



High school students in Connections worked as part of Lisa Simone's research team investigating hand function rehabilitation. NJIT undergraduate Angie Zaka (center) instructs Anu Apaddhyay and Christina Moussa in testing a new device to measure finger joint angle using a camera and lasers. Above, right: Graduate student Soha Saleh supervises Andrew Horn and Christopher Ojeda in testing a method to measure whether someone is touching an object.

Shaping

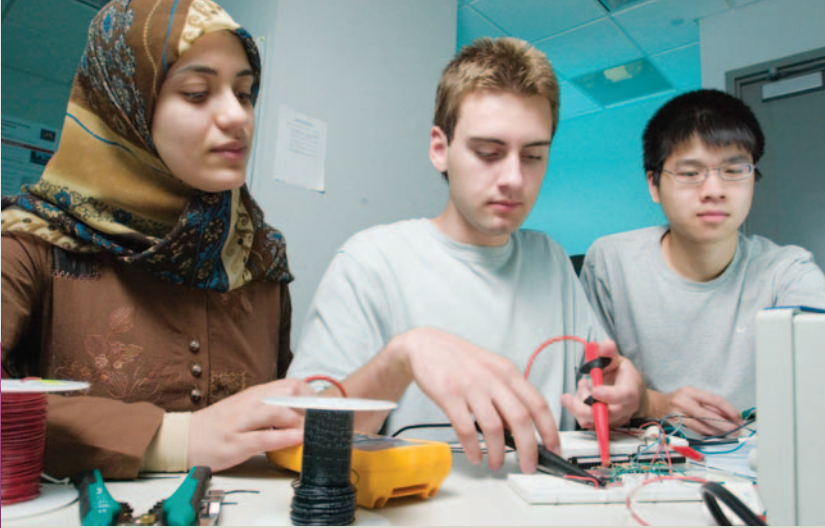
TOMORROW'S TECHNOLOGIES

Research as Education

"I *It is important to provide meaningful undergraduate research experiences at the interface of chemistry, biology, computing, engineering, mathematics and medicine. NJIT's programs emphasize high-quality undergraduate research to prepare talented students for leadership in these fields and to meet the needs of the burgeoning biomedical industries in New Jersey and the region."*

— Joel Bloom, vice president for academic and student services

THE LATEST TECHNOLOGIES AND THE MOST ADVANCED DESIGN TECHNIQUES ARE MORE THAN THEORY TO NJIT STUDENTS. UNDERGRADUATES GAIN HANDS-ON EXPERIENCE IN CUTTING-EDGE RESEARCH AND APPLICATIONS PROJECTS. EXPERIENTIAL LEARNING AT NJIT TAKES MANY FORMS FROM CO-OP JOBS AND INTERNSHIPS TO RESEARCH ASSISTANTSHIPS, BUT ONE OF THE MOST UNUSUAL AND SUCCESSFUL VENUES IS THE COLLEGE OF COMPUTING SCIENCE'S CAPSTONE PROGRAM. DEVELOPED AND DIRECTED BY UNIVERSITY SENIOR LECTURER **OSAMA ELJABIRI**, THE PROGRAM MATCHES INTERDISCIPLINARY TEAMS OF SENIOR STUDENTS WITH CLIENTS FROM INDUSTRY, GOVERNMENT AND UNIVERSITY PROGRAMS TO DEVELOP CUSTOMIZED SOFTWARE AND DATABASE APPLICATIONS, TO DESIGN AND TEST DEVICES, OR TO ANALYZE AND DIAGNOSE A VARIETY OF BUSINESS PROBLEMS.



Launched in 2002, the Capstone Program supervised more than 300 projects involving some 1,500 students. Clients have included large organizations such as Johnson & Johnson, IMS Health, CIT, PSE&G and Honeywell, as well as smaller high-tech companies like Nextech Group, Morpholytics, and CyberExtruder. NJIT departments sponsor research projects including several in biomedical engineering are regular clients, and projects have been sponsored by the city of Newark, the New Jersey Governor's Office, and the FBI.

"It's a win-win situation," Eljabiri says. "The clients get sophisticated technological support, while the students get real-world experience that increases their value in the job market."

Recently, the Capstone Program expanded to include a pre-college component, Connections: A Real world Education Program for High School Students. During a month-long internship, talented students from high schools across the state participate in work experience projects for companies and university research projects under the guidance of industry experts, NJIT students, NJIT faculty and capstone alumni. Some of the projects for 2007 included:

- High school students worked on several research projects in Research Professor Lisa Simone's laboratory, testing new devices designed to measure hand function in patients with movement disorders caused by disease or injury.

- Students worked with BanDeMar Networks to create innovative content for the Global Microscope to be displayed at the Liberty Science Center.
- Connections participants worked with the CBS anchor Harley Carnes in the Science Notebook project to create a multimedia network site for the development of affinity interest groups in science and technology.

"The idea is to create a unique learning environment for high



school students that is not only characterized by real world projects but also with one-on-one multi-level mentorship, advisement, guidance, training and peer-

Milind Shah (left), president and CEO of Rational Solutions Corp., discusses his company's project with Capstone team members Ayeesha Brown, Rudy Webster and Bruce Matai.

to-peer support," Eljabiri said.

The objectives of the multi-year high school program are knowledge enrichment, learning by doing, personality development, boosting motivation and facilitating creativity.

Eljabiri said that NJIT students also benefit, gaining experience in teaching and mentoring, and the client/sponsors gain as well.

"We have been fortunate to get students with excellent skills and capabilities beyond the average high school student," he said. "The students are capable of doing a lot of things for project sponsors, ranging from intensive research to web development to helping in lab experiments, and they bring substantial creativity to the process."

In Other Projects...

Undergraduate student **Ahmed-Tijani Agwedicham** spent 10 weeks researching polymer nanocomposites with **Kwabena Narh**, associate professor of mechanical engineering, in the Research Experience for Undergraduates in Engineered Nanocomposite Particulate Material. The NSF-supported program is directed **Rajesh Dave**, distinguished professor of chemical engineering and director of NJIT's New Jersey Center for Engineered Particulates. ■



complement one another. ■

Associate Professor **Amitabha Bose** directs an NSF-supported NSF Undergraduate Biology and Mathematics Training Program that will prepare students for research at the interface of mathematics and biology. Open to undergraduates in any major, the program educates students to recognize how mathematics and biology

Although he is a computer engineering major, **Mohamad Alsafrjalani** spent two summers in the 10-week BioMEMS Summer Institute where he designed a device to measure blood viscosity. The NSF-supported program, directed by **William Hunter**, chair of biomedical engineering, is designed as an intensive introduction to the emerging field of BioMEMS, the microscopic pumps and sensors that are becoming increasingly important in biomedicine. ■

