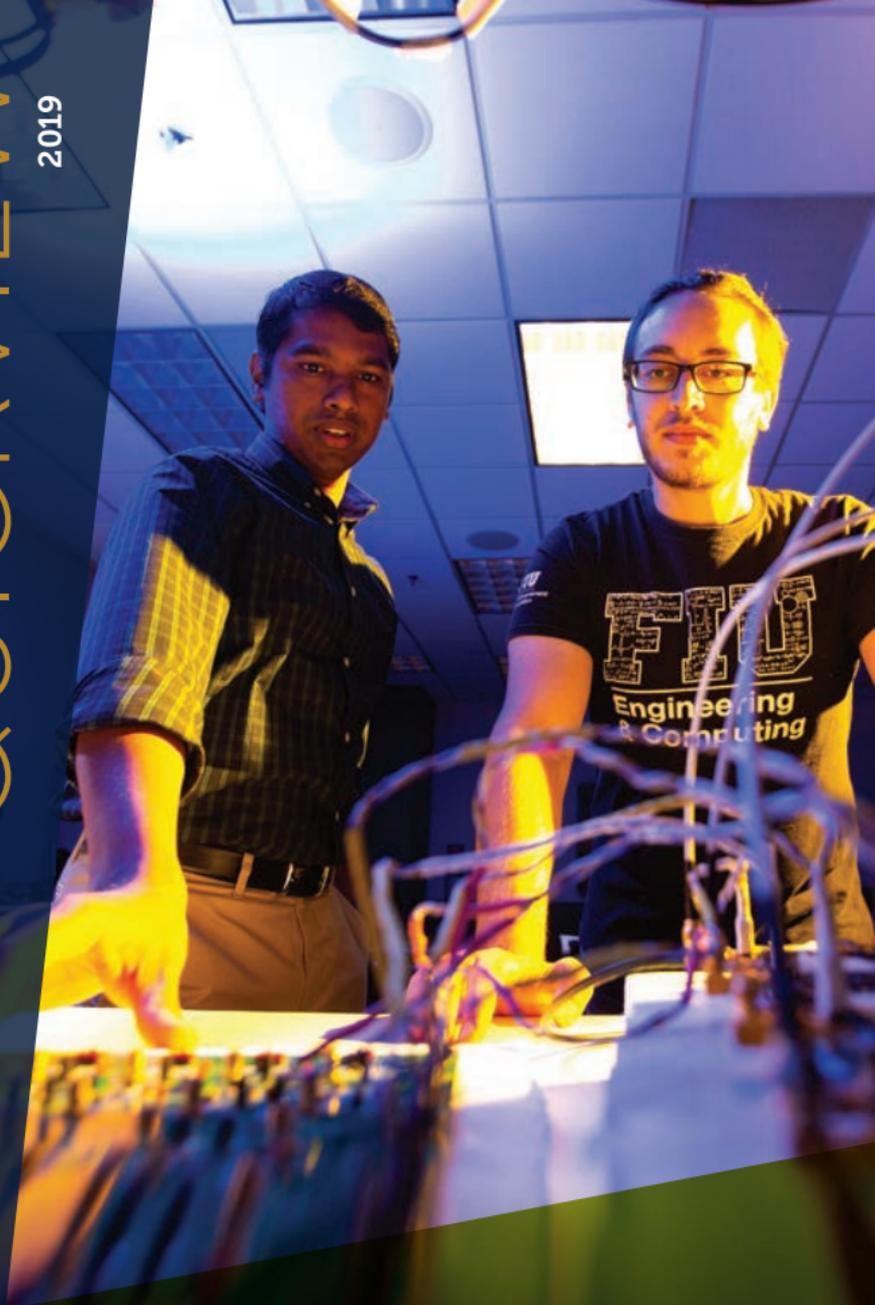


# QUICKVIEW

2019



**FIU** | Engineering & Computing

FLORIDA INTERNATIONAL UNIVERSITY

# Wireless **REVOLUTION**

The next wave in telecommunications is underway. The Air Force Office of Scientific Research awarded FIU a \$4.8 million grant to establish the **Transforming Antennas Center (TAC)**, which is developing innovative and advanced antenna technologies for next-generation Air Force and Department of Defense systems. TAC uses geometric origami, computational design methods and novel materials to enable antennas that change their shape and adapt to varying operating conditions. They can be compactly stowed, easily collapsed and quickly deployed. The antennas will provide groundbreaking capabilities to military communications, reconnaissance, sensing and energy harvesting systems used by aircraft, drones and satellites. The RFCOM Lab also conducts pioneering research in wireless communications, body-worn electronics, RF systems, sensors and sensing, wireless power transfer, photonics and more.



**\$4.8 M**

Air Force Office of  
Scientific Research grant



## State-of-the-Art Testing Facilities

Researchers at the **Advanced Materials Engineering Research Institute (AMERI)** are working on the next generation of advanced materials to power future technology. Among several projects within AMERI, one group is funded by the Army Research Laboratory to research novel materials and coatings that can be applied as a cold spray for aerospace applications. Cold spray is being used for defense-related applications in structural repair, additive manufacturing and surface engineering. By using AMERI's high-resolution microscopy facilities for micromechanical testing, the researchers can evaluate mechanical characteristics of cold sprayed aerospace alloys. The group is part of a nationwide consortium of universities and industry working with the Army Research Lab on scientific, engineering and commercial advancement of cold spray for strategic aerospace material development.

## Spotlight on **STUDENTS**



Engineering students are finding solutions for some of the nation's most pressing challenges. **Mangohacks** is a 36-hour hackathon best described as an invention marathon that incorporates creative coding. Teams identify a problem and find a solution through nonstop collaboration.



The **Senior Design Showcase** is another opportunity for graduating seniors to highlight their talents. In order to graduate, students must work on a senior project that identifies a problem and offers a solution. Past projects include a solar and electric-powered trolley and a transfer system that moves patients from one hospital bed to another. More than 500 undergraduate students from different disciplines showcase their final projects to family, friends and industry affiliates at the event held each semester.



## ROBOTS for Remediation

The U.S. faces the world's largest and costliest environment cleanup project resulting from nuclear weapons production and nuclear energy research. The **Applied Research Center (ARC)** has developed robots to assist with cleanup efforts of contaminated sites across the nation.

These robots allow people to work remotely to assess the structural integrity of radioactive waste systems, protecting them from harmful radiation. ARC has developed various robots, including a wall crawler that scales walls and moves around pipes, a pipe crawler that travels through pipes and a mini rover that makes its way through small, hard-to-access spaces.

# Mentoring the **NEXT** **ENGINEERING GENERATION**

**Engineers on Wheels (EOW)** is an initiative that takes engineering students to South Florida K-12 schools. EOW provides students with hands-on activities and engineering experiments to expose them to STEM. Topics include mechanical and materials engineering, computer science and information technology, biomedical engineering, civil and environmental engineering and electrical and computer engineering.

Every year, more than 1,500 K-12 students from Miami-Dade and Broward Country schools visit the Engineering Center as part of the **Engineering Expo**, now entering its 19th year. As part of the Expo, more than 30 of the college's labs open its doors for demonstrations and hands-on activities. Both EOW and the Engineering Expo are designed to instill in a passion for STEM careers.





## PREEMINENT Programs

A preeminent program at FIU is defined as a collaborative endeavor that demonstrates extraordinary success in providing unique learning opportunities, pioneering research and engagement while expanding the university's financial base.

The **Institute for Resilient and Sustainable Coastal Infrastructure** (InteRaCt) identifies engineering solutions faced by aging infrastructure and develops innovative and economical technologies for the creation of resilient and sustainable communities. The 12-fan **Wall of Wind (WoW)** is the largest and most powerful university research facility of its kind. WoW is among eight labs in the country with the designation of "Experimental Facilities" under the Natural Hazards Engineering Research Infrastructure (NHERI) program, and one of only two nationwide dedicated to studying extreme wind events.

## Student **SUCCESS**

For people living in impoverished communities worldwide, obtaining drinking water is a major challenge. A group of mechanical engineering students built a water purification system known as **SWEET – sterilized water energy efficient transport**. The system consists of a roller that can carry up to 75 liters of water. It provides an easy way to transport the water while using a small generator to power a UV-C LED array to kill pathogens. The students launched a startup and introduced the roller to the Wayuu tribe in La Guajira, Northern Colombia.



Andrew Bowyer and Paula Perez,  
mechanical engineering students

Another student, Giovanni Giannola, a computer engineering graduate, launched his own start-up called **Globalesm, Inc.** Based in Weston, Florida, Globalesm offers a cloud-based platform Internet of Things (IoT) solution for commercial and industrial automation.





## LIFE-CHANGING Research

Years after his hand was amputated in a traumatic accident, a hand amputee can “feel” again, thanks to technology developed by an engineer. The hand amputee was fitted with a **neural-enabled prosthetic hand (NEPH)** system that has a fully implanted, wirelessly controlled neurostimulator.

NEPH, developed by Ranu Jung and her Adaptive Neural Systems Laboratory team, restores a sense of touch/grasp force and hand opening by stimulating sensory nerve fibers in the residual limb with fine wires implanted inside nerves. As muscle activity controls the motors in the prosthetic hand, sensors in the prosthetic hand provide information that commands an implanted neurostimulator to deliver stimulation to the sensory nerve fibers. The elicited sensations can improve control of the prosthesis.

## Learning in **VIRTUAL ENVIRONMENTS**



Engineering students are learning and conducting high-tech research using virtual reality. In the **Moss and Associates Built Environment Informatics Lab (BEIL)**, researchers are studying how to make construction sites safer for construction workers by placing them in a virtual jobsite. There, they encounter hazardous situations, but in the safety of a lab and by doing so, learn how they would react in a real-life scenario.



At the **I-CAVE**, faculty and students can use 2-D and 3-D visualizations of scalable data in a completely immersive and interactive virtual environment.



## SOLUTIONS-DRIVEN: VIRTUAL ROLL CALL

The Pinecrest Police Department wanted to bring policing into the 21st century so its chief, Samuel Ceballos, reached out to FIU's computer science students for help. Together, they developed and implemented a **virtual roll call** that allows police officers to log on to their computers from their patrol cars and get the same information they would at a live roll call, including daily crime reports, **Be on the Lookout (BOLO)** flyers and officer safety alerts.

Virtual roll call eliminates a 15-minute delayed response to assigned patrol zones and allows officers to spend more time policing. The technology received the 2018 IACP/Security Industry Association Michael Shanahan Leadership in Public/Private Cooperation Award.

# CEC at a Glance

