

SEE WHY FLORIDA'S TECH FUTURE IS

2018 FLORIDA-WIDE STUDENT ENGINEERING DESIGN INVITATIONAL

BIG

Ten Engineering Colleges to Showcase Student-Made Technology and Designed Solutions

Thursday, April 19 | 10 a.m. to 3 p.m.
UNIVERSITY OF CENTRAL FLORIDA, ORLANDO

From Jacksonville to Miami, to the Space Coast and the High Tech Corridor, Florida's universities are educating and preparing thousands of engineering and computer science students for jobs in the Sunshine state - the nation's fastest-growing economy - and beyond.

In a first-of-its-kind partnership, the deans of 10 Florida engineering colleges have joined to showcase the best of their graduating seniors' innovative concepts, and to collaboratively demonstrate the scope and strength of Florida's talent pipeline of engineering and computer science graduates who are fully prepared to enter the global workforce. Projects to see include:

- advanced vehicles and aircraft
- robotics
- smart sensing technology
- renewable energy and sustainability
- space science and exploration
- civil engineering solutions
- industrial engineering systems
- much more

The University of Central Florida's College of Engineering and Computer Science will host the inaugural Florida-Wide Student Engineering Design Invitational during its Senior Design Showcase, where 130+ projects made by 600 graduating seniors will be displayed. The host university designation will rotate among each partner college in the years to follow.

ABOUT FLORIDA'S INNOVATION ECONOMY

Florida ranks 4th in the nation for high-tech employment, with nearly 237,000 workers. Top industries include modeling and simulation, aviation, aerospace and defense, turbomachinery, agriculture, renewable energy, biomedical engineering, advanced manufacturing, entertainment and hospitality.

Florida's top employers include Lockheed Martin, Harris Corporation, Siemens, Mitsubishi, NASA, Boeing, Disney, Northrop Grumman, and many more. In the 23-county Florida High Tech Corridor, 22,000 firms provide high-wage jobs averaging \$86,000 across all industry sectors.

Florida is ranked the nation's best state for higher education by *U.S. News & World Report*, and its universities are the nation's #1 workforce supplier to the aerospace and defense industry (*Aviation Week*).

With 65,000 open STEM jobs in Florida, highly skilled graduates are in demand. Centrally located in Florida, Orlando was recently recognized by *Forbes* as the nation's top city for STEM job growth.

DEANS

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Embry-Riddle Aeronautical University, Daytona

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STELLA N. BATALAMA, PH.D.
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MARCO CARVALHO, PH.D.
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Florida Institute of Technology, Melbourne

JOHN L. VOLAKIS, PH.D.
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MICHAEL GEORGIPOULOS, PH.D.
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University of Central Florida, Orlando

CAMMY R. ABERNATHY, PH.D.
Herbert Wertheim College of Engineering
University of Florida, Gainesville

JEAN-PIERRE BARDET, PH.D.
College of Engineering
University of Miami, Miami

MARK A. TUMEO, PH.D.
College of Computing, Engineering & Construction
University of North Florida, Jacksonville

ROBERT H. BISHOP, PH.D.
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PARTICIPATING ENGINEERING SCHOOLS



CONTACT

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2018 FLORIDA-WIDE STUDENT ENGINEERING DESIGN INVITATIONAL

EMBRY-RIDDLE AERONAUTICAL UNIVERSITY College of Engineering

Maritime RobotX Challenge: USV Propulsion and UUV Teaming

“Minion” – a 16-foot-long autonomous surface vessel for competition. Platform allows for multi-vehicle teaming and includes a unique propulsion system.

Hybrid-Electric Camaro ESS for EcoCAR3 Competition

Challenged to refit a stock 2016 Camaro into a hybrid-electric vehicle, ERAU’s design maintains the classic Camaro look with 57 MPGGE (miles per gallon gas equivalent), goes 0 to 60 in under 5 seconds, and has 657 foot-pounds of torque and 350 horsepower.

Integration of Augmented Reality and Neuromuscular Gesture Recognition for Remote Vehicle Operations

By integrating wearable devices (AR headset and gesture-control armband) as a control system, operators gain mobility and situational awareness. The entire system is a secure network that allows long distance communication between users and vehicles.

FLORIDA A&M UNIVERSITY – FLORIDA STATE UNIVERSITY College of Engineering

Autonomous Ground Vehicle Platforms for DeXter™ System

To create a more fluid manufacturing environment, this multifunctional printing system could replace the industry standard of single machine operations. It facilitates multiple machines to work cooperatively to enable simultaneous fabrication of unique and customized builds.

DriGo Weather Protection System for Wheelchair Users

A motorized umbrella system to protect wheelchair users from the rain and sun. It mounts to the back of the wheelchair and deploys with a single touch of a button. An inverted design avoids the user as the umbrella opens and prevents dumping water as it closes.

PowerNap: Electrically-Stimulating Oral Appliance for Those with Mild to Moderate Obstructive Sleep Apnea

Current treatment options are invasive, and range from uncomfortable forced-air face masks to oral appliances that hold the mouth partially open. This alternative solution is an oral appliance that allows a closed-mouth position and stimulates the relaxed tissues in the throat when it senses decreasing oxygen levels.

FLORIDA ATLANTIC UNIVERSITY College of Engineering and Computer Science

“Oceanus Vi”: Micro Hydro- Electric Kinetic Power System

Designed for its potential as a personal-use turbine to convert the mechanical energy of moving water into electricity, store the power and dissipate it when needed.

Little Havana Mixed-Use Development

Designed according to the MIAMI-21 code, the Florida Building code, and implements the environmental aspects of LEED to achieve a gold certification, the innovative design will produce a healthy environment while optimizing energy usages.

“N.E.R.D.” – Nearby Robotic Delivery Service

An autonomous robotic platform designed to assist with the delivery of mail and food across a college campus. NERD is a full ordering system that allows customers to place orders on a website or mobile app.

FLORIDA INSTITUTE OF TECHNOLOGY

Orbital Management System for Space Debris Removal

A potential solution to assist with space debris removal, this is a lab prototype of a robotic orbiter, Cerberus, capable of locating, tracking, approaching, and capturing target objects; and a docking interface (Typhon Refuel and Recharge Interface for Cerberus Capture System) that can capture, refuel, recharge, and release the robot

PEREGRINE Jet Unmanned Aerial Vehicle

Intended to expand FIT’s Flight Test Engineering capabilities, this high-speed UAV will give more students hands-on experience with flight testing. This aircraft was designed to perform at slower subsonic speeds and transonic speeds due to the maximum testing velocity of 100mph set by FAA regulations.

“CARACAL” (3D Bio-Printer)

The main problem in bio-printing is finding an affordable, standalone system with a sterile chamber to sustain 3D printed tissue. Caracal features complete climate control inside the printing chamber: maximizing humidity, temperature control and carbon dioxide concentration to maintain cell viability. Bioprinters can cost \$10,000-\$250,000. This prototype cost is \$1,500.

FLORIDA INTERNATIONAL UNIVERSITY College of Engineering and Computing

In-Situ Mass Sensor for Materials Used in Next Generation Space Vehicles

The proposed device captures in real-time the continuous changes in mass experienced by high-temperature-resistant materials exposed to velocities and temperatures similar to those in re-entry environments of space vehicles.

Autonomous Real-Time Indoor Navigator

This robot implements the Simultaneous Localization and Mapping algorithm incorporating image processing and data mining to navigate and accurately map indoor layouts, upload the layout details to a centralized database, which can be referenced for path planning tasks.

Vein Preservation System for Coronary Artery Bypass Graft Surgery

When storing the Saphenous vein during this surgery, vein damage can occur. With this system, the vein will be connected to an interface that will pump nutrients through the vein using optimal flow conditions. This first-of-its-kind device is reusable, biocompatible and sterile.

UNIVERSITY OF CENTRAL FLORIDA College of Engineering and Computer Science – 2018 HOST

More than 120 projects made by 600 graduating seniors will be showcased, involving Computer Science; Electrical and Computer Engineering; Industrial Engineering; Mechanical and Aerospace Engineering; and Optics and Photonics.

UNIVERSITY OF MIAMI College of Engineering

Automated Cell Cluster (ACC) Quantification for Diabetes Research with MIN6 Spheroids

Diabetes treatment research involves the transplantation of certain-sized islets, requiring a timely way to precisely measure the size of islet clusters. This ACC precisely quantifies the size distribution of multiple cell clusters at once with a user-friendly interface. A moving microscope exports images to software which uses segmentation to analyze the data.

Automatic Power Grip Exercise for Spinal Cord Injury Patients

For researchers to objectively test a patient’s motor skills and automatically record their progress. The device is a board with several indentations, and when a specific one lights up, the patient must place a cylinder in it. Sensors record reaction time between indentation light and cylinder placement. A report of reaction times is generated.

UNIVERSITY OF FLORIDA Herbert Wertheim College of Engineering

Bench-Scale Process Design for CO2 Separation and Transportation for Sustainable Algae Growth

A proposed chemical absorption column for OUC that removes at least 10% of carbon dioxide from flue gas. In a plant, flue gas will interact with a sodium hydroxide solution that will capture CO2 and create a buffer that will be later transported to algae ponds. With this design, power plant carbon emissions will be reduced drastically, and captured CO2 will be used for the biofuel market.

Telescoping Mast Drive Assembly for Harris Corporation

A drive system to deploy Harris’ telescoping mast precisely and repeatedly in a space environment. Design includes a telescoping tube system. Threaded tubes are stored within each other. Using a motor and gearbox, the tubes are unscrewed, with the bottom tube always rotating. Inside the tubes, round telescoping tangs stop the top tube (attached to the space structure) from rotating.

ALTAS: Audit Log Threat Analysis System for The Walt Disney Company

Modern software systems can generate gigabytes to terabytes of logs a day. Within the massive volume of data are anomalies that can indicate malicious activity within a network. This cloud-based software application detects threats on local computers to ensure client security without compromising privacy. Scalable, customizable and affordable.

UNIVERSITY OF NORTH FLORIDA College of Computing, Engineering & Construction

Strap-to-Wire Automated Welding System

An automated process in which a 20 AWG wire is spot welded to a small nickel strap. These high-volume components are used in smart battery packs to connect individual battery cells to circuit boards and other components. This system will allow 2-3 paid technicians to perform other tasks.

La Esperanza’s Drinking Water Distribution System

Sustainable, highly constructible, maintainable, and culturally acceptable for the Guatemalan community, this system consists of two 10,000 L tanks at the point of highest elevation, fed into four distribution lines that will service every home and a school.

Automated Final Product Testing of a Peristaltic Pump for Stenner Pumps

Automates the testing procedure to decrease testing time per pump, while reducing human error. The system uses a smart camera, a programmable logic controller, and small pneumatic cylinders. The template could be adjusted to work with a variety of pump models.

UNIVERSITY OF SOUTH FLORIDA College of Engineering

Phytochemical Nanoparticles for Alzheimer’s Treatment & Preventive Care

A proposed nanoparticle-encapsulated product – containing cannabidiol, polyphenolic antioxidants and caffeine – for treating Alzheimer’s Disease. Cannabidiol from hemp and polyphenolic antioxidants (extracted from blueberries) improve cognitive functions, and may slow disease progression. Caffeine has been shown to shield neurons from disease-causing amyloid plaques.

Mixed-Reality C-130 Loadmaster Simulation for CAE USA

This mixed-reality simulator provides an immersive and highly realistic experience to train military personnel for the role of Loadmaster in a C-130 aircraft. The Loadmaster is responsible for loading, securing, and deploying cargo. Combines a real-world view of C-130 cockpit instrumentation with VR technology.