

ABSTRACTS

HONORING EXCELLENCE IN RESEARCH

The NJIT Board of Overseers awarded its eighth annual Research Prize and Medal to Distinguished Professor of Physics Haimin Wang, a leading authority on fluctuations of the Sun's magnetic field that give rise to solar flares and space weather.



John Seasholtz '59 (left), Chairman of the NJIT Board of Overseers, joined President Joel S. Bloom in presenting the 2015 Overseers Excellence in Research Prize and Medal to Distinguished Professor of Physics Haimin Wang. Photo: Larry Levanti

Wang, who is the chief scientist for NJIT's Big Bear Solar Observatory and director of the Space Weather Research Laboratory at NJIT's Center for Solar-Terrestrial Research, had a key role in NJIT's acquisition of Big Bear from Caltech in 1997 and its subsequent research efforts. He has secured more than 60 federal grants worth more than \$25 million as either a principal or co-principal investigator. He has been funded as a guest investigator for all of NASA's recent major solar missions.

Wang and his colleagues recently produced the first high-resolution images of the magnetic structures known as solar flux ropes at their point of origin in the Sun's chromosphere, allowing scientists to distinguish between relatively mild manifestations and those severe

enough to cause space weather. These observations provide an unprecedented glimpse into the complex dynamics of the Sun's atmosphere as well as insights into massive eruptions on the sun's surface. In 2013, he was appointed by NASA to lead the flare focus team for Living with a Star, the agency's program dedicated to studying space weather that affects the Earth and the interplanetary medium. He also heads an international network composed of nine observatories around the world that constantly monitors the Sun.

The NJIT Board of Overseers Excellence in Research Prize and Medal is awarded in recognition of a sustained record of contributions that has enhanced the reputation of NJIT. ■

SHEDDING LIGHT ON SOLAR FLARES

Solar scientists at several institutions, including NJIT, have shed light on an elusive structure known as a termination shock that is believed to play a key role in converting released magnetic energy from flares into kinetic energy in accelerated particles. Through observations captured by Jansky Very Large Array (VLA), a large radio telescope, they have imaged a shock and its time evolution during a long-lasting solar flare, demonstrating its role in accelerating particles. Their findings were published in *Science* magazine.

"Although predicted by theoretical models, this is the first time we have had direct images and movies showing the repeated formation, disruption and reformation of a termination shock, enabling us to link it directly to particle acceleration," said Distinguished Professor of Physics Dale Gary, one of the authors of the article.

The observations were made possible by the ability of the newly-enhanced VLA in New Mexico to acquire the more than 40,000 individual images per second of observation needed to resolve the rapidly varying emission features produced by the termination shock.

"We have been studying the Sun for many years using observations of its light in a broad range of wavelengths, but we have been unable to observe some of its activities in detail, including those related to particle acceleration," said astrophysicist Bin Chen, who served as the article's lead author and is an assistant professor of physics at NJIT. "Radio telescopes, which are now able to capture tens of thousands of images per second through various frequencies, are giving us much more information on what was previously hidden."

NJIT is expanding its own solar-dedicated radio telescope, the Expanded Owens Valley Solar Array, to observe the Sun every day with many of the same observational capabilities. Multifrequency imaging with high frequency and time resolution will become a standard method of studying solar flares in the near future. ■

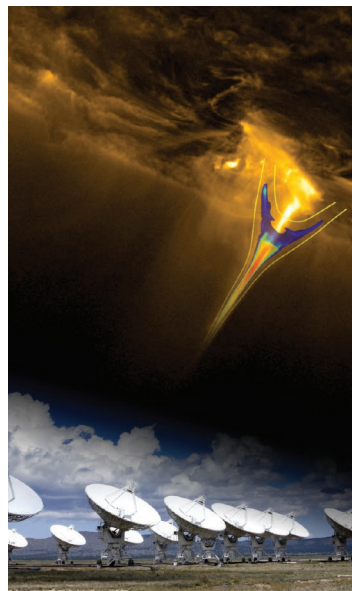


PHOTO: NATIONAL RADIO ASTRONOMY OBSERVATORY AND ASSOCIATED UNIVERSITIES, INC.



Distinguished Research Professor Louis Lanzerotti

A STELLAR CAREER

In the mid-1960s, just as U.S. space exploration was taking off, a young physicist named Louis Lanzerotti with a newly minted Ph.D. from Harvard University and an eager interest in applied research found himself “at the right place at the right time” to begin tackling some of the fundamental challenges of flying spacecraft in orbit around Earth.

“The space program was new and I saw an opportunity to do engineering and science,” recalled Lanzerotti, who interviewed with several major companies involved in early aerospace research and chose AT&T’s Bell Labs. He set to work immediately on some of the country’s first communication satellites, preparing them for travel in the Earth’s near-space environment, a then little-known realm subject to powerful geomagnetic fields and radiation.

“The first communication satellite, Telstar 1, was launched in 1962 and I analyzed data from the detectors flown on the satellite to measure the radiation environment at its orbit altitude. I then worked on the design, construction and calibration of a radiation monitoring package on the ATS-1 test communications satellite, which went up in December 1966. One of the challenges was to prepare the satellite to cope with the electrons and protons that would bombard it at geosynchronous altitudes and potentially burn out its transistors,” he recalled, adding, “The Van Allen radiation belts had just been discovered in 1957 — it was an exciting time.”

Over the course of his career at Bell Labs, Lanzerotti was involved in a wide range of research related

to solar influences on communication systems, including long-distance ocean and land cables and wireless systems.

Now a distinguished research professor at NJIT’s Center for Solar-Terrestrial Research and one of the country’s foremost researchers on space weather and its impacts on both space- and ground-based technologies, Lanzerotti continues to lend his half-century of expertise to efforts by the federal government to better prepare and secure the nation’s expanding, increasingly sophisticated communications and energy infrastructure against potentially catastrophic solar storms. He is currently the principal investigator of data-gathering instruments on the NASA Van Allen Probes spacecraft, which are advancing understanding of Earth’s radiation belts.

Late last year, Lanzerotti was the sole academic researcher invited to take part in the panel discussion “Space Weather: Understanding Potential Impacts and Building Resilience,” convened in Washington D.C. under the auspices of the Executive Office of the President of the United States and attended by scientists and engineers from academia and industry, as well as policymakers and elected

officials. At that time, the U.S. Office of Science and Technology Policy laid out a multi-part action plan to address, as Lanzerotti put it, “civil societal issues related to all aspects of space weather.”

In an op-ed piece that followed, he called the federal plan “impressive for its analyses and coverage of the measurements, data and models that will be required to ensure security under space weather events of all types — from huge geomagnetic storm-produced telluric currents initiated by coronal mass ejections to solar radio-produced outages of GPS receivers to radiation effects by magnetosphere, solar and galactic radiation to satellite drag effects from Earth’s atmosphere and ionosphere.”

He notes that the variety of technologies embedded in space-affected environments has steadily increased over the past century and a half since the first telegraph systems experienced “anomalous currents” in their wires following the powerful solar storm of 1859, known as the Carrington Event.

Given the susceptibility of modern technologies to solar storms with the power to cause electrical grid blackouts, spacecraft failures and the disruption of GPS systems, Lanzerotti and his colleagues are working to better characterize the physical dynamics of space weather in order to build more robust technological infrastructure.

In April, he headed back to Washington to take part in a follow-up symposium, sponsored by the Universities Space Research Association and the Space Policy Institute at George Washington University, on emerging opportunities in the field of space weather for both basic science and practical applications.

“Going forward, more sophisticated and detailed research is required to understand and anticipate solar-related effects on modern technologies, which are increasingly complex both in themselves,” he says, “and in their relationship to their environment.” ■

Author: Tracey L. Regan is an NJIT Magazine contributing writer.

NJIT RECEIVES \$4 MILLION GRANT FOR CYBERSECURITY EDUCATION



NJIT, home to the largest computer science program among all research universities in the New York metropolitan area, continues to build a critical mass and increase its visibility as a top university for future leaders in the field of cybersecurity. The National Science Foundation (NSF) CyberCorps®: Scholarship for Service, a program seeking proposals that address cybersecurity education and workforce development, awarded a \$4,078,362 grant to NJIT’s College of Computing Sciences.

“This is a tremendous acknowledgement of both the strength of NJIT’s College of Computing Sciences and our country’s need to educate top-quality cybersecurity experts,” said NJIT President Joel S. Bloom. “We welcome these new scholars who will be able to take full advantage of NJIT’s interdisciplinary research networks and innovation partnerships.”

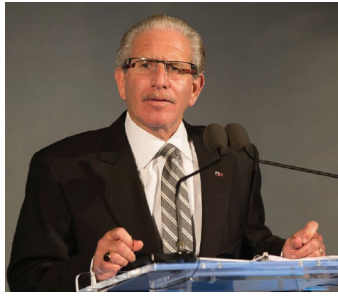
The NJIT Secure Computing Initiative (SCI) will be supported by the funds and capitalize on the premier polytechnic university’s broad range of strengths in cybersecurity to recruit, train and place highly successful cohorts of expert cybersecurity professionals in federal, state and local agency jobs.

Students from within and outside NJIT who are citizens and lawful permanent residents of the United States funded by the grant will receive three-year scholarships that support them through the last year of their bachelor’s program, as well as two years in one of the two M.S. programs in cybersecurity available at NJIT: the M.S. in Cybersecurity and Privacy and the M.S. in Information Technology Administration and Security. ■

NJIT PRESIDENT RECOGNIZED BY U.S. AIR FORCE AND R&D COUNCIL OF NEW JERSEY

NJIT President Joel S. Bloom was recently selected for the Air Force Chief of Staff's civic leader program — one of only a few national university presidents ever requested to serve in such a role. Bloom joins about 30 business and civic leaders from across the nation.

The Air Force Civic Leader Program is an Air Staff-level program whose membership is composed of respected business and community leaders. The Air Force civic leaders are unpaid advisors, key communicators and advocates for Air Force issues. They advise the Secretary of the Air Force, Air Force Chief of Staff and Air Force senior leaders about how missions can best be accomplished and about public attitudes. The program also

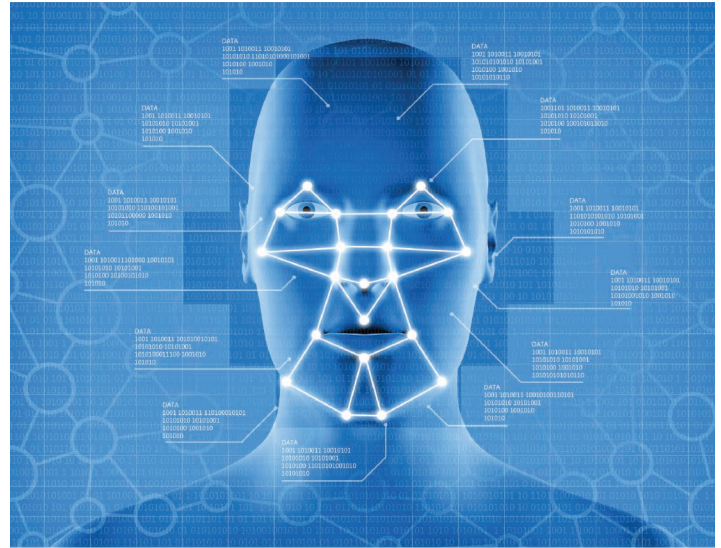


benefits NJIT by offering visibility, access to Air Force R&D and engagement of civic and business leaders from across the nation.

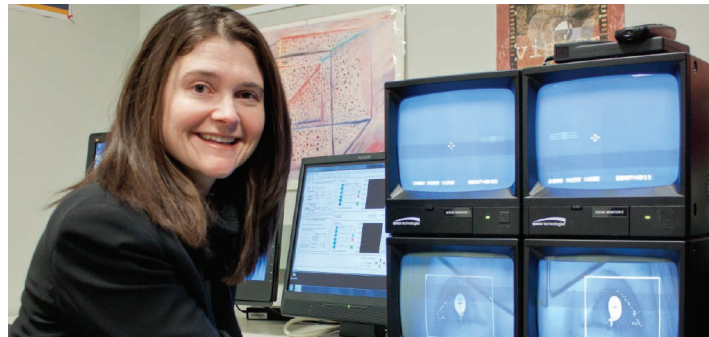
In November, The Research & Development Council of New Jersey named Bloom as Educator of the Year. In his acceptance speech, Bloom discussed how NJIT's legacy of industry-driven innovation and academic excellence leverages the energy and entrepreneurial spirit of today's students. Established in 1962, the Council is dedicated to cultivating an environment supportive of the advancement of research and development in New Jersey. ■

"When the system has a match with someone who appears on camera with someone who isn't allowed on campus, an alarm is generated and Public Safety is called and will respond."

— NJIT security system director Robert Gjini '91



NJIT is home to a cutting-edge, facial-recognition security system.



EYE-OPENING RESEARCH

Tara Alvarez, a professor of biomedical engineering at NJIT, has received an Edison Patent Award from the Research & Development Council of New Jersey for a novel test she and a colleague designed to help eye doctors predict how well their patients will adapt to progressive lenses.

In collaboration with Bérangère Granger, an optometrist with French optics company Essilor International, the world's largest manufacturer of corrective lenses and the creator of the first progressive lens, Alvarez invented a device that measures how quickly people optimize their vision at various distances. The pair's research shows the correlation between two visual systems — the ability to adapt to near or far distances and the speed with which a person's eyes coordinate and converge to see a single image — to the capacity to adjust to progressive lenses.

"Progressive lenses require a sizable investment of money and time and it is helpful to both the patient and the clinician to know who will be able to adapt to them," said Alvarez, director of NJIT's Vision and Neural Engineering Laboratory. "For some people, objects appear larger than they actually are, which can be a problem on stairs and curbs. For others, periphery vision may blur when they turn their head from side to side."

Alvarez and Granger received their award at the 2015 Edison Patent Awards Ceremony last November at the Liberty Science Center. ■

FACE TO FACE

For over a year, the security systems team at NJIT has worked with Panasonic on the implementation of FacePro, a facial-recognition, server-based analytics technology that captures face images of people walking in and out of the Robert W. Van Houten Library.

As students, faculty and alumni stroll through the field of view of the cameras, FacePro captures pictures of their faces using real-time video streams taken by four Panasonic 6 series 1080p i-PRO cameras that hang in the corners of the entryway of the library. The images are then juxtaposed against those stored in a database populated with people allowed on the NJIT campus and another database that catalogs snapshots of those who are barred from campus for a number of reasons.

"When the system has a match with someone who appears on camera with someone who isn't allowed on campus, an alarm is generated

and Public Safety is called and will respond," explained NJIT security system director Robert Gjini '91 who, alongside the NJIT Department of Public Safety, set out on a crusade to tighten up security when the library reported an uptick in property theft.

Since FacePro was installed and the pilot program began on a cloud network last winter, there have been no library thefts reported on campus.

"With the help of our partners at Panasonic, FacePro has proven to be a sound choice to help overcome some security challenges, identify persons of interests on our college campus and drastically lower incidents of theft in the library," said Gjini. "It's fitting that this modern, cutting-edge security system would play a crucial role in upholding the value we place on safety at NJIT, where sophisticated technology permeates all aspects of student life." ■

TWO DISTINGUISHED PROFESSORS NAMED NAI FELLOWS



Distinguished Professors Atam Dhawan (top) and Somenath Mitra (bottom).

Somenath Mitra, a Distinguished Professor of chemistry and environmental science, and Atam Dhawan, a Distinguished Professor of electrical and computer engineering, were named 2015 fellows of the National Academy of Inventors (NAI) for diverse technological innovations that have had impacts in areas like environmental monitoring and point-of-care devices in health care. They were inducted as part of the Fifth Annual Conference of the NAI at the United States Patent and Trademark Office.

Mitra, who has been issued 11 patents, has achieved global prominence for his work in several areas, including trace measurements and diverse nanotechnology applications ranging from flexible batteries, to solar cells, to seawater desalination. “There is a huge and growing demand for potable water coming from developing nations that are modernizing their infrastructure to improve living conditions. At the same time, droughts caused by climate change are reducing supply in many regions of the world, including parts of the U.S.,” said Mitra. “Our hope is to expand the supply of water in places that really need it, while also reducing costs for industry.”

Dhawan’s patent on low-angle transillumination technology for examination of skin lesions has led to the formation of two startup companies with Veinlite and DermLite products that are now being used, respectively, for treating spider vein diseases and the examination of skin lesions for diagnosis of skin cancers. The health IT inventor and advocate is also vice provost for research and founded and directs NJIT’s Undergraduate Research and Innovation program, which provides guidance and academic and corporate mentors to students conducting research on real-world topics, such as smart information systems for social networking and biofuel energy.

“We wanted to create a platform for students that will allow them to try their hand at inventing and even commercializing innovative devices without the risk,” said Dhawan, who is also an Institute of Electrical and Electronics Engineering (IEEE) Fellow and the founding co-Editor-in-Chief of the *IEEE Journal of Translational Engineering in Health and Medicine*. His four issued patents also include cybersecurity and secured data-communication systems inventions. ■

“Building a structure out of cans for an entire day piques the curiosity of those walking by who may not find out about the CANstruction effort to fight hunger otherwise.”

— Monica Gomez '99

CAN-DO SPIRIT

College of Architecture and Design (CoAD) alums and Gensler job captains Jesus Marmol (B.Arch. '08) and Monica Gomez (B.Arch. '99, M.S. Civil Engineering '01) helped to design and construct a mailbox made of over 6,000 canned goods to help feed the nearly 900,000 New Jerseyans who rely on food banks each year.

For 17 years, the Newark and Suburban section of the New Jersey Chapter of the American Institute of Architects has participated in CANstruction, an annual, international design exhibition to benefit local food bank programs.

Team Gensler, in its fifth consecutive year participating in the competition, fashioned the iconic blue mailbox used to snail mail missives. The structure, which stood 72 tuna cans high (7 feet 6 inches) and 3 feet wide by 3.5 feet deep, was on display at the Livingston Mall, where it was critiqued by judges before being dismantled by the Community Food Bank of New Jersey and shipped to a network

of churches, food kitchens and other vendors in need of food.

“It brings attention to an important issue in an unconventional way,” said Gomez, who worked on the Revit model to help develop the design plan of the mailbox, which took home awards for Jurors’ Favorite and Best Use of Labels. “Building a structure out of cans for an entire day piques the curiosity of those walking by who may not find out about the CANstruction effort to fight hunger otherwise.”

As a graduate of NJIT, where faculty and staff take great care to nurture students who are concerned about humanity, Marmol feels that it is his responsibility to use his architecture and design talents to give back to the community.

“We have a creative platform to use our unique skillset to shed light on the unheard voices of concern and solve them through the power of problem-solving design,” he said. “We have the opportunity, so we must take on the challenge.” ■

CoAD alumni helped to design and construct a mailbox made of over 6,000 canned goods. Photo: Gensler



END NOTES

Nirwan Ansari, distinguished professor of electrical and computer engineering, was invited to serve on the panel, “Opportunities and Challenges of Globally Networked Sensors and Cameras” at the 7th IEEE International Conference on Cloud Computing Technology and Science, an IEEE premium conference on cloud computing. He was one of the five expert panelists, and he delivered the panel talk, “Mobile Edge Computing by Cloudlet Networking.” He also presented two other papers: “Green Energy Aware Avatar Migration Strategy in Green Cloudlet Networks” and “Renewable Energy-Aware Inter-datacenter Virtual Machine Migration over Elastic Optical Networks.”

Theologos Homer Bonitsis, associate professor of finance in NJIT’s Martin Tuchman School of Management, was the first keynote speaker at the International Conference on Applied Business & Economics of the International Strategic Management Association, held in November at the University of Piraeus in Greece. His presentation was on “Economic Competitive Inversion: The Greek-German Heuristics.” In November, Bonitsis participated in a panel discussion on “What Are the Future Prospects for the European Union and Eurozone?” and served as Chair of the Finance and Investment Session at the 42nd Annual Conference of the Northeast Business and Economics Association in New York City. He also was part of the “Have Your Research Published Before You Perish” special session of academic journal editors.

Yi Chen, associate professor and The Henry J. Leir Chair in Healthcare in NJIT’s Martin Tuchman School of Management, was named a recipient of a Google Faculty Research Award. Dr. Chen is the PI, and Songhua Xu, assistant professor of information systems, is the co-PI. The highly prestigious Google Research Awards are given to world-class faculty members at top universities around the world conducting groundbreaking research in 23 fields, including computer science, engineering, neuroscience and economics.

P. Ben Chou and **Cesar Bandera**, senior university lecturer and assistant professor, respectively, in NJIT’s Martin Tuchman School of Management, gave a presentation about their working paper “A Game Theoretical Model for Compatible and Incompatible Standards: As Applied to Short and Multimedia Message Services” at the 42nd Annual Conference of the Northeast Business and Economics Association in November in New York City.

James Geller, professor and chair of the Department of Computer Science, presented a paper in December at the seventh International Conference on Knowledge Engineering and Ontology Development in Lisbon, Portugal. The paper, titled “Identifying Pairs of Terms with Strong Semantic Connections in a Textbook Index,” was co-authored by Shmuel T. Klein of Bar-Ilan University in Israel and Yuriy Polyakov, a research professor at NJIT. In November, Geller delivered a keynote address at

the Consortium for Computing Sciences in Colleges Eastern Conference held at Stockton University.

Moshe Kam, dean of the Newark College of Engineering, was selected to receive IEEE’s 2016 Haraden Pratt Award. One of the global engineering organization’s most prestigious honors, the award is bestowed annually by its board of directors for outstanding service to IEEE. Kam, a former president and CEO of the organization, was chosen for his “original and high-impact contributions to IEEE’s educational activities, expanding IEEE’s global reach and effectiveness” over the course of three decades. His efforts to promote engineering education cover a broad range, from introducing engineering to pre-university students to developing advanced continuing education programs for longtime practitioners.

Raj Sodhi, professor in the Department of Mechanical and Industrial Engineering, has co-authored *Kinematics and Dynamics of Mechanical Systems; Implementation in MATLAB and SimMechanics* (Taylor and Francis). The two co-authors of the book, Dr. Kevin Russell and Dr. Qiong Shen, both received doctoral degrees from NJIT. Sodhi was a guest speaker at Thapar Institute of Engineering and Technology University, Patiala, India, on January 14, 2016. The topic was “Graduate Studies and Research at Newark College of Engineering, NJIT.”

Ellen Thomas, assistant professor of marketing in NJIT’s Martin Tuchman School of Management,

presented a paper titled “The Impact of Knowledge Type and Environmental Dynamics on Producer-Supplier Collaborations in New Product Development” at the 2015 Product Development and Management Association’s annual global conference on product innovation management, a premier conference for product management academics and professionals.

Troy West, associate professor emeritus of architecture, exhibited his work as part of the “HACLab Pittsburgh: Imagining the Modern” experimental presentation at the Carnegie Museum of Art’s Heinz Architectural Center. The exhibit explored Pittsburgh’s complex history of postwar architecture and urban design.

Stephen Zdepski, professor in the College of Architecture and Design, has received an honorary commission of Kentucky Colonel by Governor Steven Beshear, State of Kentucky. The award is the highest honor bestowed by the Commonwealth of Kentucky. The Commission of Kentucky Colonel is given by the governor to individuals in recognition of noteworthy accomplishments and for their outstanding service to a community, state or the nation.

Haisu Zhang, assistant professor of marketing and entrepreneurship in NJIT’s Martin Tuchman School of Management, presented two research projects at the research forum of the Product Development and Management Association’s Product Innovation Management Global Conference in Anaheim, California.