

# Henry Samueli School of Engineering

**UTSR Workshop 2012**

**Irvine, Ca**

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*Dean, The Henry Samueli School of Engineering  
Professor, Mechanical and Aerospace Engineering*

# Grand Challenges

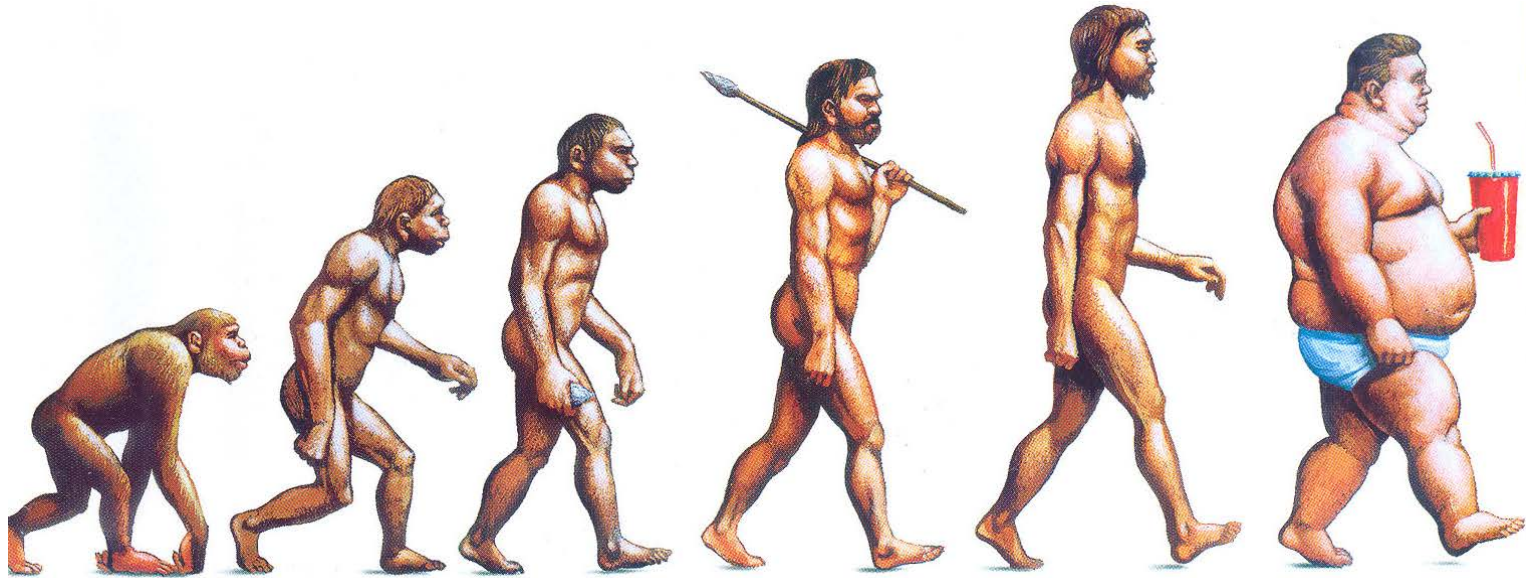
- **Three major Forces**
  - World Population Growth (7 Billion people)
    - Energy/Environment
    - Infrastructure
    - Poverty
    - Water
  - Global Market Economies
  - Telecommunications and Aviation Revolution



I-35 Bridge Collapse - Minnesota

# The BIG Problem is Over-Consumption

3



- In about 50 years, we have exhausted about half of a resource (oil) that it has taken 100 million years to create.
- Most productive wells in depletion. Discoveries of an additional 5 mbd needed just to break even.
- Exporter countries are developing a thirst for oil. More than 3mbd of production will come off line just to support the domestic consumption in OPEC countries, Mexico and Russia.



# Who Are We?

## UCI Engineering At a Glance

- 22<sup>nd</sup> Ranked Public Engineering Program
- Ranked 39<sup>th</sup> overall by USNWR – Grad
- \$78M in Research Expenditures
- Average incoming engineering  
**SAT scores — 639 (85<sup>th</sup> Percentile)**  
**GRE scores – 758/800 (95<sup>th</sup> Percentile)**

## Enrollment

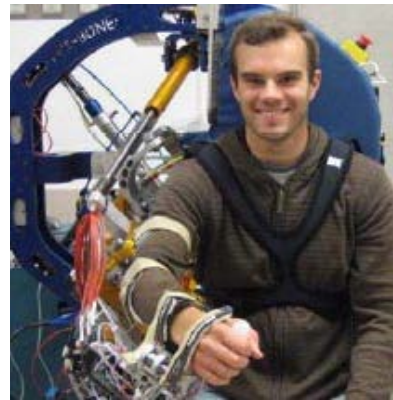
- 2793 UG students
- Total Enrollment **3585**
- 12 Engineering programs (11 accredited)
- 112 Faculty
- 5 Departments



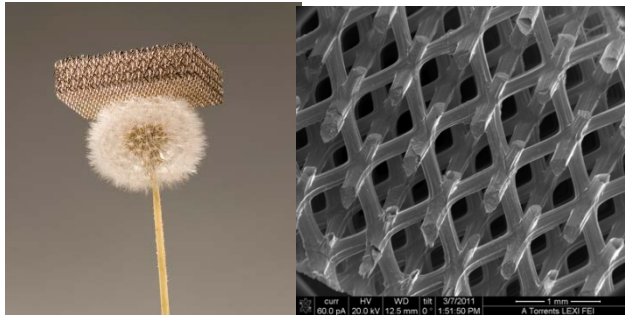
# Who Are We?



UCI Hydrogen Refueling Station



Robotic Therapy



Lightest Known Material



E-Health Music Glove



Infant Wireless Accelerometer

- The **highest ranked Public** engineering programs in the country with less than 125 faculty. *Overall **only Seven institutions ranked higher.** Avg tuition of these 7 is (\$37,422)*
- Entering class GPA from 3.72 (2002) to 3.94 (2012).
- 12 National Academy members. 1/3 of faculty are Fellows of key societies
- Nations Largest Micro-Fluidics Center
- Nations Largest Fuel Cell Research Center
- Nations best Biophotonics Institute (Beckman Laser)
- Most Innovative Cardiovascular Center (Edwards LifeSciences)

# Strategic Vision of the School of Engineering:

**Vision: Excellence and Distinction in Research and Educational Programs**

**Partnerships for Success:** with Industry, Our Alumni, other Units on campus and key Universities

**Competitive Distinction thru Experiential Learning** will produce commercially productive students

**Focus Research and Innovation:** focused on programmatic thrust related to engineering challenges

**Reinvent and Retool the brand:** Rebrand engineering as the technology and innovation campus.

Partnerships with Key Industrial partners and NGO's

Student project groups as a platform for experiential learning

Develop process to Identify 3 focused thrust

Novel Marketing techniques

Novel Partnerships with SoB, SoM, SoPS, and other Schools

Collaborations with innovative companies for experiential learning

Process for increasing success for large block grant proposals

Benchmark competitors to improve perception

Novel Partnerships with Global universities and alumni

Globalization of the SoE curriculum

Develop novel strategies to improve research

Develop Surveys to highlight strengths and weaknesses

Better partnerships and training for staff

Establish the First Year Engineering Program

Develop IP Ecosystem to turn ideas into IP

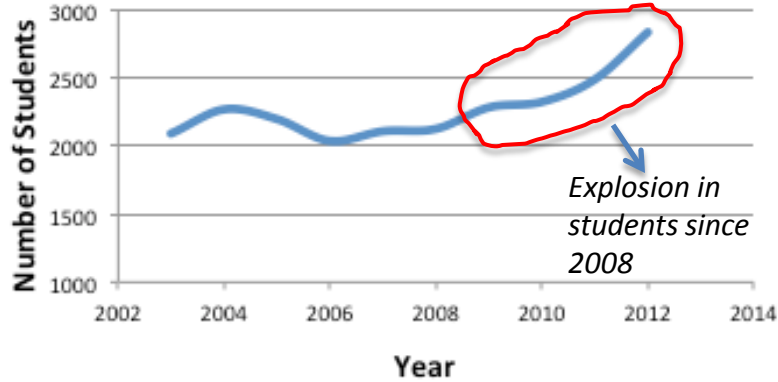
Differentiation from other UC Schools

Short course, certificate and distance learning program development

- In Alignment with current strategic plan**

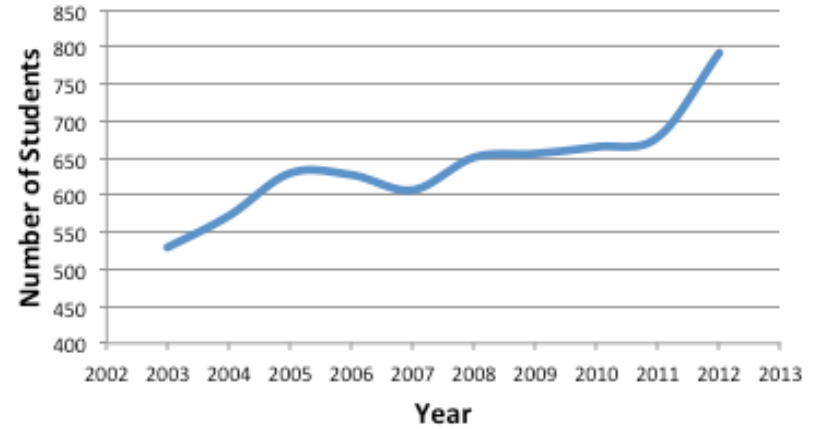
# Key Metrics

### Number of Undergrads



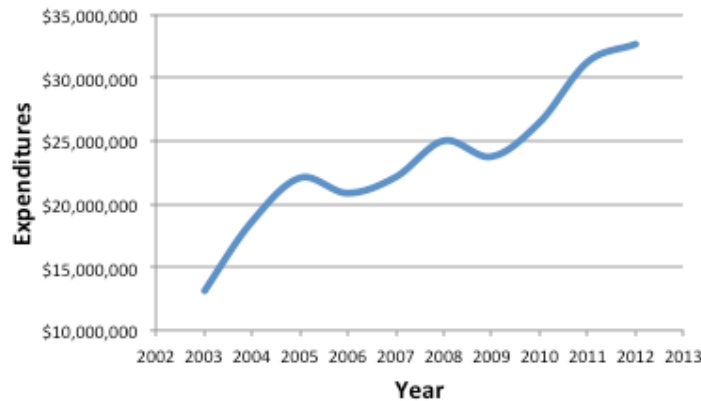
**33% Increase in 5 years**

### Number of Graduate Students



**22% Increase in 5 years**

### Research Expenditures

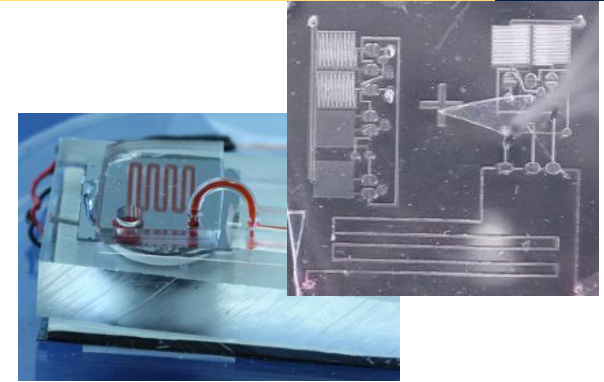


**32% Increase in 5 years**

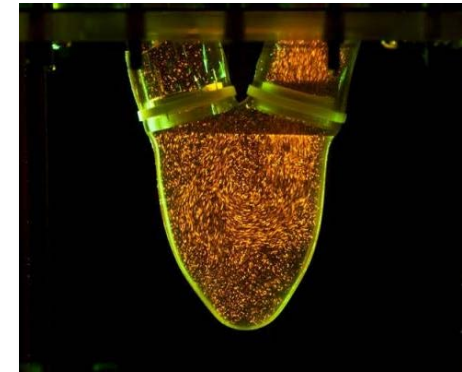


# Biomedical Engineering

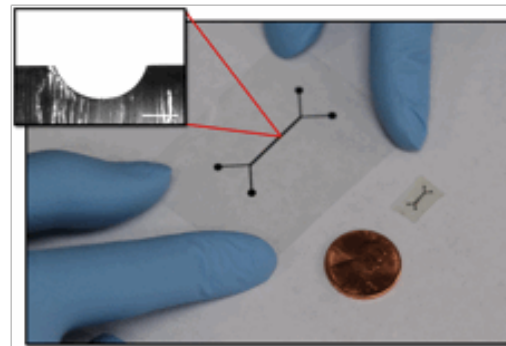
- **Number of Faculty: 21**
- **Number of Undergraduate Students: 578**
- **Number of Graduate Students: 140**
- Biomedical Computational Technologies
- Biomedical Fluorescence Spectroscopy
- Biomedical Image Processing
- Biomedical Nanoscale Systems
- Biomedical Signal Processing
- Cardiovascular Technologies
- Medical Diagnostic Devices
- Micro / Nano Fluidics
- Single Cell Analysis Systems
- Tissue Engineering
- Biophotonics



**Microfluidic Pump (MF3)**



**Heart Valve Dynamics (Edwards)**



**Shrink Nanotechnology**

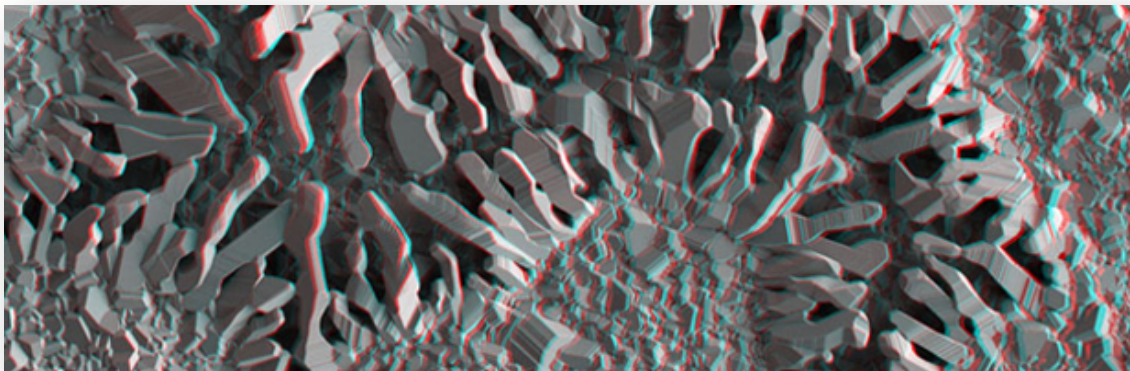
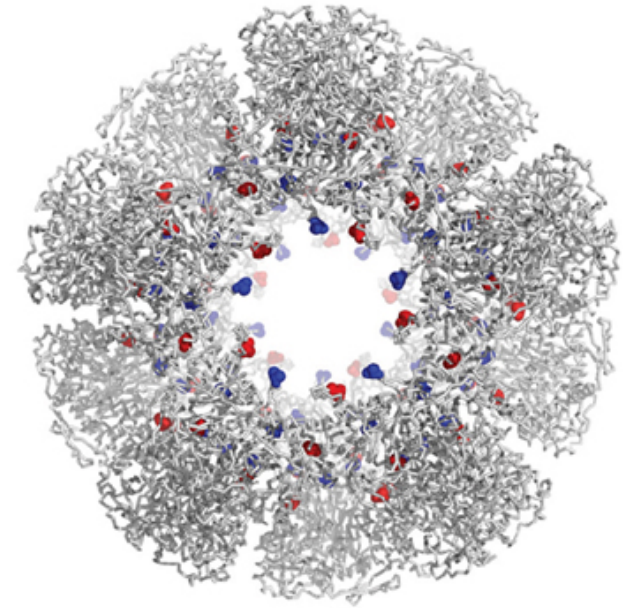


**Laser therapy for port-wine skin (BLI)**



# Chemical Engineering and Materials Science

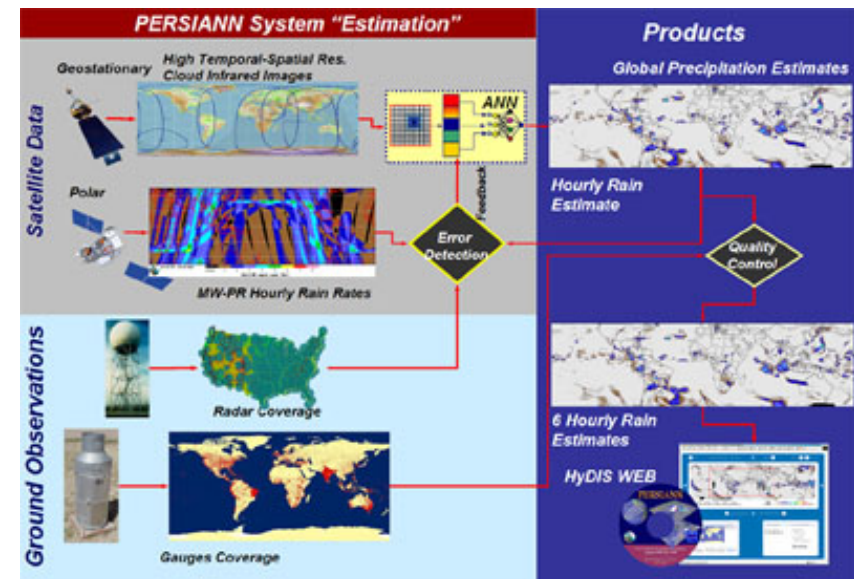
- **Number of Faculty: 15**
- **Number of Undergraduate Students: 260**
- **Number of Graduate Students: 86**
- Bio-Nano-Materials
- Biophotonics
- Ceramic Materials Engineering
- Complex fluids and Colloids
- Drug Delivery Engineering
- Environmental Microbiology and Engineering
- Molecular Biotechnology and Recombinant cell technology
- Nanostructured Materials and Nanotechnology
- Optoelectronic Devices and Materials



**Lignocellulosic Biomass to Polymers  
and Fuels**

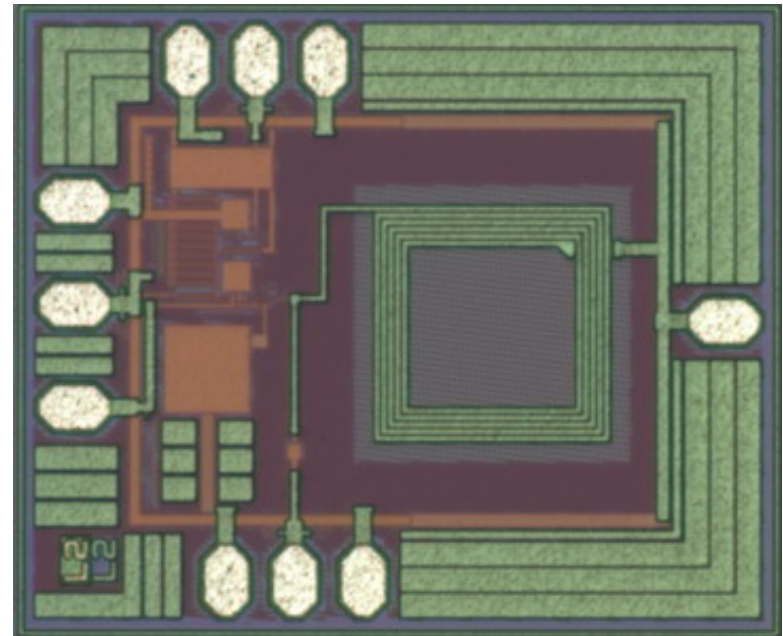
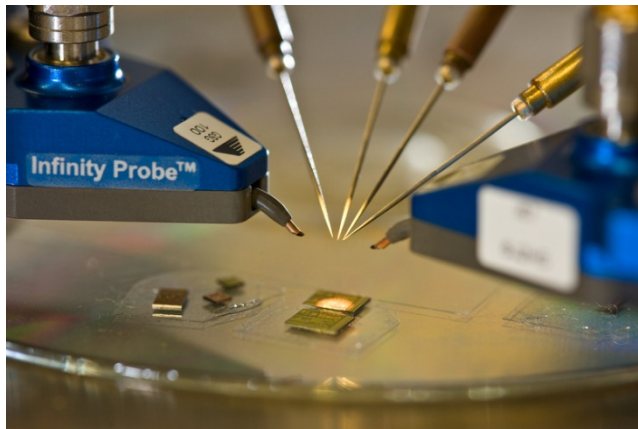
# Civil and Environmental Engineering

- **Number of Faculty: 22**
- **Number of Undergraduate Students: 575**
- **Number of Graduate Students: 126**
- Earthquake Engineering
- Hydrology/Hydrometeorology/Remote Sensing
- Smart Materials and Structures
- Structural Systems Reliability
- Sustainable built and natural environment
- Transportation Driven pollution control
- Transportation Systems Engineering
- Water and Wastewater Treatment
- Water Chemistry and Reuse



# Electrical Engineering and Computer Science

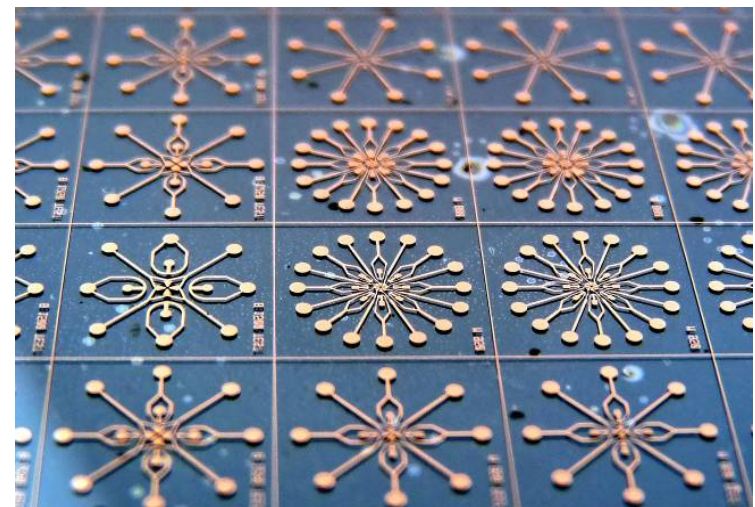
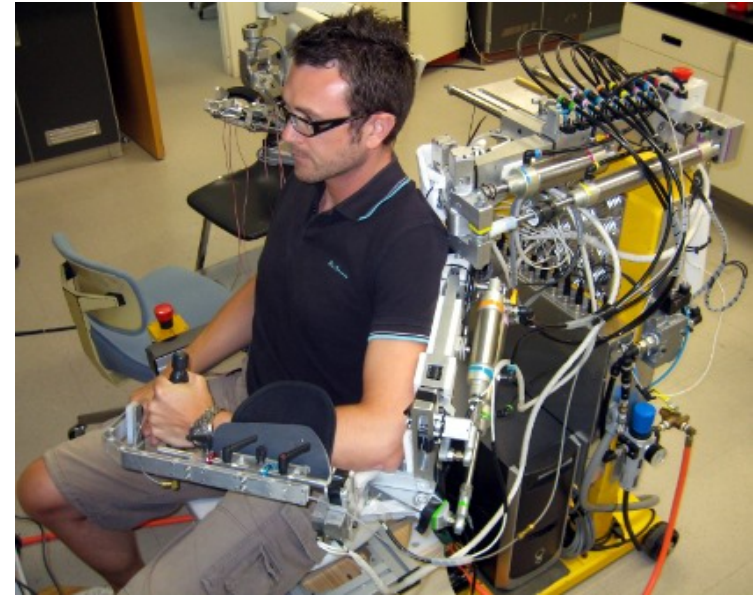
- **Number of Faculty: 36**
- **Number of Undergraduate Students: 484**
- **Number of Graduate Students: 306**
- Analog/RF IC design
- Communications
- Computer architecture
- Embedded systems
- Nano/biotechnology
- Photonics/MEMS technology
- Power electronics
- Signal processing
- System software
- Wireless communications and networks





# Mechanical and Aerospace Engineering

- **Number of Faculty: 25**
- **Number of Undergraduate Students: 787**
- **Number of Graduate Students: 117**
- Aerospace Systems: Propulsion and Dynamics
- Combustion and Thermophysics
- Energy Systems / Fuel Cell Technologies
- Environment and Sustainability
- Fluid Mechanics and Turbulence
- Micro/Nano-mechanics
- Miniaturization Engineering
- Optimization and Control
- Robotics and Machine Learning
- Structures and Solid Mechanics
- Systems & Design





# Major Research Centers, Institutes & Facilities Affiliated with The Henry Samueli School of Engineering

- California Institute for Telecommunications and Information Technology (Calit2)
- Integrated Nanosystems Research Facility (INRF)
- California Plug Load Research Center (CalPlug)
- LifeChips
- Micro/Nano Fluidics Fundamentals Focus Center (MF3)
- Center of Excellence for Electron Microscopy
- Center for Pervasive Communications and Computing
- Center for Embedded Computer Systems
- The Edwards Lifesciences Center for Advanced Cardiovascular Technology
- Beckman Laser Institute (BLI)
- Center for Hydrometeorology and Remote Sensing
- Advanced Power and Energy Program (APEP)
  - The National Fuel Cell Research Center (NFCRC)
  - UCI Combustion Laboratory
- Institute of Transportation Studies
- Center for Advanced Monitoring and Damage Inspection

