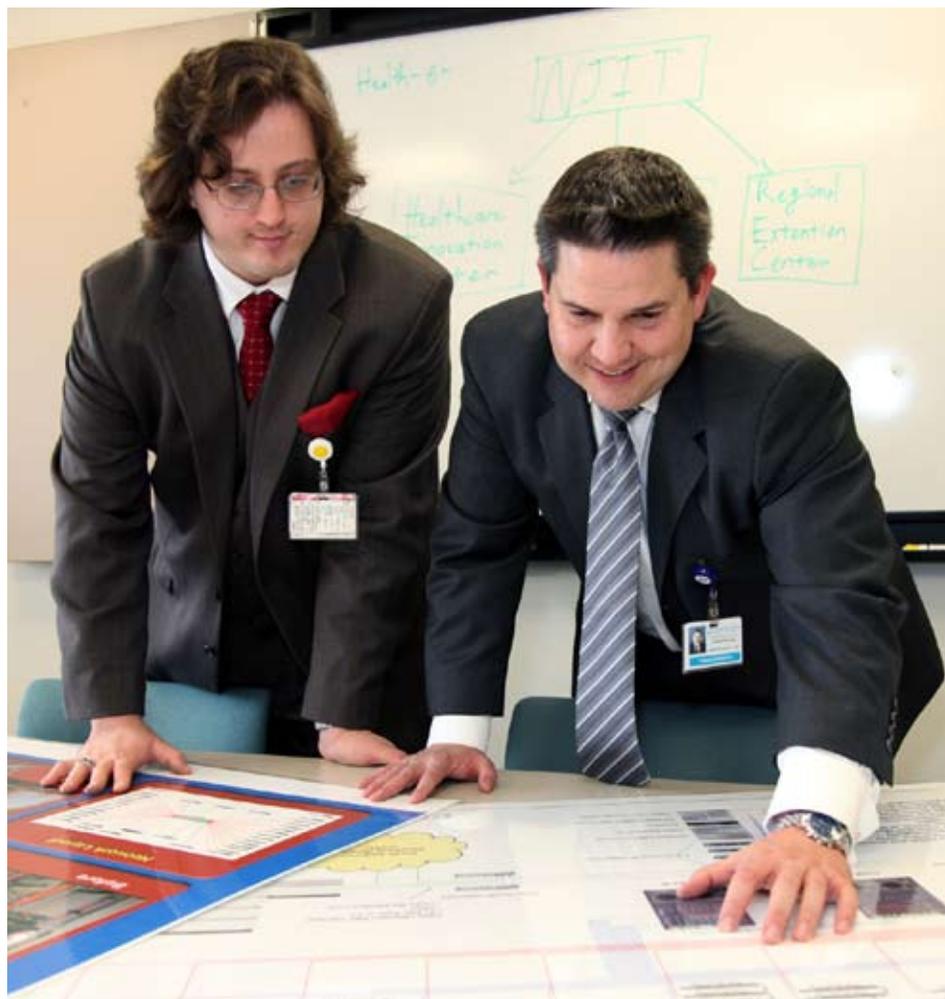


PHOTO: COURTESY OF BETH ISRAEL MEDICAL CENTER

people enter the door through their being assigned a bed.

Besides the more than 20 IT specialists who report to Gregorio, he has worked with dozens of NJIT interns and co-op students, as well as with seniors whose Capstone IT projects have been oriented toward health care. In fact, NJIT students had a significant role in implementing various innovative projects under the supervision of Gregorio and his staff.

*Working on information technology for better health – alumni Andrew Hromada BS '09 (left) and Tomas Gregorio MBA '08*

## STAFFING EMERGENCIES

Andrew Hromada, BS '09 in computer science, is one student who met Gregorio through the Capstone program. He later became a full-time member of Gregorio's IT group. Hromada's Capstone project for Newark Beth Israel Medical Center was the Employee Demographics Emergency System.

The objective was to help Beth Israel staff meet pressing personal responsibilities when they are unexpectedly required to remain on duty during an emergency – a flu pandemic, for instance. To this end, Hromada designed a system to store the information that employees provide about needs such as caring for children, elderly parents, and even pets. Newark Beth Israel Medical Center administrators can thus arrange appropriate assistance. They can also get an instant snapshot of personnel available to handle localized emergencies at all Saint Barnabas facilities.

Hromada is contributing his talents to other IT initiatives as well, including the electronic hospital admissions system and Health-e-cITI-NJ. "These are among many IT innovations that can improve efficiency and cut health-care costs," Gregorio says. "What's much more important is that they can save lives."

## A MILLION DIMENSIONS

The new initiative in health information technology joins other efforts related to health that are well under way at NJIT. In the College of Computing Sciences (CCS), for example, Professor Yehoshua Perl and Professor James Geller are engaged in a project that could prevent the administration of drugs to individuals dangerously allergic to them.

Perl and Geller have funding from the National Library of Medicine, part of the National Institutes of Health, to refine the complex, sometimes inconsistent vocabularies used for patient records and for systems that support therapeutic decisions. Their goal is to eliminate errors and redundancies in the massive clinical databases involved. In addition to reducing the cost of *[continued on page 14]*

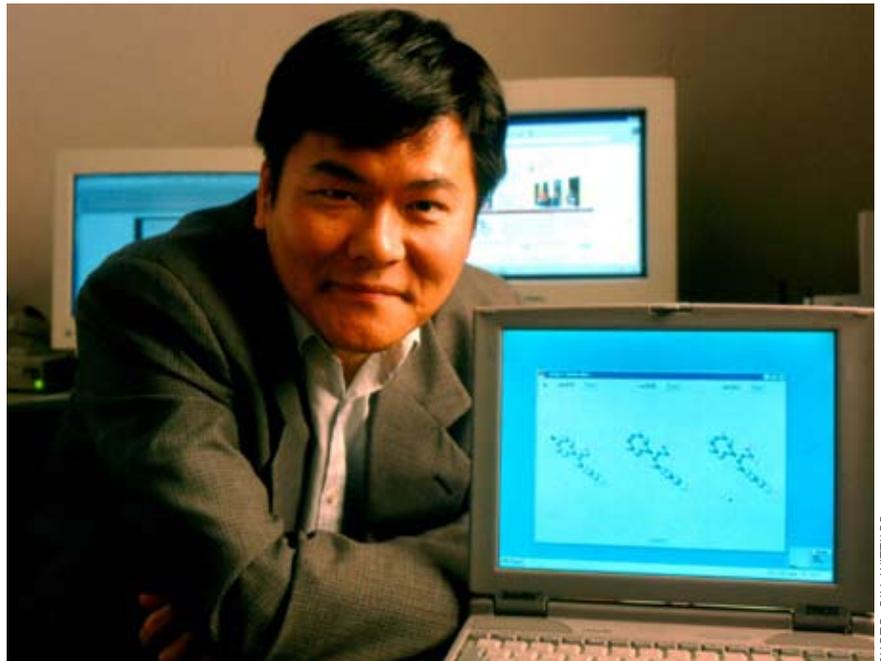


PHOTO: BILL WITTKOP

*Professor Jason Wang, College of Computing Sciences, is among the NJIT researchers working with massive volumes of data in the search for new insights into genetics and other basic aspects of health.*

## MINING A MOUNTAIN OF DATA

Since the human genome was decoded a decade ago, the volume of genetic data about organisms on our planet has increased at an amazing pace. Virtually all of this information is in the public domain due to the influence of the global scientific community. The data is thus readily accessible to researchers around the world. At NJIT, faculty in the Department of Computer Science are mining genetic information for greater understanding of how we become ill and how effective treatments can be developed.

■ Professor Jason Wang is investigating a certain type of RNAs, difficult to detect molecules of ribonucleic acid that may have significant genetic importance with respect to triggering disease. Support from the National Science Foundation has also helped him develop a tool for searching large databases that could facilitate drug design, protein evaluation and the classification of DNA sequences.

■ Assistant Professor Usman Roshan and Assistant Professor Zhi Wei are studying the relatively small number of DNA base pairs in the human genome that seem to account for the largest percentage of variations from individual to individual – and individual proclivity for particular diseases. Working in the realm of disease-risk prediction, or “personalized medicine,” their focus is on the incidence of Type I diabetes.

■ Professor Frank Shih, an expert in pattern recognition, has developed methods to automatically read the significant data in a huge amount of information to determine which genes are active in a cell at a given time.

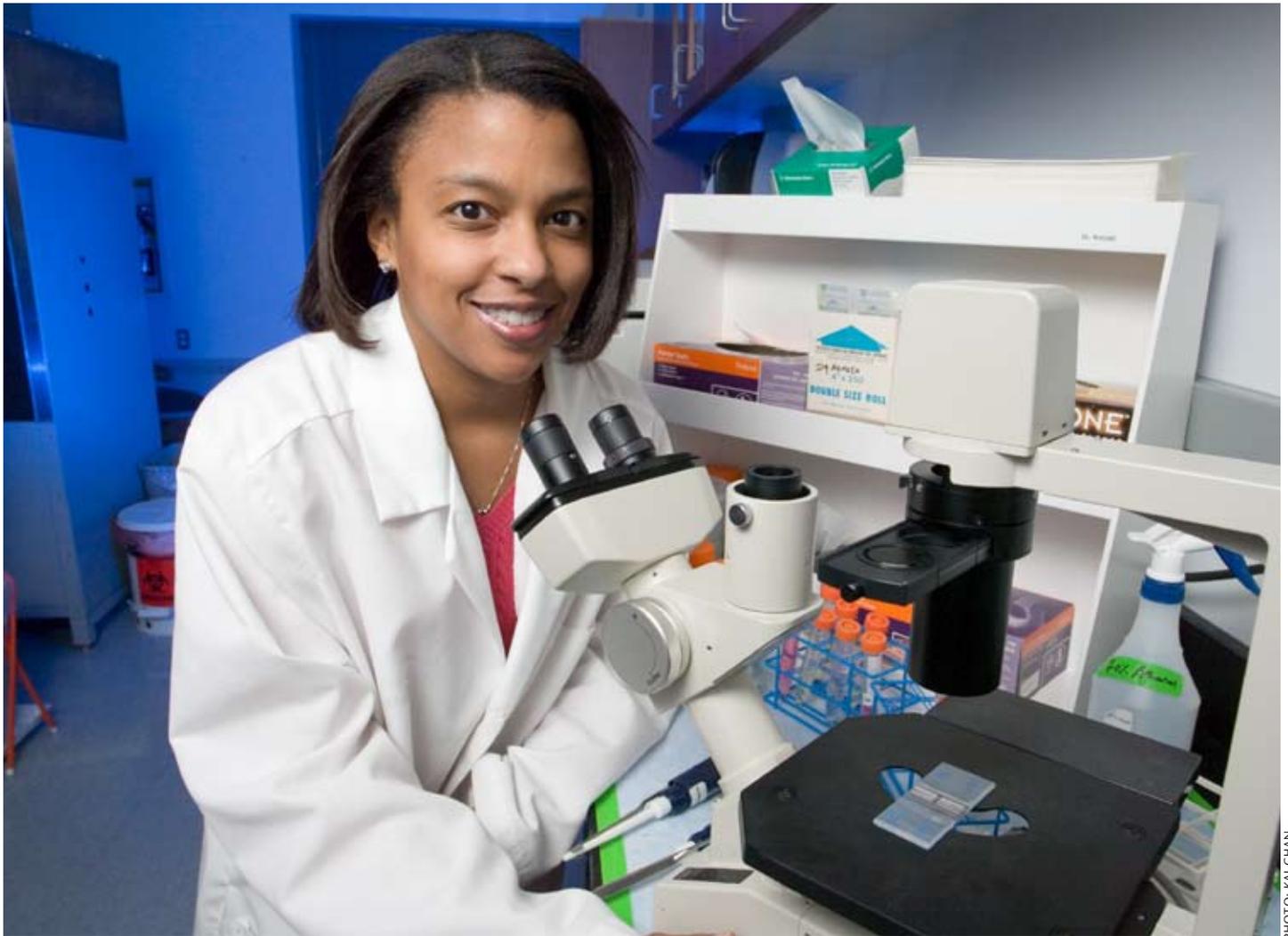


PHOTO: KAI CHAN

Associate Professor of Biomedical Engineering Treena Livingston Arinzeh is helping to advance the use of adult stem cells for the repair of bone and other tissues.

**B**REAKTHROUGHS IN BIOLOGY ARE PROVIDING RESEARCHERS WITH 'MILLION-DIMENSIONAL DATA' THAT CAN BE STUDIED AND MINED WITH THE POWER OF COMPUTING."

Associate CCS Dean Barry Cohen

health care, this can minimize the possibility that confusion over a drug's name or ingredients will lead to very serious consequences.

Speaking of other frontiers in health, CCS Dean Narain Gehani says that basic biological research and the development of new therapies are increasingly quantitative endeavors. Barry Cohen, associate CCS dean, adds that breakthroughs in biology are providing researchers with "million-dimensional data" that can be studied and mined with the power of computing.

This is especially true of dramatic developments in genomic analysis. Since the pioneering publication of the human genome in 2001, there has been an incredible increase in genomic data available for analysis – a fast-expanding catalog of genetic profiles ranging from humans to bacteria. It is now possible to look much deeper into how many illnesses originate, and a number of CCS faculty are taking this deeper look with powerful computational tools.

## WORK ON DIVERSE FRONTIERS

Founded in 2000, the Department of Biomedical Engineering is sharply focused on our well-being, with faculty members drawing on diverse technologies to improve health and alleviate the effects of injury and illness. Treena Livingston Arinzeh, associate professor and interim department chair, says that there are two broad categories of work in the department: neural engineering and tissue engineering. Arinzeh is an internationally recognized leader in research involving adult stem cells and the repair of damaged bone and related musculoskeletal tissues.

Investigators in other departments at NJIT are also pursuing work significant for health:

- Jorge Golowasch, associate professor of mathematical and biological sciences, is funded by the National Institute of Mental Health to study substances in the body affecting neurons and neuronal networks with the aim of understanding how normal neuronal function can be restored after injury or disease.
- Farzan Nadim, professor of mathematical and biological sciences, has a grant from the National Institute of Mental Health to investigate neural activity underlying disorders such as epilepsy.
- Carol Venanzi, distinguished professor of chemistry and environmental science, has funding from the National Institute on Drug Abuse to seek an opioid analgesic with minimal side effects and low potential for addiction.

Across a wide spectrum of disciplines and departments, all of these NJIT researchers are bringing their knowledge and skills to bear on the same objective – better health. ■

*Author: Dean L. Maskevich is editor of NJIT Magazine.*

*On the Web:  
<http://ccs.njit.edu>  
<http://biomedical.njit.edu>*



PHOTO: WINNIE YEUNG

*Assistant Professor Mesut Sahin is researching how nerve signals might control mobility devices such as a wheelchair.*

## AT THE BIOMEDICAL FRONTIER

Members of NJIT's Biomedical Engineering Department are engaged in a broad spectrum of initiatives funded by grants from state, federal and private sources. The following are representative of these efforts:

- **Helping stroke patients regain the use of their hands through innovative therapies is a primary focus for the work of Associate Professor Sergei Adamovich.**
- **Associate Professor Tara Alvarez is investigating better ways to detect and treat traumatic brain injury and vision problems such as convergence insufficiency, which makes it difficult to read or view a computer screen.**
- **The interests of Richard Foulds, associate professor and director of the graduate program, include neuromuscular/rehabilitation engineering, neural control of movement, and haptic and kinesthetic systems for physical therapy.**
- **Professor William Hunter is researching cardiac function and biomedical applications for microelectromechanical (MEMS) devices.**
- **With a special interest in regenerative medicine, Assistant Professor Cheul H. Cho is studying techniques for cardiac, liver and neural tissue engineering.**
- **Research Professor Michael Jaffe is exploring renewable and synthetic materials as scaffolds for tissue repair, which includes working with nanofiber-based medical devices and processing collagen into fibers, films and sponges.**
- **Assistant Professor Bryan Pfister's investigation of growing axons, which interconnect nerve cells, could facilitate surgical repair of neural damage and lead to a nerve-tissue interface for thought-controlled prosthetic limbs.**
- **Assistant Professor Mesut Sahin is also focused on developing technologies to interface with the central nervous system so that those afflicted by injury or disease can regain mobility through, for example, the use of nerve signals to control a wheelchair.**