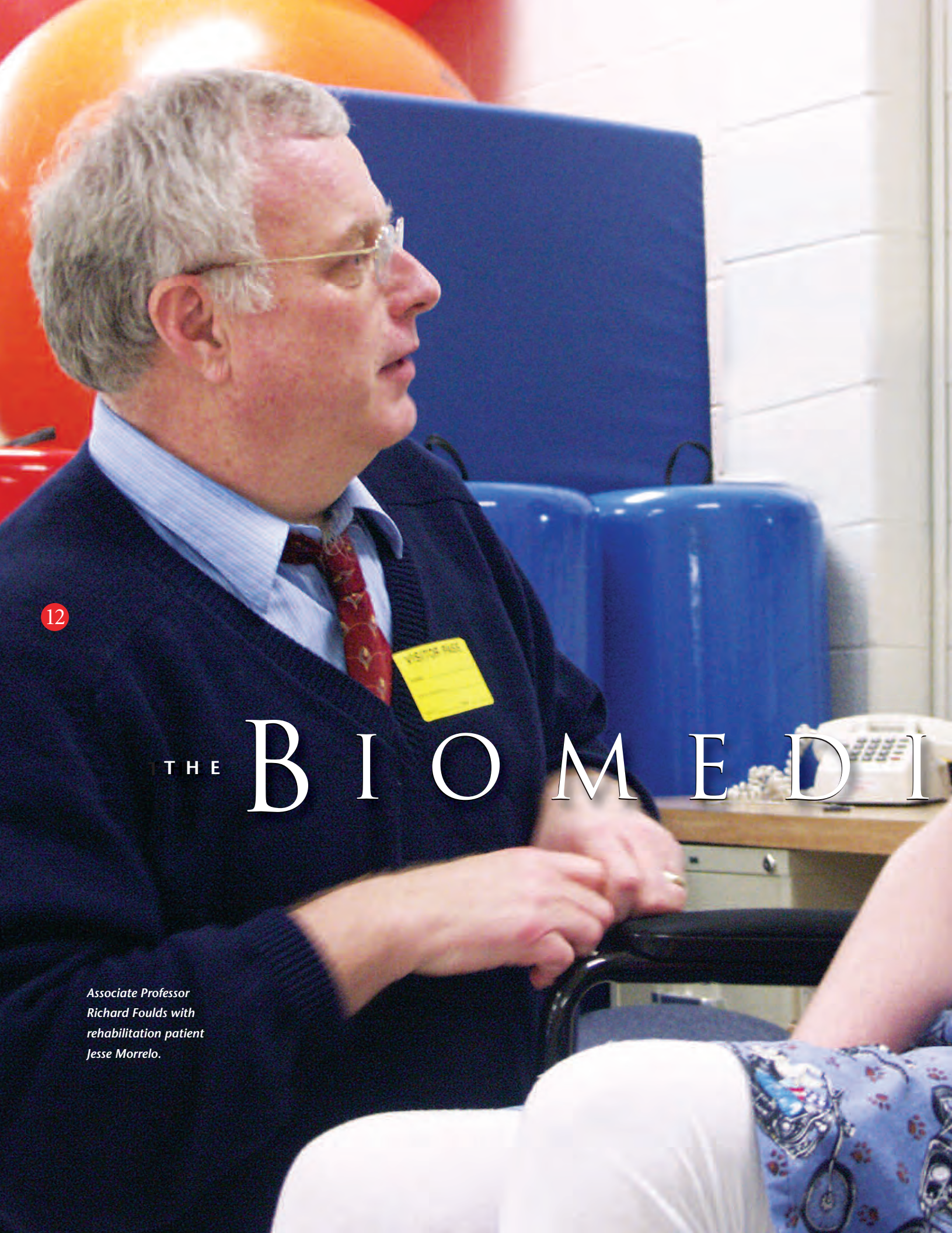


THE BIOMEDI

*Associate Professor
Richard Foulds with
rehabilitation patient
Jesse Morrelo.*



In under a decade, biomedicine has become the single largest concentration at NJIT in education as well as research. **The Department of Biomedical Engineering**, founded in 2002, is now one of the largest in the university with nearly 400 students enrolled from bachelor's to doctoral level. The Federated Department of Biological Sciences has nearly 200 students in undergraduate and graduate degree programs.

In addition, degree programs focusing on specific aspects of the life sciences and health care, developed and launched in 2008-2009, are offered in departments throughout the university. These include: bioinformatics (information systems); bioelectronics (electrical and computer engineering); biostatistics (mathematical sciences); computational biology (mathematical sciences); healthcare systems management and pharmaceutical systems management (mechanical and industrial engineering); pharmaceutical bioprocessing and pharmaceutical engineering (chemical, biological and pharmaceutical engineering); and pharmaceutical chemistry (chemistry and environmental science). The university also has accelerated joint degrees with professional schools for programs in medicine, dentistry, optometry, physical therapy and physician's assistant.

Research projects in the biomedical area have also become ubiquitous at NJIT. The department receives \$2.5 million annually in grant support. Its largest initiative is the **Rehabilitation Engineering Research Center for Children with Orthopedic Disabilities**, funded by the Department of Education's National Institute on Disability and Rehabilitation Research, and directed by Associate Professor **Richard Foulds**. The center has developed therapeutic video games to aid children with severe sensory and motor disabilities. The NEC Foundation of America recently gave the center additional funding to support the dissemination of the games.

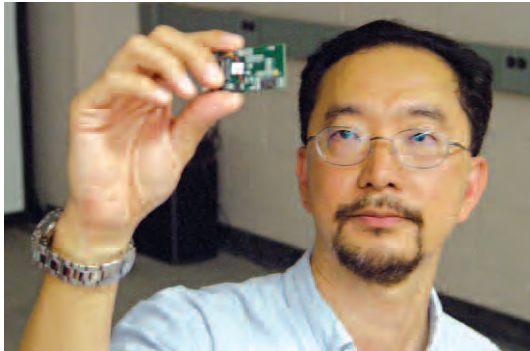
In recent years, three young faculty members have received prestigious NSF CAREER awards – **Tara Alvarez**, for her work in vision and neural engineering; **Bryan Pfister**, for his axon stretch research; and **Treena Livingston Arinze**, whose cutting edge work with adult stem cells earned her the Presidential Early Career Award for Scientists and Engineers, the highest national honor that a young researcher can receive.

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CALBOOM

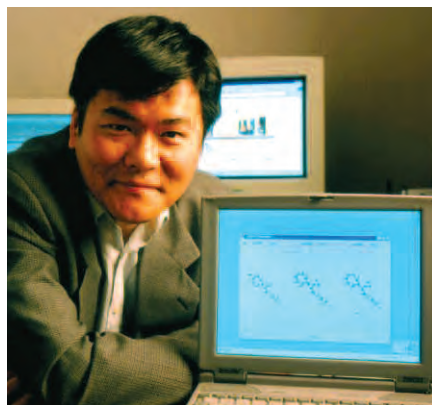
Like the degree programs, research in biomedicine and health sciences is ongoing in departments throughout the university. **The Department of Mathematical Sciences**, for example, has a strong research program in mathematical biology that studies such areas as biological fluid dynamics and mathematical neuroscience. Chemical Engineering increasingly focuses on pharmaceutical research, particularly as it relates to engineered particulates and membrane separations. Computer Science faculty study bioinformatics and medical data mining. Some recent projects:



Timothy Chang, professor of electrical and computer engineering, received a U.S. patent for his low transient pulse (LTP) technique for ultrasound that provides better resolution medical imaging. He is working in partnership with Medsonics, Inc., a start-up company in NJIT's Enterprise Development Center, to develop and commercialize a lightweight, portable diagnostic device that applies the LTP technology for diagnosing and monitoring fatigue fractures. He is also working with Dr. Wen Ching Liu of UMDNJ's Department of Radiology, to apply LTP ultrasound to diagnosis of tumors in soft tissue.

Brooks Atwood, adjunct professor of architecture, designed the Listening Studio (*above right*), a unique new audio and visual laboratory with state-of-the-art testing equipment for the hearing impaired. Atwood, co-founder and principal of POD DESIGN+MEDIA, built the project with architecture students **Gene Dassing**, **Benjamin Lindner** and **Kevin Kuziola** in NJIT's Fab Lab. The Listening Studio, designed to challenge and extend the capabilities of people with hearing problems, was installed in the Center for Hearing and Communication in Manhattan.

Jason Wang, professor of computer science and director of the Data and Knowledge Engineering Laboratory, is working on an unusual project: creating a search engine to simplify — by analysis and classification — huge amounts of biological data. With support from the National

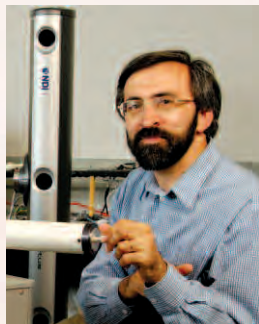


Science Foundation, Wang's team, which includes researchers from the National Cancer Institute and Harvard University, is developing and testing a search tool for processing queries about information patterns in large databases. The project is part of a long-term initiative to build a cyber infrastructure for RNA data analysis and mining that would allow researchers to uncover patterns with potential applications in the detection of genetic diseases, the classification of DNA sequences, the prediction of RNA and protein secondary and tertiary structures, the investigation of structure-function relationships, the understanding of protein evolution, and rational drug design.





Sergei Adamovich, associate professor of biomedical engineering, has a grant from the Eunice Kennedy Shriver National Institute of Child Health and



Human Development to refine and optimize a training program to help patients rehabilitate a hand paralyzed by a stroke. The study uses interactive virtual reality-based gaming simulations to encourage the intensity of practice needed to regain hand function.

Jorge Golowasch, associate professor of mathematical sciences and biological sciences, has a grant from the National Institute of Mental Health to study substances in the body that influence neurons and



neuronal networks with the aim of understanding how normal neuronal function can be restored after injury or disease.

Farzan Nadim, professor of biological science and mathematical sciences, has continuing support from the National Institute of Mental Health to investigate how properties of neurons and their synaptic dynamics shape the output of



oscillatory neural networks. He hopes to gain a better understanding of how synaptic dynamics such as short-term depression and facilitation contribute to the generation and control of uninterrupted patterns of neuron activity, providing insights into neurological disorders such as epilepsy.

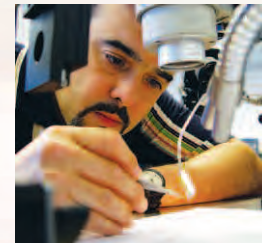
Yehoshua Perl, professor of computer science, has two grants from the National Library of Medicine to continue his work in simplifying and refining medical vocabularies – such



as UMLS (Unified Medical Language System) and SNOMED CT (Systematized Nomenclature of Medicine – Clinical Terms) used in patient records, decision-support systems and healthcare administrative systems. The goal is to eliminate errors and redundancies in large, complex clinical databases, thereby reducing healthcare costs.

Mesut Sahin, assistant professor of biomedical engineering, received grant support from the Eunice Kennedy Shriver National Institute of Child Health and Human Development to

develop technologies for interfacing with the central nervous system to learn more about its natural function and to develop treatments for neurological



disorders. The interface will assist patients with spinal cord injuries in gaining mobility.

Carol Venanzi, distinguished professor of chemistry and environmental science, has a grant from the National Institute on Drug Abuse (NIDA) to seek an opioid analgesic with a low potential for addiction and minimal physical side effects. Her team is collaborating with Thomas Prisinzano, a medicinal chemist from the University of Kansas, and Richard



Rothman, a pharmacologist at NIDA, to investigate analogs of the parent compound salvia divinorum, a member of the mint family. Her research team includes **William Skawinski**, university lecturer; **Kathleen Gilbert**, postdoctoral fellow; graduate students **Irina Vinar** and **Silu Sheng**; and undergraduates **Raymond Schweikert** and **Yanal Merza**.

NIH Grants Support a Wide Range of Projects

Grant support from the National Institutes of Health is an important indicator of a substantive biomedical research program.

Since NJIT received its first NIH grant in 2001, NJIT researchers have won institute support for a variety of projects crossing several disciplines: