

ABSTRACTS

Soon, NJIT drones will have the authorization to fly as far as 14.5 nautical miles out over the ocean...and will be used to help improve public safety and homeland security.



HISTORY IN THE MAKING

NJIT and its partners are the first to conduct unmanned aircraft systems (UAS) flights in the state under a Federal Aviation Administration (FAA) program to test the feasibility of safely integrating drones into national airspace. Earlier this year, researchers from NJIT's Crisis Communication Center conducted a historical unmanned aircraft flight in national airspace over the Atlantic Ocean.



The silver RS-16 aircraft is ready for takeoff.

"We are thrilled to have conducted these flights successfully and safely with the great team we put in place," says Michael Chumer, a research professor of information systems at NJIT and director of the Crisis Communication Center and of UAS Applied Research for the university. "We will now

apply to the FAA to take these capabilities a step further, and at some point we would like to test them during an emergency."

Observers at the test flight, which took place at the U.S. Coast Guard Training Center in Cape May, included representatives from U.S. Sen. Cory Booker's office and emergency management agencies, watched real-time video streaming from the 85-pound drone's tailcam as it flew over the ocean. Soon, NJIT drones will have the authorization to fly as far as 14.5 nautical miles out over the ocean, as high as 10,000 feet, for as many as 16 hours at a time and will be used to help improve public safety and homeland security. ■

SPARKING SPACE RESEARCH

A conversation between NASA astronaut Donald R. Pettit and Boris Khusid, a professor in the department of chemical, biological and pharmaceutical engineering, has led to a discovery about how charged water droplets behave in the microgravity environment of the International Space Station (ISS) with down-to-earth applications that could range from the production of better inkjet printers to more precise techniques for manufacturing polymer fibers, microelectronic devices and improvements in mass spectrom-

The knowledge gained about how the conical surface shape that forms when water and other liquids are electrified and accompany a spontaneous spark and fluid ejection – named a Taylor cone – prompted the development of an important new technique for controlling cone formation before it becomes a spray. “It will now be possible to control the full transition from a Taylor cone to a spray,” says Khusid. This is the key that NJIT researchers have found for improving current applications where Taylor cones are the critical element, and for opening developmental doors to even more practical uses. ■

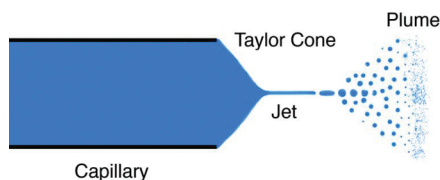
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PHOTO COURTESY OF NASA

etry. It was an experiment that put the astronaut, Khusid and several NJIT colleagues on the path to co-authoring a paper published in 2015 in *Physical Review Letters*: “Detection of a Dynamic Cone-Shaped Meniscus on the Surface of Fluids in Electric Fields.”

Astronaut Donald R. Pettit on board the International Space Station.



ABOVE: diagram of a Taylor cone

“We are applying the biomechanics of this mechanism to a robotic prototype that will be able to adhere to both rough and smooth surfaces...”

– Brooke Flammang, biologist and assistant professor of biology



Green sea turtle with attached remora

FISH STICK

Legendary for being the clingiest fish in the sea, the remora has prompted biologist Brooke Flammang to research the complex mechanism that allows it to grip so tenaciously to swift-moving hosts. The disc on the fish’s head that attaches to the varied surfaces of sharks, rays, dolphins, sea turtles and even other remoras, houses a multifaceted mechanism that could help researchers and engineers create designs for a range of devices that stick well and release easily, including pain-free bandages and tags for tracking endangered species that are more effective than suction alone, but are less harmful than barbs.

Through her work as a biologist and assistant professor of biology, Flammang is hard at work capturing the muscle activity recordings and attachment location of the hitchhiking fish in her lab at NJIT. “We have so much to learn from animals and their morphology. It’s helpful to understand how features that have been naturally selected for performance work so well,” says Flammang. “We are applying the biomechanics of this mechanism to a robotic prototype that will be able to adhere to both rough and smooth surfaces through a variety of challenging conditions, both in water and air.” ■

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PHOTO: RICKY KHARAWALA '15



LINE OF DEFENSE

As criminal acts involving computers and networks continue to rise – the global cost of cybercrime is a staggering \$400 billion per year – cybersecurity has found its place at the forefront of NJIT’s innovative research. Kurt Rohloff, an associate professor in the College of Computing Sciences and the director of NJIT’s CryptoLab, is developing practical methods for a new family of encryption schemes called Fully Homomorphic Encryption, which enables companies to safely share sensitive information.



Kurt Rohloff

“This work essentially addresses one of the primary flaws of cloud computing: that in order to use cloud computing, you need to trust the person hosting your data to not leak it in some way,” says Rohloff, who also works as a contractor for the Defense Advanced Research Projects Agency. “By encrypting the data and still enabling processing on the data, privacy sensitive

industries such as the medical and financial domains can begin to outsource much of their IT infrastructure, and obtain the resulting financial benefits.” ■

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WOMAN OF DISCOVERY

As a scientist, explorer and assistant professor of biological sciences, Daphne Soares investigates how fish have adapted to extreme environments, especially caves. The research, which has implications for understanding the evolution of all vertebrates’ nervous systems – including humans – has earned Soares recognition for her pursuit of science in distant parts of the world.

In 2014, the brave excursionist received a Women of Discovery Award from WINGS WorldQuest, an organization that celebrates and supports the achievements of women explorers whose efforts advance scientific discovery. Actress Uma Thurman presented Soares with the award at a ceremony held in New York City last October.

“Women often do not have the same status as men in some parts of the world,” says Soares, who



Assistant professor Daphne Soares (right) with actress Uma Thurman at the Women of Discovery Awards ceremony.

traveled to Iran to study the *Iranocypris typhlops*, an eyeless cavefish that lives in a subterranean water system that is part of the Zagros Mountains (she also studies cavefishes in Asia and South America). “It’s very helpful to discuss the issues that can arise with women who are out there in the world doing science and exploration, and dealing positively with the cultural challenges that we might face.” ■

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NJIT SHINES IN BROOKINGS RANKING

NJIT ranks in the top 1 percent of colleges and universities in the U.S. for its occupational earnings power – a measure of the market value of the careers it prepares its graduates to pursue, according to a new study by the Brookings Institution, the Washington, D.C.-based think tank. In a second measure, NJIT alumni are among the top 10 percent of high earners for mid-career salaries, as compared with the thousands of two- and four-year colleges and universities surveyed for the study, from Stanford University, to Northeastern

University, to Florida State College at Jacksonville.

The report, “Beyond College Rankings: A Value-Added Approach to Assessing Two- and Four-Year Schools,” looks closely at how well colleges prepare their students for high-paying careers. It bills itself as “value-added” for assessing the contributions that the colleges themselves make to their graduates’ eventual economic success, beyond their ability to attract well-prepared, high-achieving students who would likely succeed anywhere. In assessing occupational earnings power, for example, the study includes metrics ranging from the value of an institution’s curriculum, its STEM orientation and its alumni skills, among others. ■

"The Valentino project was a truly international effort. It's redefining what architecture and retail is on Fifth Avenue."

— Aherin Lee Cox, B. Arch. '03, M.S. '12

FASHION FORWARD

College of Architecture and Design alumnus Aherin Lee Cox (B. Arch. '03, M.S. '12) co-managed the design implementation efforts for the Valentino flagship store in New York City. As a project manager at Tricarico Architecture and Design, a fully integrated architecture, design and planning group based in Wayne, Cox facilitated the relationships with the various parties involved to help bring the

Aherin Lee Cox



PHOTO: BILL MANOLJADIS

Italian luxury label's eight-story emporium to life.

"The Valentino project was a truly international effort. It's redefining what architecture and retail is on Fifth Avenue," says Cox of the store, which opened last August and boasts a massive glass façade made in Germany with top tiers composed of black steel, aluminum and brass. "It's a template. It's setting the new standard. You really don't see retailers on Fifth Avenue doing what they did."

The stunning architectural retail layout – a 27-foot high central atrium with an exposed monolithic staircase, terrazzo walls, palladiana floors, oak shelving and brass fixtures – landed on the cover of *Architecture Record*. "That's really it as far as exposure," says Cox. "You can't do any better than that." ■

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Interior of the Valentino flagship store in New York City



PHOTO: JANINE KRONER

SEASONED VETS

Fifteen veterans graduated from a five-week intensive training program.

NJIT's Division of Continuing Professional Education (CPE) has partnered with Workforce Opportunity Services – a non-profit education and social venture enterprise that prepares highly motivated veterans and young adults for business careers – to identify and train veterans for placement in the workforce as WOS consultants with partner companies.

"What I learned during the program directly relates to the position I'm filling. I use the skills every day," says Nathan Hooper, who received training in project management, corporate communication and Six Sigma tools and is currently enjoying a new career as a project manager at Hewlett-Packard after 16 years of active duty in the military. "People from the military come out of service and we have skills that directly relate to different jobs, but because we've been in the military so long, translating those skills into a resume is almost impossible."

Through UPskill, a program made possible through a four-year grant awarded to NJIT by the U.S. Department of Labor, CPE plans to deliver training to 420 underemployed and out-of-work veterans and midcareer professionals. ■

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