

# ABSTRACTS

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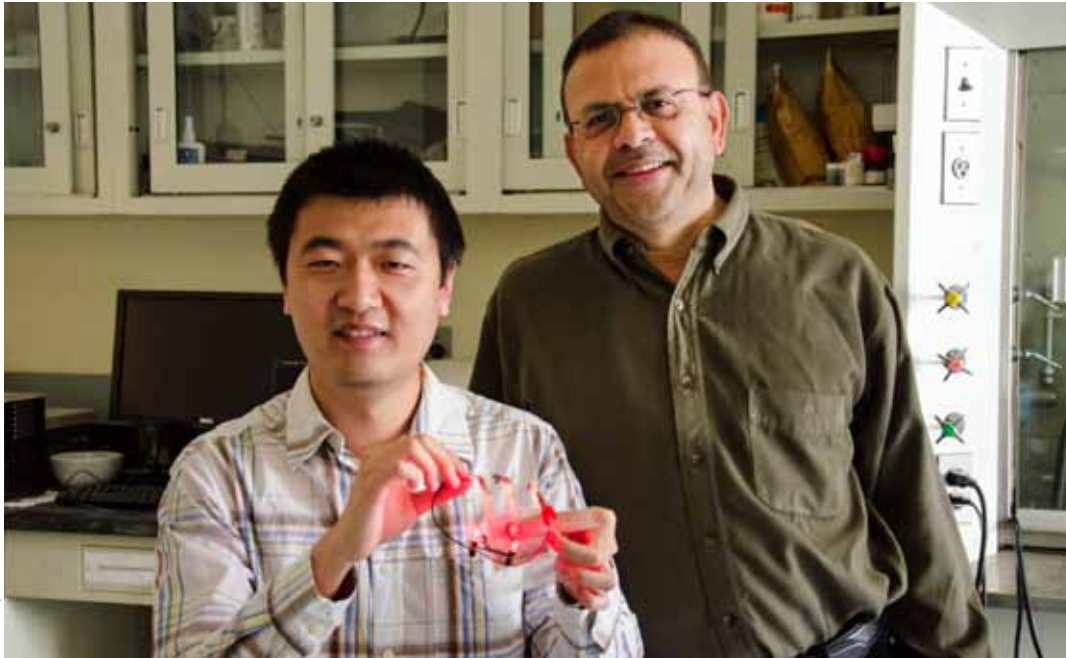


PHOTO: JED MEDINA

Professor Somenath Mitra (right) with doctoral student Zhiqian Wang, who helped to develop the flexible battery powering red LEDs in the photo.

## POWER FOR A FLEXIBLE FUTURE

Electronics manufacturers are now making flexible organic light-emitting diode (LED) displays, a pioneering technology that allows devices such as cell phones, tablet computers and TVs to literally fold up. And a new battery developed at NJIT has the potential to power these devices with matching flexibility. The bendable battery, for which a patent application has been filed, is made from carbon nanotubes and micro-particles that serve as active components – similar to those found in conventional batteries.

**“This battery can be made as small as a pinhead or as large as a carpet in your living room,”** says Somenath Mitra, a professor of chemistry and environmental science whose research group invented the battery. **“So its applications are endless. You can place a rolled-up battery in the trunk of your electric car**

**and have it power the vehicle. We have been experimenting with carbon nanotubes and other leading technologies for many years at NJIT, and it's exciting to apply leading-edge technologies to create a flexible battery that has myriad consumer applications.”** ■

<http://chemistry.njit.edu>

## TAMING FLOODS IN NEW JERSEY

The New Jersey Department of Environmental Protection has awarded NJIT a \$289,000 grant to investigate flood mitigation in the Hackensack/Moonachie/Little Ferry area. NJIT's new Flood Mitigation Engineering Resource Center will handle the work. The initiative will complement efforts by the US Army Corps of Engineers and other organizations.

“This is an important preventative project for New Jersey,” says co-principal investigator Taha Marhaba, chair of the Department of Civil and Environmental Engineering. “Our objective as an NJIT team of interdisciplinary experts is to help the State of New Jersey to develop the best solutions to protect its citizens from future floods through innovative engineering measures that are doable, beneficial, resilient and sustainable.”

Co-principal investigator Fadi Karaa, associate professor of civil engineering, notes that the area, which includes New Jersey's Meadowlands, has always been on an environmental watch list in part due to its inherent vulnerability to flooding. Additionally, not unlike much of the nation's infrastructure, its flood protection structures and flood mitigation assets need significant improvement, rehabilitation and reconstruction as part of a comprehensive strategy to make communities in the affected area safer and more resilient. ■

<http://civil.njit.edu>



*“During my five weeks at CERN... I had the chance to conduct my own research on what is known as jet charge of quark decays and inverse problems – an experience that can't be had in the classroom.” – Scott Lieberman '14*

## RESILIENCE AT THE UNITED NATIONS

Three NJIT representatives addressed the United Nations in October at an international conference focusing on how cities can use resilient design to prepare for natural disasters. Speaking were NJIT President Joel S. Bloom; Urs Gauchat, dean of the College of Architecture and Design; and Thomas Dallessio, director of the university's Center for Resilient Design, which was a co-sponsor of the conference.

The United Nations is establishing policies on resilient design — design that emphasizes stronger building methods — and the addresses by Bloom, Gauchat and Dallessio will have an influence on formulating those policies. Their remarks will be part of the



College of Architecture and Design  
Dean Gauchat speaking at the  
United Nations.



PHOTO COURTESY OF CERN

Part of the Large Hadron Collider

United Nations' proceedings and help it establish international guidelines relating to resilient design, housing and infrastructure.

The conference, titled “Resilient Design for Sustainable Urbanization,” was held as part of World Habitat Day, when cities around the world organized conferences addressing how they can improve transportation during disasters. It was convened in the United Nations' Economic and Social Council and some 400 people attended.

The conference was divided into two panels, the first of which, “To Build or Not to Build,” was moderated by Gauchat. President Bloom later talked about the resilient design efforts at NJIT, and Dallessio introduced the afternoon's panel discussion on how resilient design can build sustainable communities and enhance urban mobility. ■

<http://centerforresilientdesign.org>

## PURSuing PARTICLES AT CERN

**Scott Lieberman '14, a Dorman honors student majoring in applied physics and applied math, had a world-class learning opportunity when he spent part of last summer as an intern at the European Organization for Nuclear Research – familiarly known as CERN. He was one of four students participating in a summer research program**



**supported by the National Science Foundation who were selected to work alongside the scientists at CERN for five weeks.**

**CERN operates the Large Hadron Collider on the French-Swiss border, the world's most powerful particle accelerator, dedicated to investigating the structure of matter at its most basic level and ultimately the structure of the entire universe. In 2012, two scientists at CERN confirmed the existence of the Higgs boson particle, theorized to give other fundamental particles mass. Those two scientists, Peter Higgs and François Englert, won the 2013 Nobel Prize in physics.**

**“During my five weeks at CERN, I learned a lot about the pioneering research being done in the field of particle physics, such as neutrino oscillations and super-symmetry,” Lieberman says. “I also had the chance to conduct my own research on what is known as jet charge of quark decays and inverse problems – an experience that can't be had in the classroom. It was an amazing experience.” ■**



*“The numbers clearly demonstrate that NJIT is preparing its graduates for tremendous professional success and that the university is doing so at a reasonable cost.”*

— NJIT President Joel S. Bloom

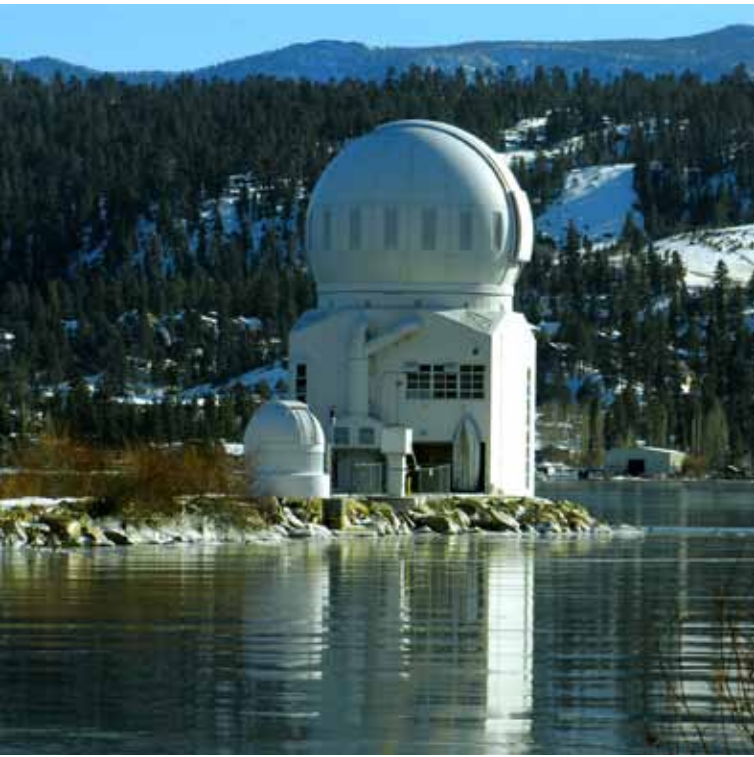


PHOTO: ALA SHUMKO

## NEW HEADS FOR BIG BEAR, COLLEGE OF COMPUTING SCIENCES

Alexander Kosovichev, a professor in NJIT’s department of physics, has been named director of Big Bear Solar Observatory. He succeeds Distinguished Professor of Physics Philip Goode, who retired after serving in the position since NJIT took over the facility from California Institute of Technology in 1997.

Prior to NJIT, Kosovichev was a senior research scientist with the W.W. Hansen Experimental Physics Laboratory and the Kavli Institute for Particle Astrophysics and Cosmology at Stanford

University, as well as a co-investigator for two instruments on NASA’s Solar Dynamics Observatory. He has more than 30 years of experience leading space and ground-based observational programs in heliophysics, theoretical modeling, data analysis and numerical simulations.

Computer scientist, educator and former research executive Marek Rusinkiewicz was appointed dean of the College of Computing Sciences in September. During his tenure as senior group vice president and general manager of applied research laboratories at Telcordia Technologies, Rusinkiewicz led research efforts in wireless communications, network management and protocols, mathematical sciences, software engineering, information processing and information security.

Before joining Telcordia, Rusinkiewicz was vice president for information technology at the Microelectronics and Computer Technology Corporation in Austin, a leading industrial research and development consortium. He has held academic positions at the University of Glasgow, Warsaw University of Technology, the University of Michigan and the University of Houston, where he was a professor of computer science. ■

## NJIT TOPS IN EDUCATIONAL VALUE

NJIT has been ranked the number one value among colleges and universities nationally by BuzzFeed.com, seven spots ahead of Princeton University and ten above MIT, as well as ahead of many other highly regarded institutions. The ranking calculates college and university value by comparing annual tuition cost

and the average starting salary of graduates.

NJIT earned the top spot among all US colleges and universities because the average starting salary of its graduates is nearly double the annual tuition fee charged to out-of-state students. Using NJIT’s tuition rate for New Jersey residents increases the university’s value proposition, making alumni average starting salaries nearly four times greater than NJIT’s annual tuition cost.

NJIT President Joel S. Bloom noted, “This rating is based upon quantifiable data, not perceptions, reputations or opinions, so it is particularly important. The numbers clearly demonstrate that NJIT is preparing its graduates for tremendous professional success and that the university is doing so at a reasonable cost. While there is a great deal of concern publicly about the cost of higher education, it is important to keep in mind that NJIT and some other institutions offer a tremendous value proposition.” ■



PHOTO: RICKY KHARAWALA

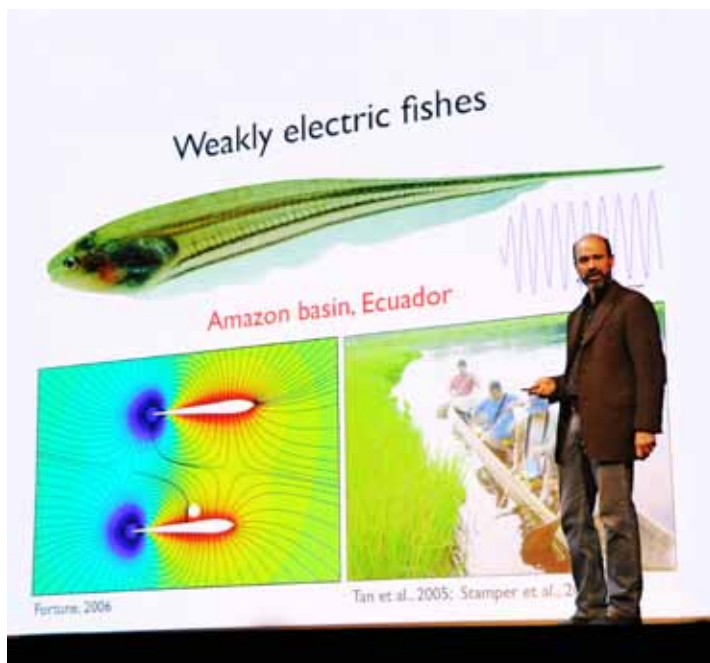
## FISHING FOR BEHAVIORAL INSIGHT

For almost two decades, NJIT associate professor of biology and animal behavior expert Eric Fortune has studied glass knifefish, a species of three-inch-long electric fish that lives in the Amazon Basin. A paper co-authored by Fortune that was published in the November 4-8, 2013 *Proceedings of the National Academy of Sciences* reveals

intriguing new findings about animal locomotion.

Fortune's studies include careful measurements of natural animal behavior which, when coupled with sophisticated quantitative analysis, can be applied in experiments to discover the cellular mechanisms used by the brain to control behavior. He believes that engineers can, in turn, translate these insights gained from the animal world into improved control systems for robots and prosthetic devices. ■

<http://biology.njit.edu>



*“Learning how the control systems of animals are built – literally their neural circuits in the context of the whole organism – has and will continue to inspire design features that can improve the flexibility and robustness of engineered systems.”*

*– Eric Fortune, associate professor of biology*



## BETTER HEALTH CALLING

People living in rural areas of the Dominican Republic may soon be able to receive vital health information via cellphone – thanks to a team of Albert Dorman Honors College students and wireless communications technology developed by a company based at NJIT's Enterprise Development Center (EDC). In 2012, several Dorman students and Paul Dine, assistant dean for student programs, joined a group of students and faculty from Rutgers on their annual humanitarian-service trip to the village of Lavapie in the Dominican Republic, to help with housing construction and other projects under the direction of the non-profit organization Cambiandas Vidas.

The Honors College team also evaluated the possibility that people living in communities like Lavapie, where access to medical professionals is limited but cellphones are available, could benefit from a mobile, or mHealth, application developed by the EDC-based company Cell Podium. The company is headed by Cesar Bandera, who is also an assistant professor in NJIT's School of Management. The value of the concept has been affirmed by the staff at Grupo Medico Maguana, a clinic about ten miles away from Lavapie in the town of San Juan de Maguana. The Cell Podium software can enable people in such areas to receive information, including video, about basic disease-preventing hygiene and interact with healthcare providers regarding how they are progressing with respect to prescribed medication and therapy.

A generous grant from the International Foundation will allow the Honors College team to return to the Dominican Republic in 2014 to implement the Cell Podium mHealth application for testing that would involve some 5000 households in a 25-square-mile area around San Juan de Maguana. Ultimately, receiving information for better health via cellphones could benefit not only people in the Dominican Republic, but in other regions where access to healthcare is restricted by terrain and economics. ■