



Research at



Engineering
& Computing



- South Florida's leading engineering education and research resource with 6000 students, including 900 Graduate Students
- FIU in #4 in size nationally
- FIU's College of Engineering and Computing is #19 in size nationally

Departments/Schools:

Biomedical

Civil and Environmental

Computing & Information Sci.

Electrical and Computer

Mechanical and Materials

Moss School of Construction,

Infrastructure and Sustainability

Enterprise & Logistics Engineering

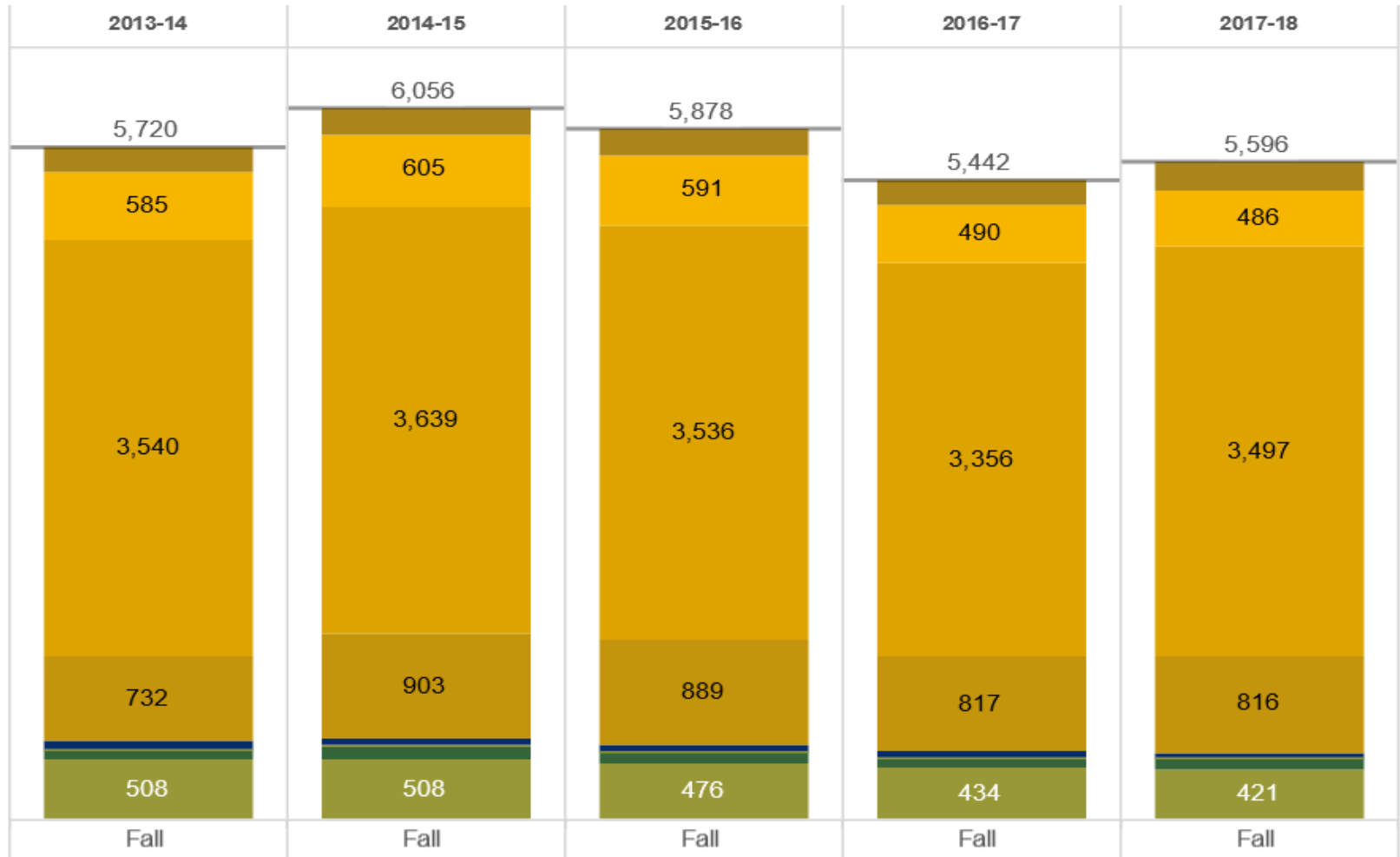
- ~\$25M of annual external research funding
- Largest producer of Hispanic engineers, and one of the top producers of African-American engineers and females with Ph.Ds. In Engineering



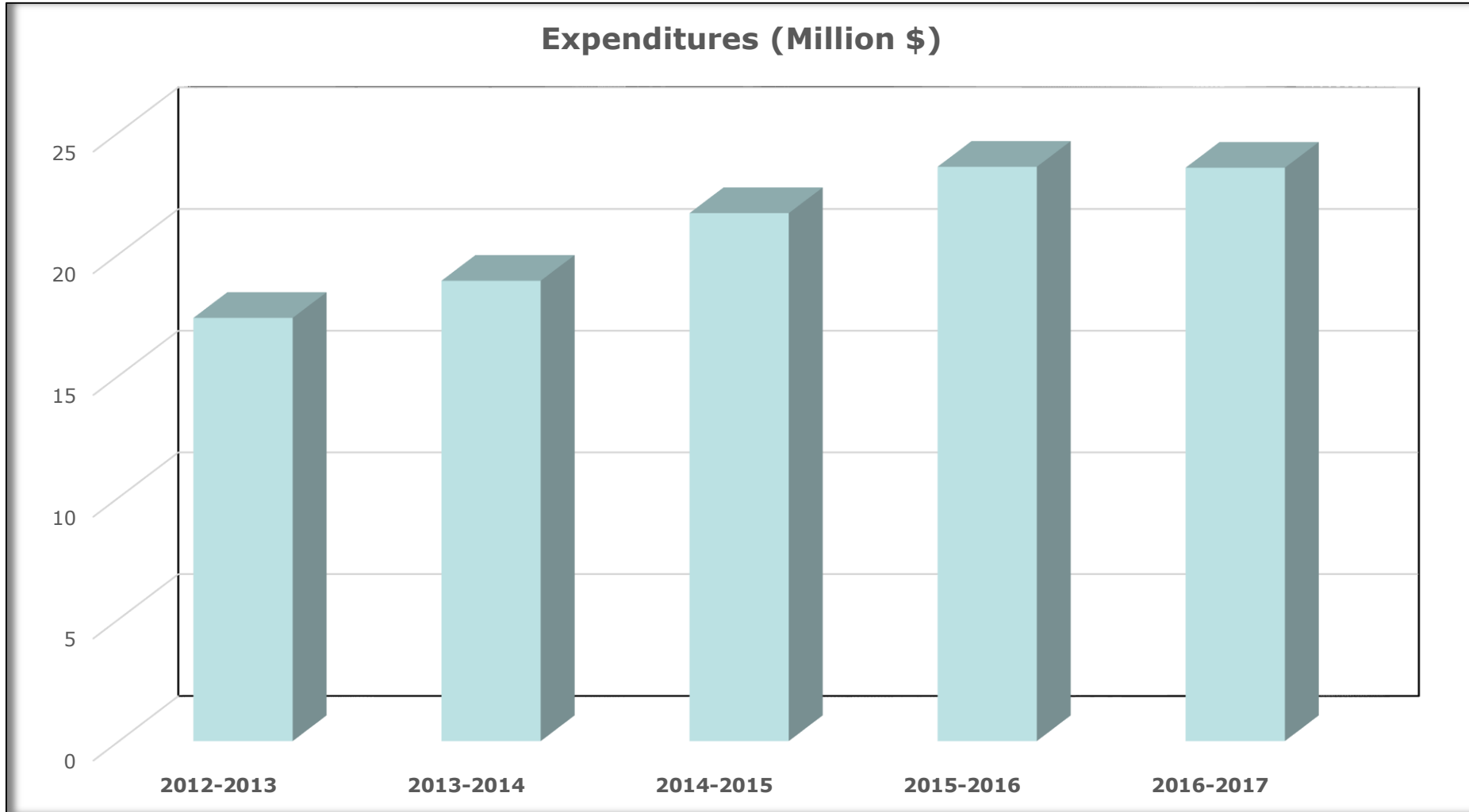
Student COUNT

Display by Student or Program Characteristics

Ethnicity / Race



Research Expenditures (CEC+ARC)



PATENTS FROM CEC FACULTY

- 30% of our Faculty are Fellows of their technical societies.
- 10 are NSF CAREER award winners.
- Our Faculty and Researchers hold numerous patents, provide consulting services to national and international organizations and serve as officers in leading professional societies.

Number of patents/ year to CEC Faculty	FY 2013- 2014	FY 2014- 2015	FY 2015- 2016	FY 2016- 2017
	3	2	5	17

- **Cross-Cutting Themes**
 - Engineering Tools of Scientific Discovery
 - Advance Personalized Learning
-

1. Smart and Sustainable Built Environments

- Restore & improve Urban Infrastructure
- Make Solar Energy Economical
- Provide Access to Clean Water



2. Augmented Connectivity

- RF/Wireless Infrastructure For Information Transfer (RF/WIFIT)
- Secure Cyberspace
- Enhance Virtual Reality
- Sensors and Nanotechnology

3. Health and Well Being

- Engineering Better Medicines
- Reverse-Engineer the Brain
- Advance Health Informatics



- **Bridge Engineering:** Accelerated Bridge Construction University Transportation Center (ABC-UTC)
- **Wind Engineering:** Wall of Wind (WOW)
- **Transportation Engineering:** Lehman Center for Transportation Research



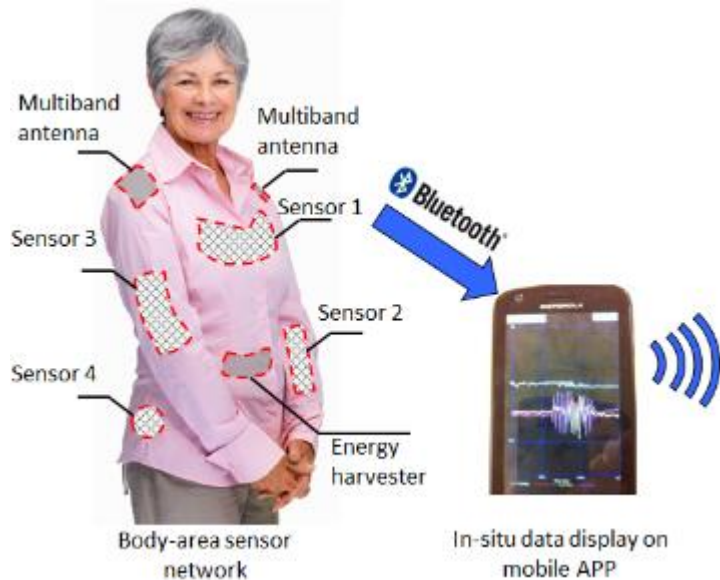
The **FIU Wall of Wind** is a National Science Foundation Experimental Facility, capable of simulating **Category 5** hurricane winds, **with water.**



Solar Energy: FPL-FIU Partnership built 1.4 MW Solar Array

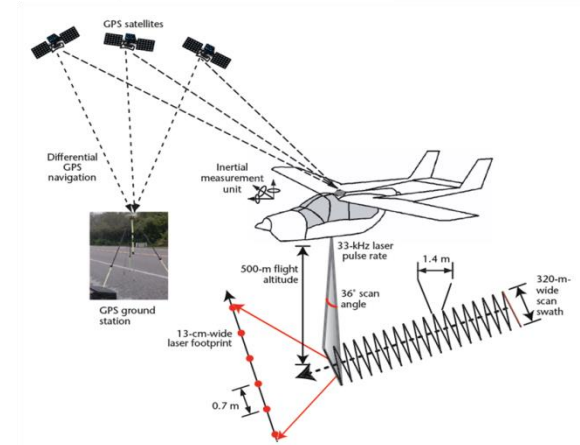
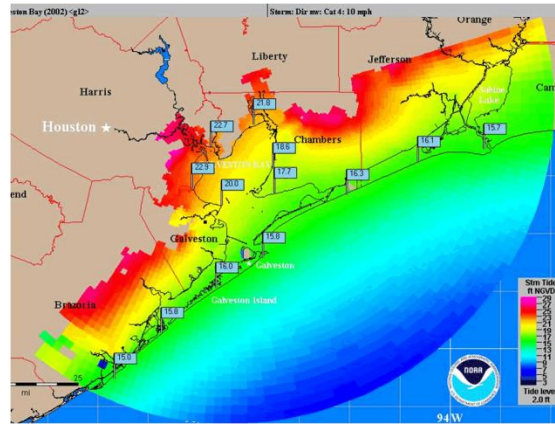


- Sensors
- Cybersecurity
- Communication Technology

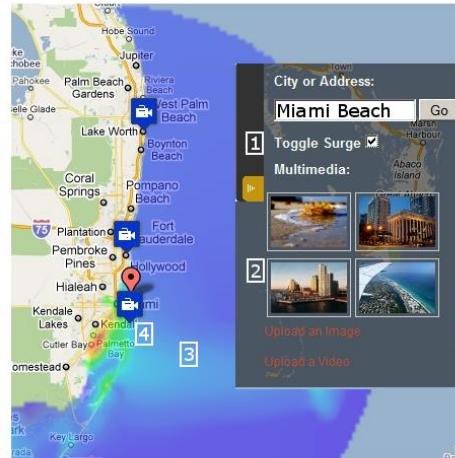
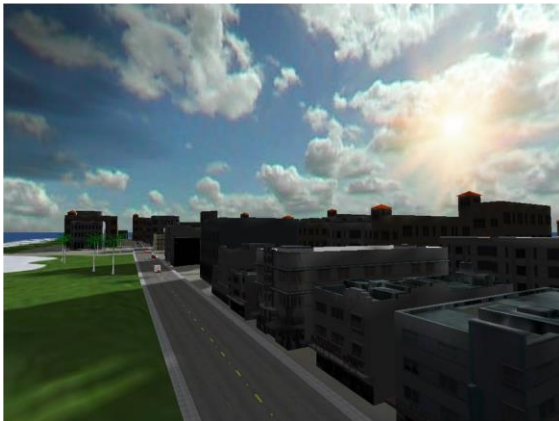


FIU researchers working on protecting nation's power grid from cyber attacks

Smart Cities and Disaster Management Tools

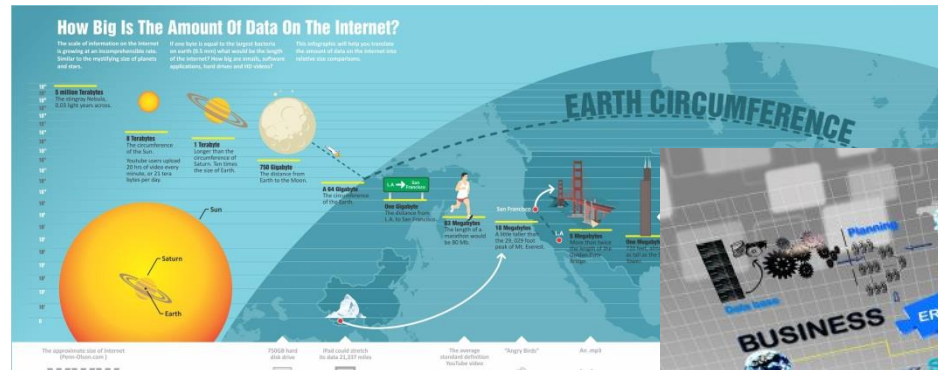


Integration of computer modeling data and remote sensing data:
(Storm Surge + Meteorological + Topographical + Real-time Road Data)



Volume

- Available data
- Available sources



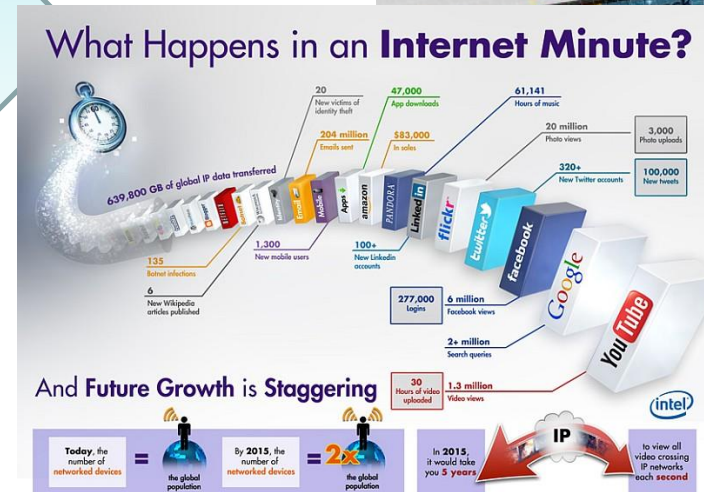
Variety

- Data Types
- Analytical Methods



Velocity

- Data flow
- Decision Making



Involves high performance algorithms /architectures including machine learning algorithms for cloud computing systems

Service Analytics

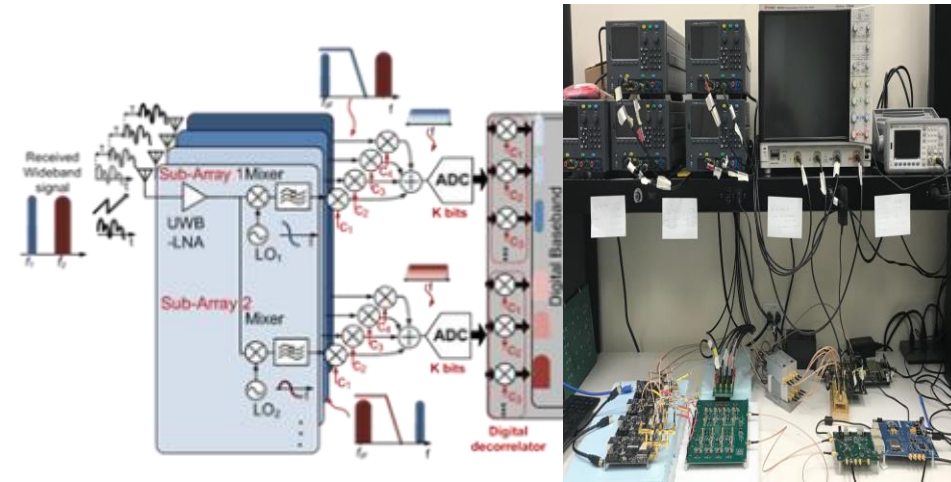
System and Cloud Analytics

Social Media Analytics

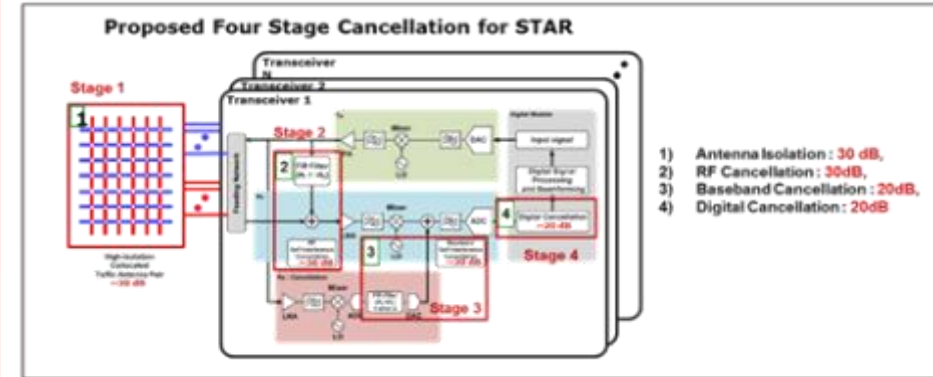
Tetherless Communication

(secure and high data rate communications using ultra wideband low power hardware)

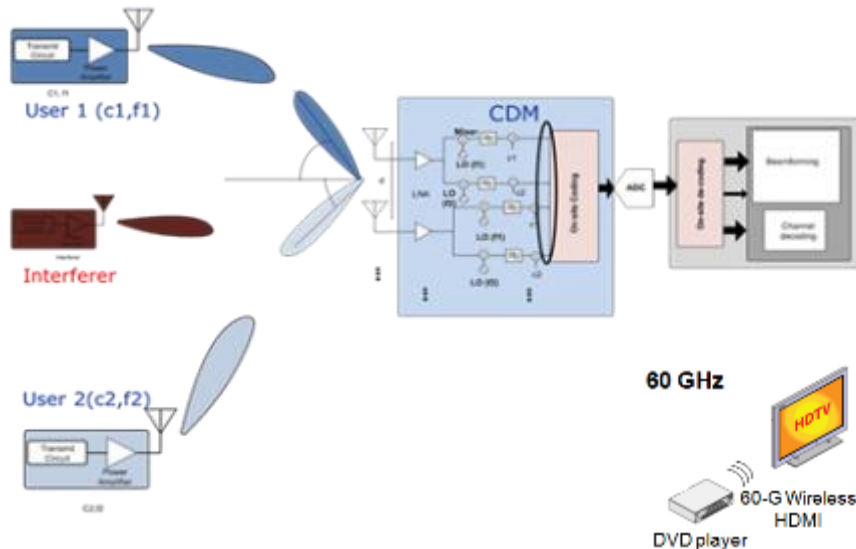
Digital Beamformers



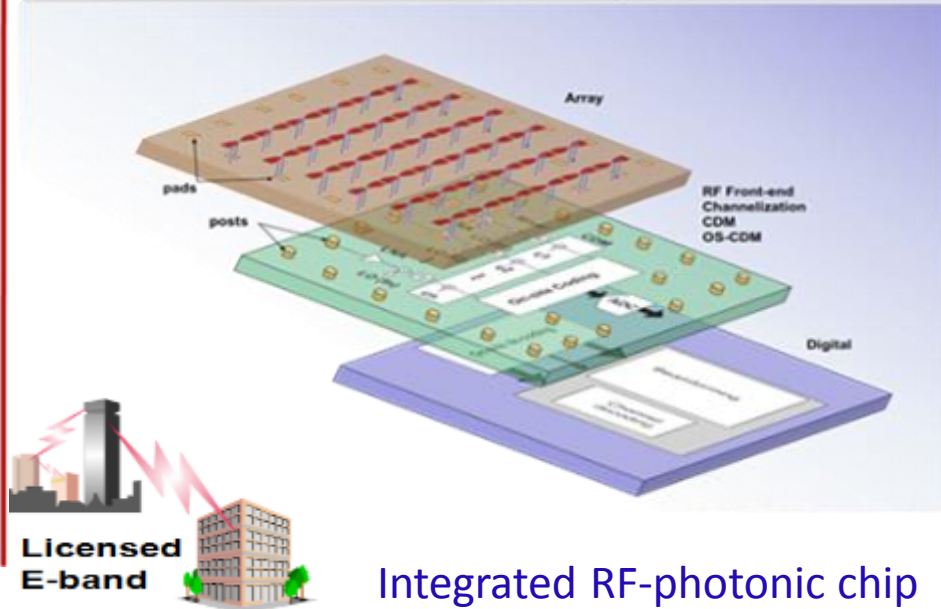
Simultaneous Transmit and Receive Systems

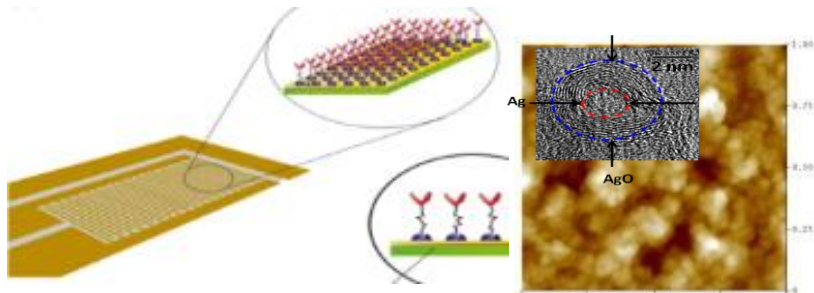


High Data Rate Communication with Interference Suppression and MIMO



5G Millimeter-Wave Systems

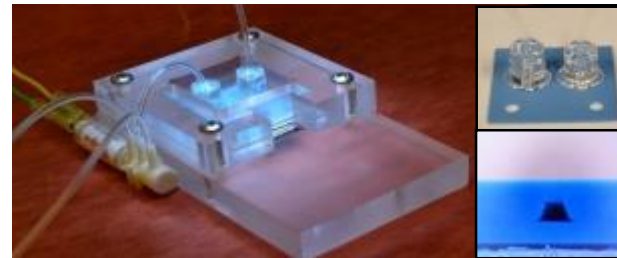




Planar electrode modified with Abs

AgO - Label free mediators

Cortisol Sensing

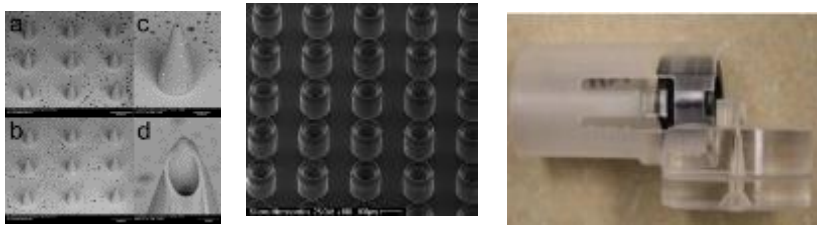


Microfluidic platform



Hardware

Biological sample collection



Microneedles

ICF collection device

Wearable Sensors

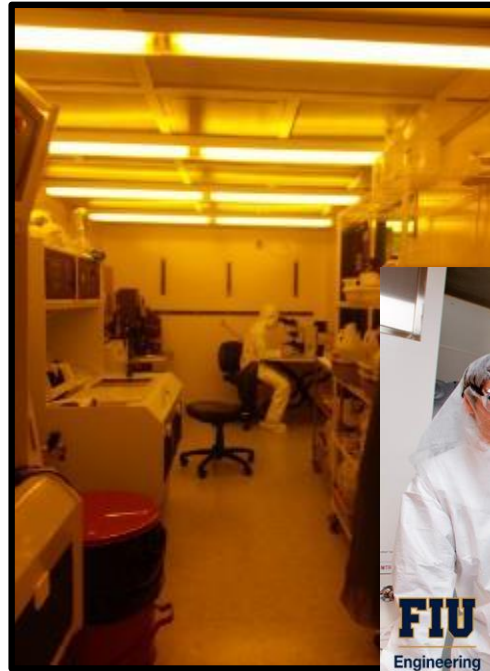
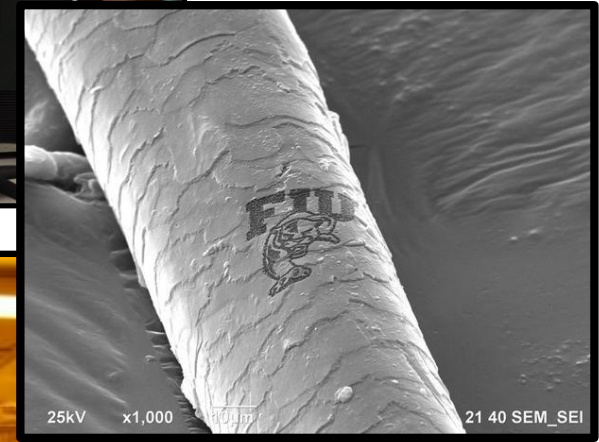
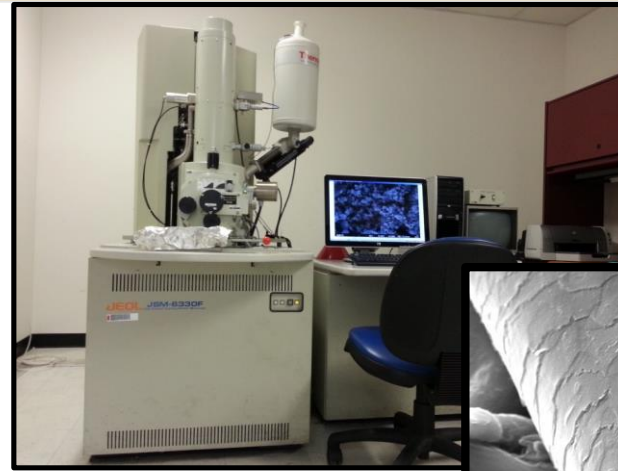


Complex activity sensing

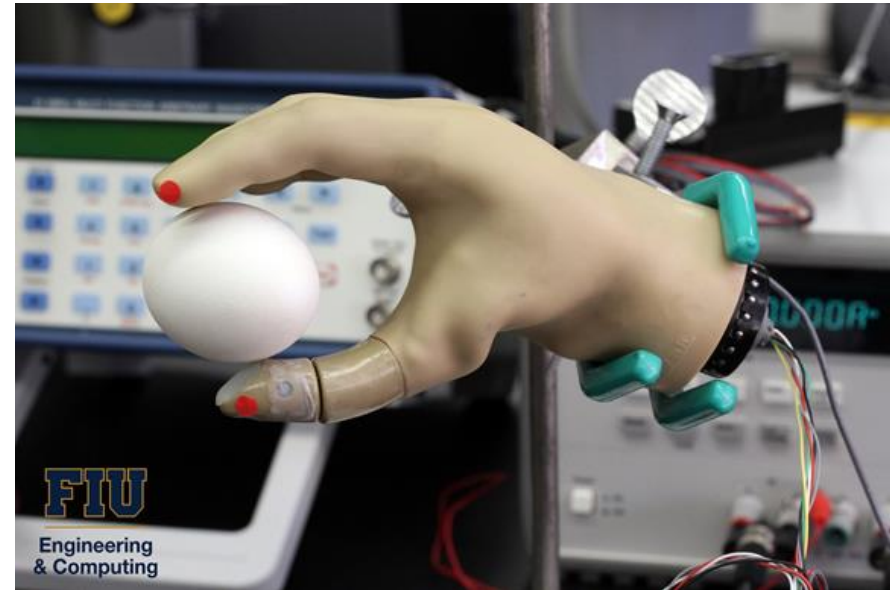


Alcohol sensing

- The Advanced Materials Engineering Research Institute (AMERI) is an **open access facility** which provides infrastructure to support nanotechnology, device and sensor fabrication, materials development and failure analysis research and education over a broad range of technology and capabilities.
- AMERI provides analytical instrumentation, materials characterization, process development and 3D printing laboratories to support faculty, students and industry.



- Biomedical Devices
- Neurotechnology
- Nanotechnology
- Cell and Tissue Engineering



New ERCs

- ❑ **Nanosystems Engineering Research Center for Directed Multiscale Assembly of Cellular Metamaterials with Nanoscale Precision: CELL-MET, led by Boston ---Arvind Agarwal (Co-PI), Chenzhong Li, and Jin He**
- ❑ **PATHS-UP (Precise Advanced Technologies and Health Systems for Underserved Populations), led by Texas A&M.--- Jessica Ramella-Roman, Chunlei Wang and Norman Munroe.**

On-Going ERC & STC

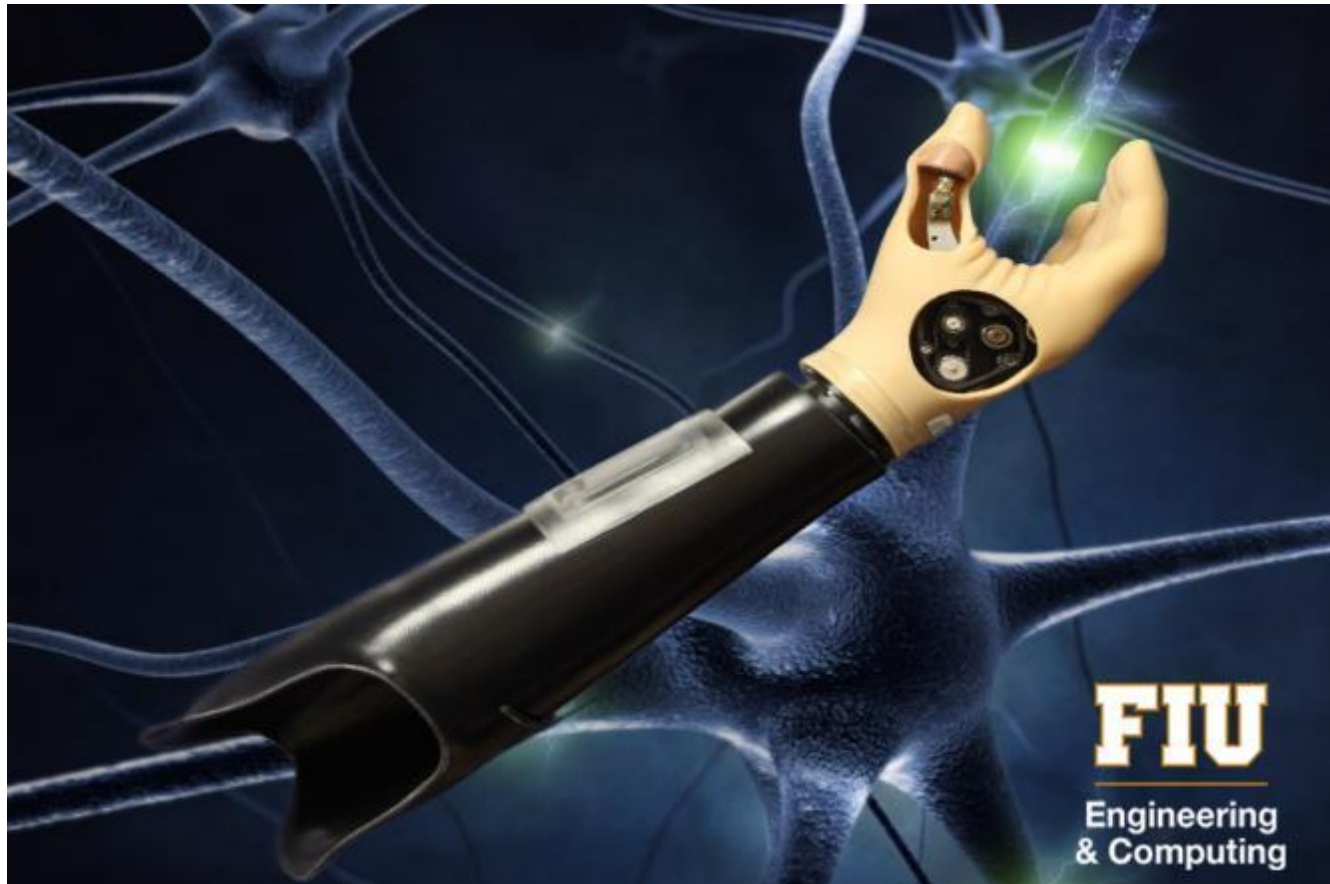
- ❑ **ASSIST (Advanced Self-Powered Systems of Integrated Sensors and Technologies), led by NC-State---Shekhar Bhansali**
- ❑ **Energy-Efficient Electronics Science (E3S), led by UC Berkeley--Sakhrat Khizroev**

<https://news.fiu.edu/2017/09/fiu-to-collaborate-on-health-breakthroughs-through-nsf-engineering-research-centers/115463>

<https://e3s-center.berkeley.edu/research/>

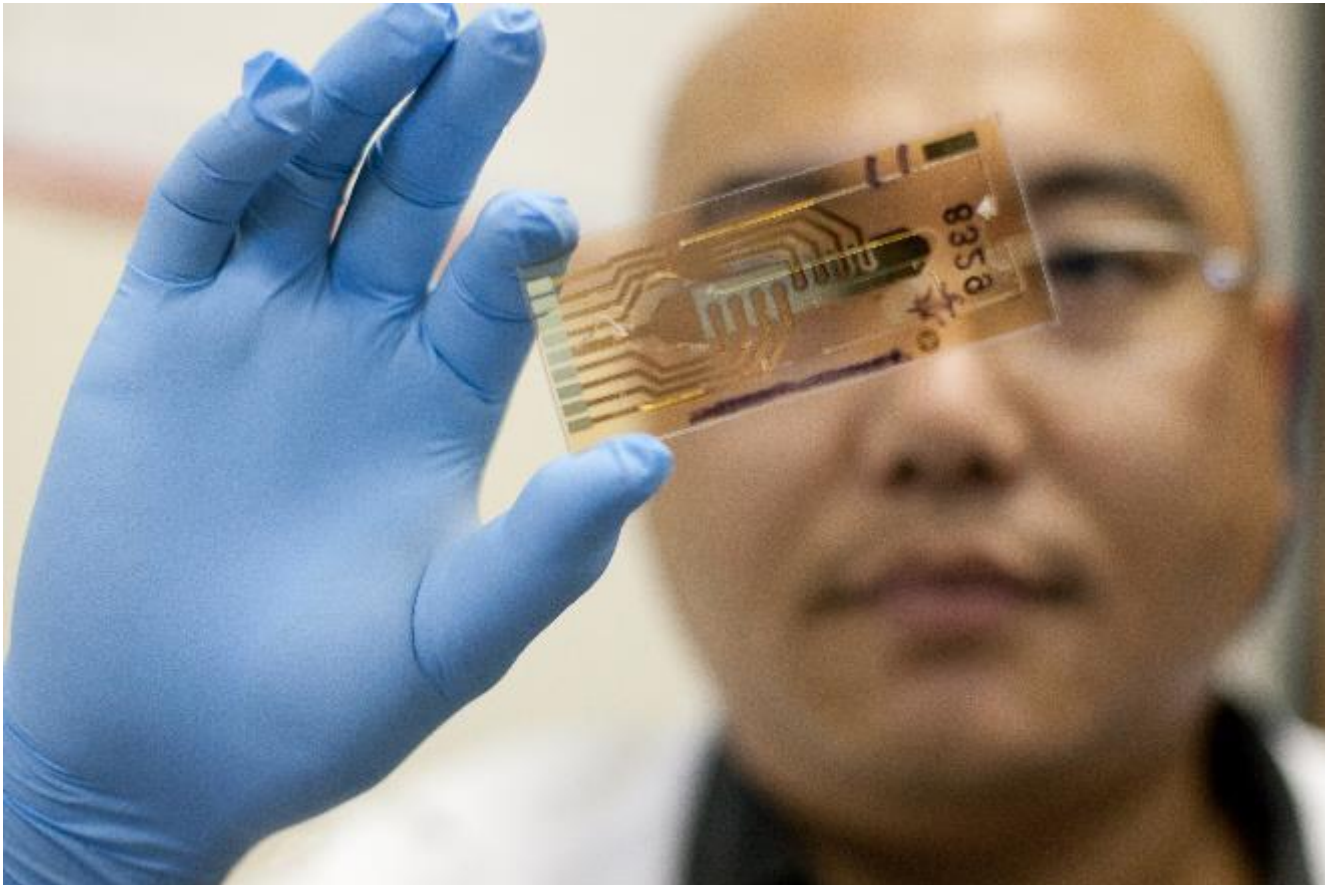
ANS:

Adaptive Neural Systems Laboratory



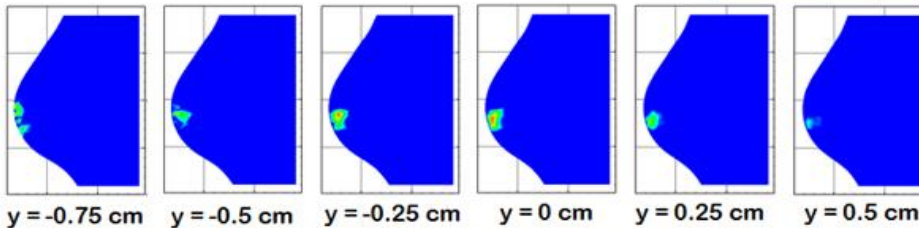
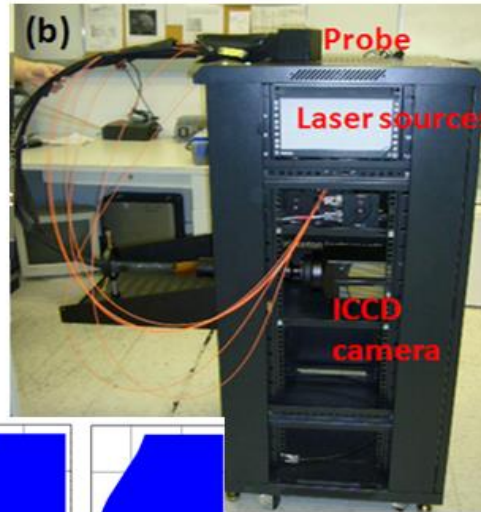
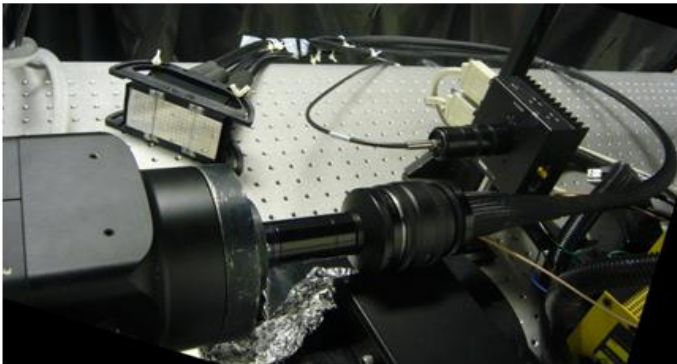
NANOBIO

Nanobioengineering/Bioelectronics Lab

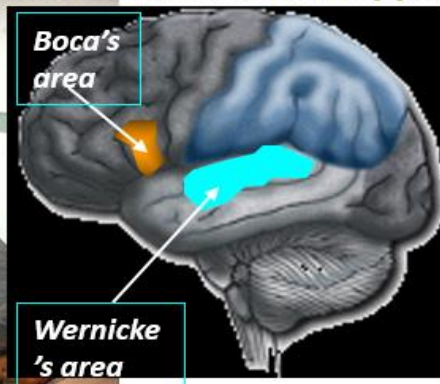


OIL: Optical Imaging Laboratory

Breast Cancer Studies



Functional Brain Mapping



Diabetic Wound Monitoring



- ARC is a university-wide center to **solve real-world problems** through multi-disciplinary research collaborations.
- Key Research Areas:
 - Environment and Energy
 - Aerospace and Defense
 - Cybersecurity and IT
 - STEM Workforce Development



RANKINGS ASEE 2016



The National Science Foundation (NSF) Rankings

- **NSF HERD Rankings**
- **#91 out of 383 institutions**
- **#1 for Math & Computer Science among Hispanic Serving Institutions (HSI)**
- **#4 among HIS (#8 in 2015)**
- **#41 for female BS graduates (#46 in 2015)**
- **#1 for Doctoral degrees to foreign nationals.**
- **#93 for research funding (#97 in 2015, #100 in 2014).**

2017 Academic Rankings of World Universities (Shanghai Ranking) of Individual Programs of CEC

- **Civil: 101-150**
- **Computer Sci: 201-300**
- **Electrical: 301-400**
- **Materials: 201-300**



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