## **Engineering** & Computing

## State-of-the-art **RESEARCH FACILITIES**

The Advanced Materials Engineering Research Institute (AMERI) is an open-access recharge facility that enables the realization of technology advancements in energy, sustainability and health with analytical/fabrication tools for academic researchers, national laboratories and corporations. AMERI provides a wide variety of advanced fabrication processing technologies and analytical testing solutions, including advanced micro/nanofabrication, materials synthesis and processing, failure analysis and testing of materials, 3D printing and electronic packaging.

#### Titan America Structures and Construction Testing Laboratory,

endowed by Titan America LLC, is a structural testing laboratory equipped with capabilities to test full-scale structures to comprehend their short and long term performances, under various human-made or natural forces. The facility is used to develop and test the latest solutions for resilient and sustainable infrastructure. The new technologies being developed address infrastructure challenges faced by the nation, very economically.

## Advancing in their field, EDUCATING FUTURE RESEARCHERS

The **NSF CAREER award** focuses on early-career faculty with the potential to serve as academic role models between research and education and to lead innovative advances within their organizations. In 2019 and 2020, three of our faculty members became NSF CAREER Awardees:

- Elias Alwan, assistant professor, conducting research on antennas, radio frequency systems and millimeter-wave technologies for 5G applications.
- Monique Ross, assistant professor, broadening participation through discipline-based education research to contribute to the retention of women and minorities in computer-related fields.
- **Zhe Cheng**, assistant professor, developing new electrode materials for fuels such as natural gas and biogas.

#### **16** members of our faculty have received the prestigious National Science Foundation CAREER Award

#### **INCREASING CONNECTIONS AND ENHANCING LEARNING** for our students

Thirty-six hours of no sleep, plenty of coffee and a will to do good is the idea behind **ShellHacks**. As Florida's largest hackathon held at FIU, more than 800 students from across the nation build code, develop apps and websites, learn the latest technologies and connect with industry mentors from top tech companies. FIU's chapter of Upsilon Pi Epsilon organizes the annual event.

Dedicated to engineering and computing education research and curricular transformation, **SUCCEED** (School of Universal Computing, Construction and Engineering Education), in conjunction with the STEM Transformation Institute, is the first engineering and computing education school at a minority-serving institution. It offers two degree programs: a bachelor's degree in interdisciplinary engineering and a doctorate in engineering and computing education.

#### Diversity in Tech



## **FULL SPEED AHEAD** with lithium batteries for electric vehicles

Bilal El-Zahab, associate professor in the School of Electrical, Computer and Enterprise Engineering, and his team have a patent pending on a **high-density lithium model** that relies on the chemical elements, platinum and palladium, to boost energy storage capacity. Predictions say the innovation could extend mileage between charging stops as much as 200 percent compared to the current technology. Presently, the maximum mileage per charge for **electric vehicle batteries** is approximately 300 miles. **Lion Battery Technologies**, Inc. plans to commercialize the invention and manufacture a product for consumers. It jump-started the researchers' work with \$3 million. Beyond transportation, lithium batteries have the potential to be used in energy-grid storage and portable electronics.

# Igniting a passion for STEM in the **YOUNGER GENERATION**

Organized by CEC's **Center for Diversity and Student Success**, the **Engineering Expo** is the college's premier annual community outreach event, welcoming more than **1,500 K-12** students from Miami-Dade and Broward County schools. On this day, where younger students can **"Be an Engineer"** for a day, students discover the endless possibilities of pursuing a degree in engineering or computing with tours of more than 30 labs, demonstrations and hands-on activities. The event is funded by the generous contributions of donors such as Chevron, Lockheed Martin and Fiat Chrysler Automobiles.

**ENLACE**, Engaging Latino Communities in Education, is a **six-week summer camp** held at FIU's Engineering Center. The program, supported by **The Children's Trust**, gives fifth-grade to eighth-grade students a safe space to explore what they want to be when they grow up while nurturing in them a love of STEM. At the camp, students don't just learn about technology and engineering. One of the classes focuses on developing social skills and emotions. A fitness class is also incorporated into the curriculum of the camp.

#### Prepared to meet 21ST CENTURY CHALLENGES

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.

An **emerging preeminent program** is a collaborative endeavor with high potential to be designated preeminent. **Cybersecurity@FIU** focuses on digital defense and protection issues that impact the global cyber landscape and examines complex human and social questions related to privacy policies and trust. Taking a multi-faceted approach, the university combines technical cybersecurity strength in areas such as cyber-physical systems, the Internet of Things, and cloud computing and storage with complementary expertise in international and public a airs, business and law.

For a full list of programs, visit **beyondpossible.fiu.edu** 

### Spotlight on AWARD-WINNING STUDENTS



An 80,000-word thesis can take nine hours to present, but at the **Three-Minute Thesis completion** (3MT), doctoral students are given a three-minute time limit to describe their research to a general audience. Sana Nasim, a biomedical engineering Ph.D. student, successfully presented her thesis at FIU's 2020 3MT, where she won 2nd place.

Armana S. Huq, a civil engineering doctoral student at the Moss School of Construction, Infrastructure and Sustainability, was recognized for her research at the Florida Puerto Rico Institute of Transportation Engineering Annual Meeting. Huq's research is on incorporating Intelligent Transportation Systems (ITS) to investigate and identify the primary causes of secondary crashes and mitigate them with advanced technology. Huq was recently chosen as a National Lifesavers Traffic Safety Scholar.





Engineering students, Jose Solis-Camara, Daniel Wilding, SK Yeahia Been Sayeed and Dieff Vital, received 1st place in a poster competition at **the International Microelectronics and Packaging Society (IMAPS) Workshop on Sensors**. Their research is on a new approach for electronics hub to sensor electrode array interconnects.

### Developing NANOMATERIALS TO EXPLORE THE FINAL FRONTIER



Creating materials that can withstand the extreme environment of space is on Daniela Radu's radar. Radu, associate professor of mechanical and materials engineering, is leading the **Center for Research and Education in 2D Optoelectronics (CRE2DO)** created at FIU through a \$3 million award from the NASA MIRO **Program**. CRE2DO researchers explore novel two-

dimensional (2D) functional materials, which are sheets made of a single or few layers of atoms. These nanomaterials are extremely strong, have high flexibility and conductivity, and due to their lightweight, are ideal for applications in space. At the center, researchers are developing cutting-edge technologies that integrate 2D materials in reliable mechanical and electrical components for spaceships, wearable electronics that could enable highspeed communication in lightweight space suits, and cryoengines to power lunar operations. The center's research will contribute to the NASA missions, including the Artemis program, that aim to send the first woman and next man to the Moon, and toward reaching to Mars and beyond.

Radu is a diversity mentor professor at FIU, committed to mentoring women and underrepresented minority students in STEM.



# Cultivating **STRONG RELATIONSHIPS** with industry leaders

The College of Engineering & Computing (CEC) has many collaborations with industry partners, many of which hire our students upon graduation. Companies that employ our students include Lockheed Martin, Fiat Chrysler Automobiles, Farelogix and Citrix Systems.



Meet **Rachelle Tobkes**, a computer science alumna. Through CEC's Senior Design Showcase, where seniors design original projects to create practical solutions for industry problems, Tobkes met the vice president of **Citrix Systems**, a multinational software company providing workspace and cloud computing technologies. She was offered an internship, and three months in, Tobkes became a full-time software engineer. Tobkes played a significant role in prototyping the company's main product, Citrix Workspace. For **her innovation, deliverables and collaboration**, Tobkes received Citrix's "Rockstar Engineering" award.

As CEC alumni, A&P Air Conditioning owners and executives, Adrian Gonzalez and Meyer Sarshalom established the A&P Air Conditioning First Generation Scholarship for Future Engineers Endowment to offer scholarships to first-generation students majoring in mechanical or electrical engineering at FIU.





### TRANSFORMING THE WORLD as ALUMNI

Alexandria Segovia chose to pursue FIU's Internet of Things (IoT) degree because it focuses on cybersecurity and felt it prepared her for real-life product development. As **FIU's first IoT grad**, Segovia gained valuable experience that led her to secure a cybersecurity internship with **United Data Technologies**. She was employed by the company as a cybersecurity consultant. With her skills, Segovia acts as an ethical hacker, assessing the cybersecurity position of other companies to help strengthen and secure their networks.

As a **propulsion design engineer** at Boeing, **Juan Valencia**'s work revolves around auxiliary power unit (APU) development. APU is a small engine installed on the tail end of an aircraft to provide power to an aircraft while parked on the ground. As a mechanical engineering graduate, Valencia works on computer-aided design (CAD) software to design an aircraft part. Valencia was offered the position at **Boeing** when he attended the BEYA (Black Engineer of the Year Awards) Conference.

## **CEC** at a Glance



#### **Research Expenditures**



#### Student Enrollment

Undergraduate and graduate students combined

5,310	5,531	6,094 students	6,984 students
spring 2017	spring 2018	spring 2019	spring 2020
#1 Bachelor's degrees awarded to Hispanics in the U.S. (ASEE 2018) Bachelor's awarded to Americans (ASEE 2		6 degrees fro o African- prog in the U.S. engine 2018) institu	#53 or best graduate gram in biomedical eering among public tions (U.S. News and

#### 5 Schools | Degrees Offered: 13 Bachelor's, 15 Master's, 7 Doctoral



FIU is committed to providing a campus climate free from illegal discrimination, harassment, and sexual misconduct. For more information, visit diversity.fiu.edu

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