

ABSTRACTS

“The New Jersey Innovation Institute is poised to help industries at every stage – from the birth of an idea in a lab to refining how that idea is produced.”

– U.S. Senator Cory Booker

U.S. Senator Cory Booker speaking at the launch of NJIT's New Jersey Innovation Institute.

going to help our state remain one of America's most important engines for economic growth and global competitiveness.”

Led by Donald Sebastian, NJII president and the university's senior vice president for technology and business development, the new corporation has already begun to forge strategic relationships with industry partners. Soon after naming Tomas Gregorio EMBA '08, a veteran healthcare executive experienced in building IT networks for regional hospitals, senior executive director of healthcare systems innovation, NJII secured its first contract.

Partnering with Osler Health IPA, a health network owned and managed by primary care physicians, the NJII team will assist physician practices with transforming their organizations to deliver higher quality service, while also helping them convert data collected in electronic medical records to actionable information.

“Our Healthcare Delivery Systems iLab is the first out of the gate with a complete set of services for the sector. With the capacity to innovate new business delivery models fueled by the latest information technology, this group is tackling the difficult issue of reducing the cost of healthcare while increasing quality and accessibility,” says Sebastian. “Our other iLabs will use the same recipe of assessment, business-process improvement, supply-chain development and enabling technology to drive innovation for our partner companies.”

NJII has also been awarded a \$5.7 million grant from the U.S. Department of Defense to examine the defense supply chain in New Jersey and assess its capacity to meet existing defense needs and grow into new markets. NJII's Defense and Homeland Security iLab will work with aerospace and defense suppliers in the state to bolster their market potential by developing new products for existing markets and gain new customers for the products they already make.

“While each of these sectors faces unique issues and market pressure to innovate, there is a shared need to rethink the role of supply-chain partners as important players in the innovation process,” Sebastian notes. “Our new grant from the Department of Defense's Office of Economic Adjustment is focused on identifying, stabilizing and diversifying the state's defense manufacturing supply chain. The tools and technologies that we develop in this program will serve us well as we look to assist companies across the other sectors.”

Six companies, including AECOM, Louis Berger, Cisco, HEALTHEC, Panasonic Corp., and Torcon, Inc., have already committed to charter memberships by making founding contributions to NJII, while several others are finalizing agreements. “These companies recognize the value NJII has for themselves and their sectors, and they are playing an active role in helping us develop our iLabs,” Sebastian says.



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INITIATING INNOVATION

The university has embarked on a new era of research and development with the launch of the New Jersey Innovation Institute (NJII), an NJIT corporation created to spur innovation and growth in key economic sectors by leveraging the resources of industry, government and higher education.

NJII consists of five innovation labs (iLabs) ready to work with industry partners in healthcare delivery systems, bio-pharmaceutical production, civil infrastructure, defense and homeland security, and financial services. Government and industry leaders, including U.S. Senator Cory Booker, New Jersey Lieutenant Governor Kim Guadagno, New Jersey Secretary of Higher Education Rochelle Hendricks, New Jersey State Senator Raymond Lesniak and Panasonic Corp. of North America Chairman and CEO Joe Taylor joined President Joel S. Bloom on campus in April for the launch.

Bloom commented, “Economic development is in NJIT's blood

and is expressly stated as part of our mission. From the very beginning, our university was created to provide a skilled workforce that could serve New Jersey industries. Throughout our history, we have viewed industry as a true partner, adapting over time and engaging in a range of business-friendly ventures because we recognize that our success and the success of our graduates are undeniably intertwined with the success of New Jersey industry.”

Booker added, “The New Jersey Innovation Institute is poised to help industries at every stage – from the birth of an idea in a lab to refining how that idea is produced. NJII is

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— Research Professor Zafar Iqbal

TOO HOT FOR SAFETY

NJIT researchers have developed a paint that changes color when exposed to high temperatures, giving a visual warning to people handling material or equipment with the potential to cause burns, malfunction, or explode. The technology was commissioned and funded by the U.S. Army Armament Research Development and Engineering Center (ARDEC) at Picatinny Arsenal in response to dangerous desert conditions encountered in Iraq, where soldiers reported temperatures near munitions sometimes exceeding 190 degrees F, far above design limits.



Research Professor Zafar Iqbal

The joint NJIT/ARDEC development team was led by Zafar Iqbal, research professor in the Department of Chemistry and Environmental Science. Referred to as a “thermal-indicating composition” and applied as a coating or a mark on packaging, the material turns different shades of color from blue to red in response to temperature,

beginning at about 95 degrees F. It was awarded a U.S. patent in May of this year.

“We essentially modified commercial paints and introduced nanotechnology to tailor the trigger temperatures,” Iqbal explains, adding that his laboratory is starting to develop inks related to the innovative coating that can be applied by inkjet printers. The technology has potentially wider applications as well, including as a temperature indicator for factory machines, household appliances and tools, signaling that they have become dangerously hot. It could also warn firefighters of the intensity of a fire on the other side of structures such as doors. ■

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PRINCETON REVIEW: NJIT AMONG THE BEST FOR 2015

NJIT is one of the best institutions for undergraduate education in the U.S., according to The Princeton Review. The education services company features NJIT in the 2015 edition of its annual college guide, *The Best 379 Colleges*. The book, which is The Princeton Review’s flagship college guide, features only about 15 percent of America’s 2,500 four-year colleges.

The Princeton Review profile states, “NJIT is certainly a crown jewel within New Jersey’s public university system. Indeed, armed with a great reputation, NJIT offers undergrads quality academic programs at an affordable price.” ■



BETTER BLEEDING CONTROL

Endomedix, a company housed at NJIT’s Enterprise Development Center, has received a \$1.4 million federal grant to develop a spray-on gel that surgeons could use to stanch bleeding during brain surgery. The gel can be sprayed onto a surgical site, and the natural bio-polymer solutions in the gel will cohere and control bleeding within 30 seconds.

The gel can shorten an intracranial surgery by 30-45 minutes. This translates into less time for the patient’s skull to be open and less anesthesia, reducing both the possibility of infection and morbidity. Shorter surgeries also reduce hospital costs.

The National Institute of Neurological Disorders and Stroke awarded the \$1.4 million to Endomedix to support its research on the gel, technically classified as a medical device. A division of the National Institutes of Health, the institute had previously awarded another grant to Endomedix for the same project.

Endomedix has been developing the gel, known as a surgical hemostat, since 2009. Its applied research phase has been successful – the company has two issued U.S. patents for the gel and anticipates initiating biocompatibility testing, after which it will seek regulatory authorization to begin clinical studies. ■



LEADING IN RESILIENT DESIGN

The American Institute of Architects Foundation (AIAF) has selected NJIT to be the site of a Regional Resilience Design Studio, whose mission is to design and build resilient structures and communities across the Northeast. The studio will be housed at NJIT's Center for Resilient Design, which works to address critical design and sustainable building challenges across New Jersey, especially those that arose in the wake of Hurricane Sandy.

Funded by a \$250,000 grant from Benjamin Moore & Co., the new studio is the first to be launched as part of the AIAF's National Resilience Program, which plans to open five Regional Resilience Design Studios in collaboration with Architecture for Humanity and Public Architecture.

Urs P. Gauchat, dean of NJIT's College of Architecture and Design, says that the studio will be a great asset to NJIT's effort to lead the nation in devising resilient designs. "Natural disasters are a real and imminent threat," says Gauchat, "and we need to find responses that examine not only where we build, but also if we build, then how. NJIT's Center for Resilient Design wants to thank the AIAF for this opportunity to help communities in the Northeast anticipate and recover more quickly from natural disasters."

Thomas Dallessio, director of the Center for Resilient Design, says the studio will allow researchers to design prototypes for resilient houses and businesses and to then turn those models into thousands of built structures. "We will establish the first AIAF studio at NJIT and it will become the flagship for the other regional studios," Dallessio says. ■

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- NJIT researcher Sean Vroom

TRANSIT COMMUNITY KEY

Transit-centered communities that are dense, service-rich and walkable are one of the pillars of developing a sustainable living environment in the 21st century. But the challenge, planners say, is figuring out how to actually create them. NJIT has risen to the challenge with the publication of *Planning for Transit-Supportive Development: A Practitioner's Guide*, a 600-page toolkit of best practices, techniques and transferable "lessons learned" that highlights successes in integrating transit planning with local land-use planning.

"We present methods for identifying project champions, engaging the community and,

ultimately, undertaking meaningful planning to realize economically and environmentally sustainable communities around transit," says Colette Santasieri, director of strategic initiatives for NJIT and the guide's principal author. "We stress the importance of taking a regional view in integrating transit and local land-use planning, with the understanding that transit investments, housing, and environmental policies must be coordinated more closely at the regional level in order to achieve the goals of sustainability on the local level."

Sean Vroom, an NJIT researcher on Santasieri's project team, points to several success stories that serve in the guide as examples for other regions and municipalities to emulate. He cites the Portland Streetcar in Portland, Oregon, and the LYNX

Light rail system in Portland, Oregon.



PHOTO: STEVE MORGAN, WIKIMEDIA COMMONS

END NOTES

Light Rail Transit System in Charlotte, North Carolina.

“Portland Streetcar is a great example of a grass roots effort to stimulate the economy and development using a transit mode, which was then supported by effective land-use planning,” Vroom says. “The LYNX Light Rail System is a great example of the incorporation of land-use considerations simultaneously with the design of a new transit system – something that is not usually done.”

The guide, funded by a \$2.2 million grant from the Federal Transit Administration (FTA), is designed as a resource document for planners on every level, including metropolitan planning organizations, regional planners, transit agencies, local planners and local governments, who want to understand the many nuances of planning for transit-supportive development. ■

The FTA has posted NJIT’s Planning for Transit-Supportive Development: A Practitioner’s Guide (in six different pdfs) on its website at fta.dot.gov/about/12351_8850.html.

Ali Akansu, professor in the Helen and John C. Hartmann Department of Electrical and Computer Engineering, and Ph.D. student Yanjia Sun presented a paper titled “Automatic Inference of Mental States from Spontaneous Facial Expressions” at IEEE’s ICASSP 2014 in Florence, Italy. ICASSP is the world’s largest technical conference focused on signal processing and its applications. Another paper, “The Power of Fear: Facial Emotion Analysis of CEOs to Forecast Firm Performance,” was co-authored with **Assistant Professor James Cicon** of the School of Management and presented at the IEEE Information Reuse and Integration Conference in August.

Cesar Bandera, assistant professor in the School of Management, presented the results of joint research conducted with the National Center on Birth Defects and Developmental Disabilities (NCBDDD) at the Pediatric Healthcare Innovation Conference in Atlanta. NCBDDD is using mobile point-of-care technology developed by NJIT students and Bandera to ensure that children with disabilities receive timely flu vaccines. The conference, hosted by Georgia Tech and Emory University, focused on commercial technology developed through collaboration between engineering schools and healthcare providers.

John D. Carpinelli, professor of electrical and computer engineering and executive director of the Center for Pre-College Programs, received the IEEE Computer Society’s 2014 Distinguished Contributions to Public Service in a Pre-College Environment Award. Carpinelli was cited for “outstanding contributions to pre-college STEM education with an emphasis on students from underrepresented populations.”

Maurie Cohen, associate professor in the Department of Humanities and director of the Science, Technology, and Society Program, has been appointed to serve as a mentor with the Central Asia and Afghanistan Research Fellowship Program funded by the International Development Research Council (Canada) and administered by the Mountain Societies Research Institute of the University of Central Asia. He will be working with Said Ahmad Najafizada, a Ph.D. student in population health at the University of Ottawa, on a project titled “An Evaluation of the Off-Farm Livelihood Skill to Create Sustainable Communities in Rural Bamyan, Afghanistan.”

Deane Evans, executive director of NJIT’s Center for Building Knowledge, delivered a presentation on architecture and building science research in the U.S. to faculty and students at Dali University in Dali, China. The presentation was part of a “Sustainable Housing and Design in Southwest China” study tour organized by the American Institute of Architects focused on sustainable development in Yunnan Province. The purpose of the tour was to explore the potential for implementing strategies for cultural preservation and sustainable development that have not yet been attempted elsewhere in China.

Nancy Jackson, professor in the department of chemistry and environmental science, has been elected a Fellow of the Geological Society of America. Jackson has conducted research assessing beaches behind detached breakwater systems on the Emilia Romagna coastline of the Adriatic Sea as a Fulbright Scholar at the University of Ferrara’s Department of Physics and Earth Science. This work has been funded in part by the National Geographic Society Research and Exploration Program.

Clarisa Gonzalez Lenahan, associate director of graduate studies at NJIT, has been appointed to the New Jersey State Department’s Center for Hispanic Policy Research and Development Advisory Committee (CHPRD). Formerly known as the Office of Hispanic Affairs, the CHPRD seeks to empower and provide financial support and technical assistance to Hispanic community-based organizations throughout New Jersey, and ensure that the executive and legislative branches are informed of legislative initiatives with potential impact on the Hispanic community.

Laurent Simon, associate professor in the Otto H. York Department of Chemical, Biological and Pharmaceutical Engineering, has received an Outstanding Teaching Award from the American Society for Engineering Education.

Raj Sodhi, professor in the Department of Mechanical and Industrial Engineering, recently co-authored the book *Mechanism Design: Visual and Programmable Approaches*, published by the Taylor & Francis Group. Kevin Russell and Qiong Shen, two co-authors of the book, received their doctoral degrees from NJIT.

Murray Turoff, distinguished professor emeritus, has been named a Sloan-C Fellow for his pioneering and visionary research in computer-mediated communications, learning-management systems, and the effectiveness of online learning. Turoff has been engaged in research and development involving computer-mediated communication systems since the late 1960s.

Roman S. Voronov, an assistant professor in the Otto H. York Department of Chemical, Biological and Pharmaceutical Engineering, is the co-author of “Bulk stress distributions in the pore space of sphere-packed beds under Darcy flow conditions,” published in *Physical Review E – Kaleidoscope*.