

# ABSTRACTS



## ERGONOMIC MUSICAL CHAIRS

“It’s well established among musicians that proper posture and breathing improve sound quality and are directly linked to exceptional instrument control and mastery. What’s less understood is the influence of chair design on the ability to achieve these goals.” That’s what David Brothers, assistant professor of interior design at NJIT’s School of Art+Design, says of his motivation to create a chair that will help musicians feel better and play better.

Brothers is working to design a chair configured to reduce the back pain that is an occupational hazard for musicians, who are required to sit for long periods, most often on a chair that doesn’t accommodate their physical needs. The office furniture industry has produced many chairs that reflect the latest insights of medical professionals and ergonomic experts into facilitating workplace tasks while preventing health issues for individuals who must remain seated for extensive periods, says Brothers. Musicians are similarly expected to practice and perform while seated for prolonged periods.



PHOTO: JED MEDINA

David Brothers with a prototype of an ergonomically beneficial musician’s chair.

“But little attention has been paid to professional musicians. There are equally significant questions to address for the health and performance of people whose offices happen to be practice rooms and performance halls, and whose sitting requirements, though distinctly different, are just as physically demanding as the contemporary knowledge worker.”

One design proposed by Brothers can be “tuned” to the individual preferences and body characteristics of each musician for their

instrument type and playing style. It features a seat that can be tilted forward to reduce the strain of backward pelvic rotation, as well as adjustable seat height and backrests for proper lumbar support. The chair is flexible to allow for movement, and its lightweight carbon fiber frame provides exceptional strength to absorb the dynamic stresses produced when musicians are performing.

Brothers based his design on 18 months of research, including interviews with professional musicians and observational studies of orchestra and ensemble groups. He concentrated on the ergonomic issues of sitting for musicians playing string, brass and woodwind instruments.

“As a furniture designer, I found it odd that performers from all three of those orchestral sections sat in identical chairs when what they are doing seems so fundamentally different. The study addresses the question of whether the specific physical requirements of playing an instrument could lead to a unique chair design. I see this research as the beginning of a long-term effort to design, fabricate and test a series of chairs with working musicians to assess the viability of the proposed strategies in real-world applications.” ■

<http://art.njit.edu>

*“In meeting and exceeding each of the commission’s 14 Characteristics of Excellence, we have fulfilled the responsibilities inherent in the accreditation process as a true measure of our commitment to quality in higher education.”*

– NJIT President Joel S. Bloom

## MIDDLE STATES ACCREDITS NJIT

Compliments University on a Disproportionate Educational Impact Given Its Means

The Middle States Commission on Higher Education has reaffirmed NJIT’s accreditation for the next decade. According to the report issued, “NJIT is making a disproportionate impact in higher education given its means. In particular, NJIT is providing an admirable service to first-in-family students attending college. The students are excellent, well-trained, and graduates are highly successful after leaving the university. NJIT’s success in providing a first-class education and college experience to a diverse student body is enviable.” The entire report is available at [www.njit.edu/middlestates/evaluation.php](http://www.njit.edu/middlestates/evaluation.php).

“I am pleased to report this positive outcome, the result of a comprehensive three-year effort by the Board of Trustees, university administration, alumni, faculty, staff and students,” said NJIT President Joel S. Bloom.

The Middle States evaluation team’s report confirmed that NJIT meets or exceeds all 14 standards outlined in the commission’s “Characteristics of Excellence in Higher Education.” The team read NJIT’s *Self-Study Report*, considered detailed reports on each standard, and reviewed substantial additional documentation provided by the NJIT steering committee.



“I want to extend my congratulations and thanks to the entire NJIT community for the diligence, tenacity and integrity it has taken to bring this important process to success,” Bloom added. “In particular, I want to thank Professor Norbert Elliot, chair of the NJIT self-study. The accrediting process has indeed strengthened and sustained the quality and integrity of our university, and we have again demonstrated our fulfillment of public confidence. In meeting and exceeding each of the commission’s 14 Characteristics of Excellence, we have fulfilled the responsibilities inherent in the accreditation process as a true measure of our commitment to quality in higher education.”

To be eligible for federal financial aid, an institution of higher education must be accredited by the Middle States Commission on Higher Education in the Middle Atlantic region. Although the organization is non-governmental, it offers a revealing self-examination process for educators by educators. This accreditation is

authorized by and answerable to the federal government. The organization is composed of selected veteran educators, who volunteer their professional services on behalf of the accrediting agency to oversee the educational integrity of colleges and universities. A Middle States review, a multi-year process, initiates an in-depth self-examination and encourages, advances, assists and sustains the continuous improvement of the institution and student-learning outcomes. ■

## U.S. LABOR FOR THE 21ST CENTURY

NJIT and the Newark Workforce Investment Board (NWIB) have received a total of some \$8 million from the U.S. Department of Labor to assist local institutions with development of innovative strategies to prepare workers for the 21st-century economy. In cooperation with the NWIB, industry partners, local community colleges and other business alliances, NJIT will provide training in high-wage, high-demand information technology occupations to help fill vacancies that otherwise would go to foreign labor using H-1B visas. ■

[www.njit.edu/continuing/](http://www.njit.edu/continuing/)

## OPEN HOUSES AT NJIT

If you’re thinking about graduate work at NJIT or know someone considering NJIT after high school, coming to campus for an open house is a great way to learn about programs and admissions procedures in person.

Undergraduate open houses: Sunday, October 21, 2012 and Sunday, February 24, 2013.

[www.njit.edu/admissions/openhouse](http://www.njit.edu/admissions/openhouse)

Graduate (Thursdays): October 11, November 8, December 6, 2012; January 10, March 7, April 11, May 16, 2013

[www.njit.edu/admissions/visit/graduateopenhouses.php](http://www.njit.edu/admissions/visit/graduateopenhouses.php)



## TOP AWARDS FOR HIGH TECH

Products to shorten brain surgery, manage computer security and boost communications bandwidth earned three high-tech companies based at NJIT's Enterprise Development Center (EDC) top awards at the 2012 Venture Conference sponsored by the New Jersey Technology Council.

The medical innovator Endomedix, Inc. ([www.endomedix.com](http://www.endomedix.com)) was awarded the laurel Best Life Science Company.

Endomedix recently received their first patent, related to the company's core technology of producing an all-natural, non-blood-derived tissue sealant. An initial application will be a spray-on surgical hemostat to control bleeding indicated for use in brain surgery. The product is expected to shorten the typical craniotomy procedure by 30 minutes. This translates into less time that the patient's skull must be open and less anesthesia, reducing morbidity and the

possibility of infection.

Allweb Technologies Inc. ([www.allwebtechnologies.com](http://www.allwebtechnologies.com)), focused on addressing the password overload and identity-fraud challenges stemming from online activity, was accorded the Best Information Technology Company award.

The plethora of passwords required to log on to websites causes major issues such as forgotten passwords, account lockdown and other headaches, and the inclination to use relatively simple passwords increases the possibility of identity fraud. Organizations incur significant expenses in contending with these issues. Allweb plans to launch a unique, convenient cloud-based service for password management and biometrics-based user identification. The company has also developed a fast, scalable and highly accurate fingerprint matching system that can be used for real-time individual identification.

ATC Labs ([www.atc-labs.com](http://www.atc-labs.com)) garnered the Best Communications Company award.

## MORE FRESH WATER FOR THE WORLD



A third of the world is already short on fresh, potable water, a shortage that's expected to increase to 50 percent by 2025. But recently patented technology developed by Distinguished Professor of Chemical Engineering Kamalesh K. Sirkar and colleagues at NJIT provides a new resource for confronting this crisis through advanced desalination of seawater.

The direct-contact membrane distillation system devised by Sirkar and his team could double the amount of potable water obtained from the same amount of brine processed with reverse-osmosis technology, today the most widely used alternative for desalination. Patented under the title "Desalination Devices and Systems Using Porous Hydrophobic Hollow Fibers and Hydrophobic Porous Coatings," the technology described also makes it feasible to process brine with salt concentrations of up to 20 percent. Reverse osmosis as currently implemented does not work when salt content exceeds six percent.

While significant work remains to be done before this application can be commercialized for desalination, membrane separation processes are used throughout the world by the chemical, food, petrochemical, pharmaceutical and biotechnology industries to separate, purify or concentrate liquid solutions, cellular suspensions and gaseous mixtures. Sirkar is an internationally recognized expert in the field. A Fellow of the American Association for the Advancement of Science, he is also Foundation Professor, Membrane Separations and director of the Membrane Science, Engineering and Technology Center at NJIT. ■

<http://chemicaleng.njit.edu>

Based in New Jersey and India, ATC Labs has a proven technology platform for audio and video compression and processing. A key customer, Sirius XM, achieved a nearly 30-percent gain in bandwidth efficiency on its Sirius Satellite audio service using this technology. ATC

recently launched three products for internet radio and for the rapidly expanding FM broadcasting industry in India, where 800 new stations are projected to be on the air in the near future. ■

[www.njit-edc.org](http://www.njit-edc.org)



*“Civil engineering majors love hands-on projects. They put in endless hours of work because they love to design and build.”*

*– John Schuring, NJIT professor of civil engineering*

## WINNERS IN CONCRETE AND STEEL

It was a sweep of a weekend in April for two teams of NJIT civil engineering students. For the seventh consecutive year, the Steel Bridge Team won the regional competition that was held at New York City College of Technology, while the Concrete Canoe Team paddled to victory in an equally exciting metropolitan contest at Denville’s Cook Pond.

Competing in the concrete canoe challenge for the first time in 10 years, the women and men of NJIT built a craft whose design and performance beat seasoned teams from Rutgers, Stevens, The College of New Jersey and participants from five other schools.

The scaled-down, 20-foot long structures created for the steel bridge competition must be lightweight yet strong enough to sustain a 2,500-pound load. NJIT placed first for design, lightness, efficiency and economy, as well as first-place overall. The team’s effort topped other universities that included Columbia, Cooper Union

and NYU Polytechnic Institute.

The canoe competition was judged in several categories, one of which was how fast the concrete creations could be rowed across the pond in a sprint (200 yards) and an endurance race (800 yards). NJIT team members took second place in each race and placed highly in the three other categories: a research paper describing the design of the canoe, a presentation about the design, and a display of the canoe’s mold.

“I’m super proud of both teams,” said John Schuring, the NJIT professor of civil engineering who advises the teams. “Civil engineering majors love hands-on projects. They put in endless hours of work because they love to design and build.”

Corporate partners in the steel bridge competition were Acrow Corporation and Schiavone Construction Co. Support for the concrete canoe competition was provided by CME Associates, Dewberry, Louis Berger Group, Moretrench Corporation, HNTB Corporation, ASCE North Jersey Branch and Jacobs Engineering Group, Inc. ■

<http://civil.njit.edu>

## ENGINEERING PROTEINS TO ORDER



PHOTO: RICKY KHARAWALA

Associate Professor Edgardo Farinas

The long-term goal of Associate Professor Edgardo Farinas, chair of the Chemistry and Environmental Science Department, is to engineer proteins “designed to order.” He’s pursuing this objective with the help of nearly \$340,000 provided by the National Institutes of Health.

“My more specific aim is to stabilize G protein-coupled receptors, or GPCRs, which are membrane proteins involved in almost every physiological process,” says Farinas. GPCRs transmit most cellular responses across cell membranes through an array of extracellular stimuli, and irregular control of such proteins can lead to pathological conditions. Accordingly, as drug targets, they are of very great importance in the pharmaceutical industry.

Determining crystal structure is necessary to investigate the molecular details of activation/deactivation processes. However, doing so is difficult because GPCRs are difficult to crystallize in the required stable form. Hence, a robust and efficient

protein engineering system is needed to optimize these proteins for structural determination.

Farinas is researching optimization using an approach that mimics natural evolution. The method is called directed or laboratory evolution. An unstable protein becomes the parent of a “library” of offspring proteins. The library is then screened for a particular fitness – in this case, stability. Once an offspring with more of the requisite fitness is identified, it becomes the parent for another round of laboratory evolution. This is done in iterative cycles until the desired degree of fitness is achieved.

In 2008, Farinas received a National Science Foundation CAREER award for his project “New Tools for High-Throughput Screening of Protein Libraries: Engineering Metalloproteins Displayed on *Bacillus Subtilis* Spores.” The prestigious award recognizes teacher-scholars most likely to become the academic leaders of the 21st century. ■

<http://chemistry.njit.edu>



PHOTO: DAN SOBKO



## FORGING AHEAD WITH ELECTRONIC HEALTH RECORDS

The New Jersey Health Information Technology Extension Center (NJ-HITEC) established by NJIT continues to forge ahead as a national leader in helping physicians implement and achieve Meaningful Use of electronic health records (EHRs). NJ-HITEC has earned this leadership by exceeding member requirements, developing a staff of subject matter experts and implementing innovative programs. Launched with a \$23 million grant from the U.S. Department of Health and Human Services, NJ-HITEC has also assisted in delivering over \$20 million of federal incentive money to Garden State physicians.

“We’ve embarked in a new direction since exceeding the grant’s 5,000 member milestone,” says Executive Director Bill O’Byrne. “With over two-thirds of our members at ‘go live’ status in the implementation of their EHR system, we are committed to assisting them succeed in meeting the Meaningful Use requirements for receiving federal incentive dollars.” Over 900 NJ-HITEC member doctors have attained Meaningful Use, making New Jersey one of the nation’s leaders in provider usage of EHRs.

In addition, NJ-HITEC and NJ Medicaid have partnered to provide qualified physicians with the same services as outlined in the federal grant. This partnership is the first of its kind, serving as a national model. But NJ-HITEC has

not stopped there. O’Byrne explains, “We are here to assist all New Jersey physicians with achieving successful utilization of their EHR system. We are advocates for the effective use of health information technology in delivering high-quality patient care and patient-case management. If a physician does not qualify for either the federal or state program, for an appropriate fee, we will assist that provider as well.”

In furtherance of federal law, NJ-HITEC is developing a sustainability plan to continue its mission after the federal grant expires. Through its partnerships with health organizations, hospitals, state agencies and physicians, as well as the expertise of its staff, NJ-HITEC is involved in a number of initiatives promoting the growth of health information technology. There are growth opportunities in patient-centered medical homes (PCMHs), accountable care organizations, clinical health data predicative analytics and aggregations, cloud computing solutions and many more.

NJ-HITEC’s goal is to remain in the vanguard of health information technology in New Jersey. ■

For more information about NJ-HITEC, visit [www.njhitec.org](http://www.njhitec.org) or call 973-642-4055.

## END NOTES

**Professor Ali Akansu**, Electrical and Computer Engineering, traveled to Cesme, Turkey to give a plenary talk titled “Financial Signal Processing and High Frequency Trading: A Killer App for Smart Clouds” at the 13th IEEE International Workshop on Signal Processing Advances in Wireless Communications. In Istanbul, he gave a plenary talk, “A Vision for the Future of the Global Village: An Electrical Engineer’s Perspective,” at a conference dedicated to the centennial celebration of the Electrical Engineering Department of Bogazici University.

**Professor Nirwan Ansari**, Electrical and Computer Engineering, delivered a keynote address, “On Wide Area Network Optimization,” at the 4th International Conference on Communications, Mobility and Computing in Guilin, China.

**Associate Professor Roberto Rojas-Cessa**, Electrical and Computer Engineering, was the general co-chair of the 35th IEEE Sarnoff Symposium, held for the first time on the NJIT campus in May. The program included keynote speakers in the areas of network security, communications and wireless networks.

**Distinguished Professor Atam Dhawan**, Electrical and Computer Engineering, will serve as co-editor of the IEEE *Journal of Translational Engineering in Health and Medicine*. The publication bridges the engineering and clinical worlds, focusing on detailed descriptions of advanced technical solutions for a clinical need along with clinical results.

**Stephen Pemberton**, Federated History, spoke to physicians about hemophilia at a special meeting of the Medical History Society of New Jersey, delivering the society’s Morris Saffron Lecture. Pemberton

is the author of *The Bleeding Disease*, a history of the medical and social efforts to manage hemophilia in the U.S. over the last century.

**Associate Educational Opportunity Program Director Crystal Smith** has been elected to the national board of the Minorities in Engineering Division (MIND) of the American Society for Engineering Education. MIND works to increase the participation of Black, Hispanic and Native/Pacific Islander Americans professionally and at all levels of engineering education.

**Associate Vice President of Continuing and Distance Education Gale Tenen Spak** was among the speakers discussing “The Next 150 years: Campus of the Future” and “Expanding Community Engagement in the Future” at the Smithsonian Folklife Festival in Washington, D.C. The festival is an international exposition of living cultural heritage produced annually on the National Mall by the Smithsonian Institution. Events for 2012 centered around three themes: “Citified: Arts and Creativity East of the Anacostia River,” “Campus and Community” and “Creativity and Crisis.”

**University Lecturer John Wiggins**, Engineering Technology, has been appointed to the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET) for the 2012-2013 accreditation cycle. ABET is a non-governmental organization that accredits post-secondary education programs in applied science, computing, engineering and engineering technology. An attorney and licensed Professional Engineer in New Jersey and Pennsylvania, Wiggins will serve as a representative of the American Society of Civil Engineers, of which he is a Fellow.

**Correction:** The caption for the photo taken at the University of Medicine and Dentistry of New Jersey (UMDNJ) on page 11 in the spring 2012 issue misspelled the name of Jony Sheynin, who is a graduate student in the joint NJIT-UMDNJ biomedical engineering doctoral program.