
UC San Diego
Jacobs School of Engineering
CORPORATE AFFILIATES PROGRAM
Welcome
CAP Executive Board
Thursday June 9th, 2016

CAP Executive Leadership

Acting CAP Chairman

Chris Root

Advanced Aircraft Technologies IPT Lead

Office of Research and Technology Assessment (ORTA), NAVAIR

Welcome New CAP Members

Welcome Distinguished Students

Triton Engineering Student Council
(TESC)

Outgoing President
James Natanauan, B.S. CSE 2016

Incoming President
Aamir Rasheed, B.S. CSE 2018

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Technology-Enhanced Conservation of the Mexican Vaquita

Antonella Wilby
PhD Student, Computer Science and Engineering
University of California, San Diego

UC San Diego

NATIONAL GEOGRAPHIC

SAN DIEGO ZOO GLOBAL

INECC

UCSDCSE
Computer Science and Engineering

Vaquita Marina: Background

Artist's Rendition *[source: Greenpeace]*

Pair of Live Vaquita [courtesy Thomas A. Jefferson]

Vaquita Marina: Background

Artist's Rendition *[source: Greenpeace]*

Pair of Live Vaquita [courtesy Thomas A. Jefferson]

Current Population Estimate: 60 individuals

Background: Gillnet Mortality

Deceased vaquita porpoise in gillnetting *[source: National Geographic]*

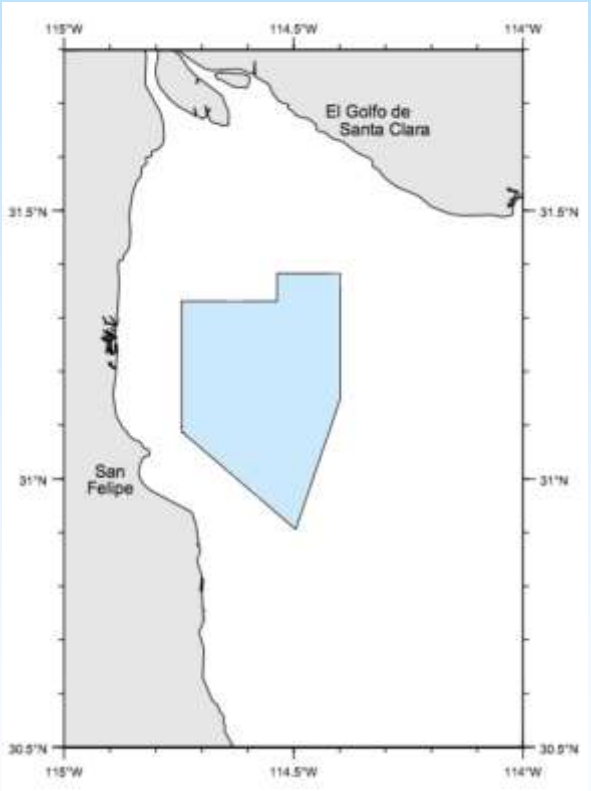
Fishing boats in San Felipe

Background: Illegal Totoaba Trade

Totoaba *[source: Smithsonian]*

Totoaba and vaquita
[source: NOAA]

Vaquita Conservation Effort

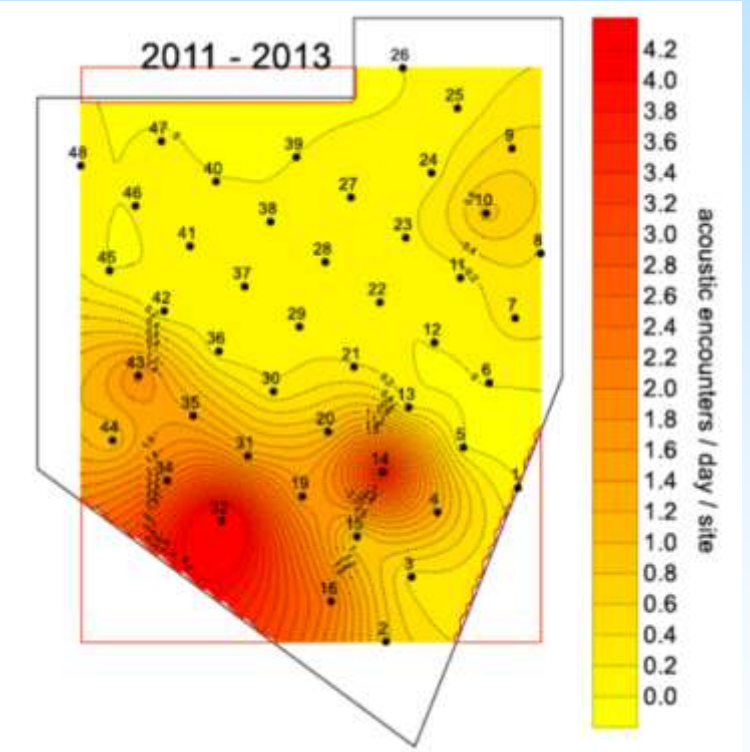


Vaquita Refuge Boundaries

- Gillnet ban in refuge until April 2017
- Incentives for fishermen to use vaquita-safe fishing technologies
- Navy is monitoring illegal fishing in the refuge

Acoustic Monitoring

Deploying C-Pod Acoustic Recorders
[courtesy WildLensInc]



Vaquita Abundance Map

Project Goals

1. Media for Outreach

2. Behavioral Monitoring

Underwater Monitoring: SphereCam

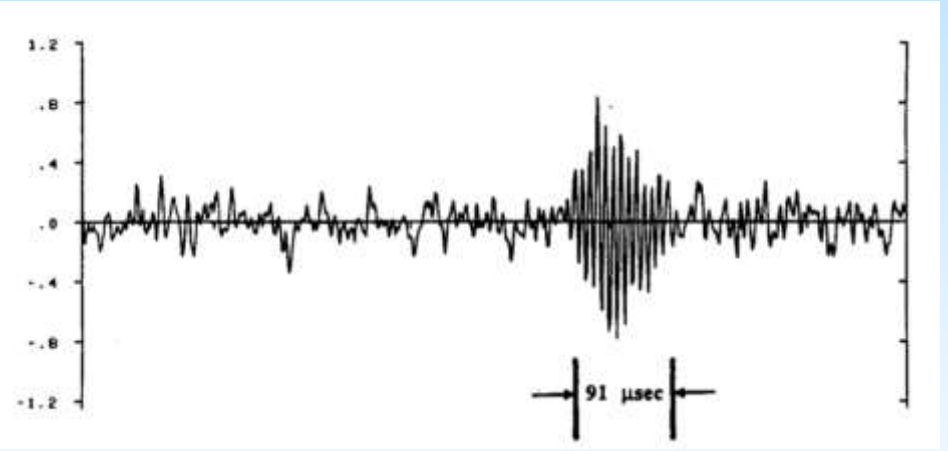
On-board computing

6 GoPro cameras

Large battery pack

Ultrasonic Hydrophone

Ultrasonic Triggering



Vaquita echolocation click waveform

Deploying SphereCam in Sea of Cortez

Sample image from camera: poor visibility!

Future Work and Applications

- Behavioral monitoring of other marine populations
- Virtual Reality for “immersive conservation”

DEAN'S BRIEF

Albert P. Pisano

Dean, Jacobs School of Engineering

UC San Diego
Jacobs School of Engineering

Securing Excellence

Seven Year Strategic Growth Trajectory

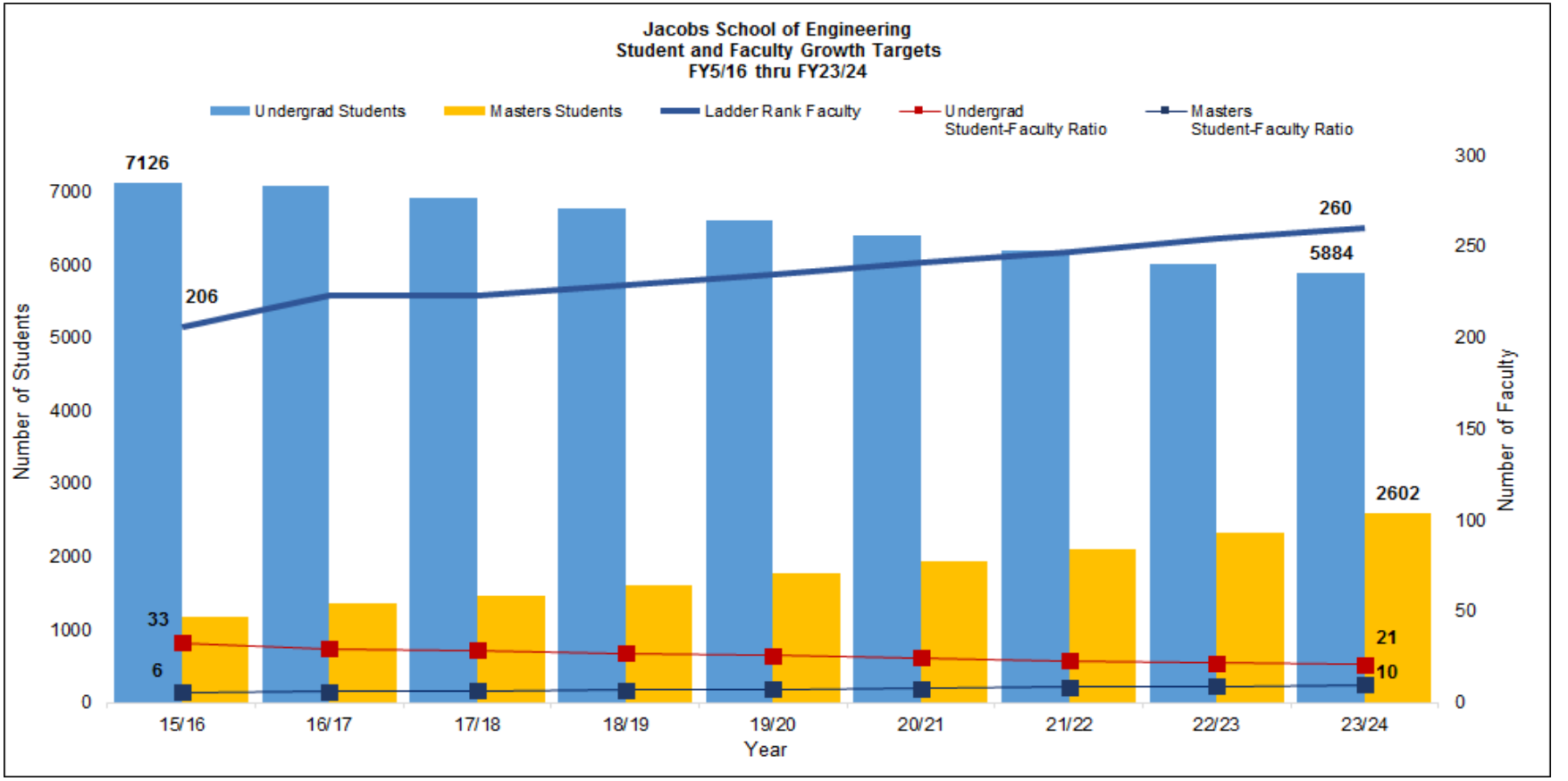
1. Grow Faculty to 280
   64 hires over next seven years
2. Construct 155K ASF Building at P502
   2017 projected start
3. Begun a $75 million Building Campaign
   $50 million in pledges required to begin project

Pathway to Top 10

	2015	2023 Target	Top Ten Average*
Faculty	216 (206 LRF/10 LSOE)	280 (260 LRF/20 LSOE)	304
Undergraduates	6677	5880	4938
Undergrad/Faculty	30:1	21:1	16:1
Graduate	2244	≥ 2700	2446
Graduate/Faculty	10:1	≥ 10:1	8:1
Research/Faculty**	$833K	$1M	$786K
Total Research	$162M	$260M	$224M

*Data reported to US News and ASEE in 2015
US News Graduate Ranking 2015: MIT, Stanford, UC Berkeley, Caltech, CMU, Michigan, Georgia Tech, Illinois, Purdue, Texas-Austin
**FY2015, based on 195 Full-Time Ladder Rank Faculty as requested by US News

Student-Faculty Ratio Trajectory



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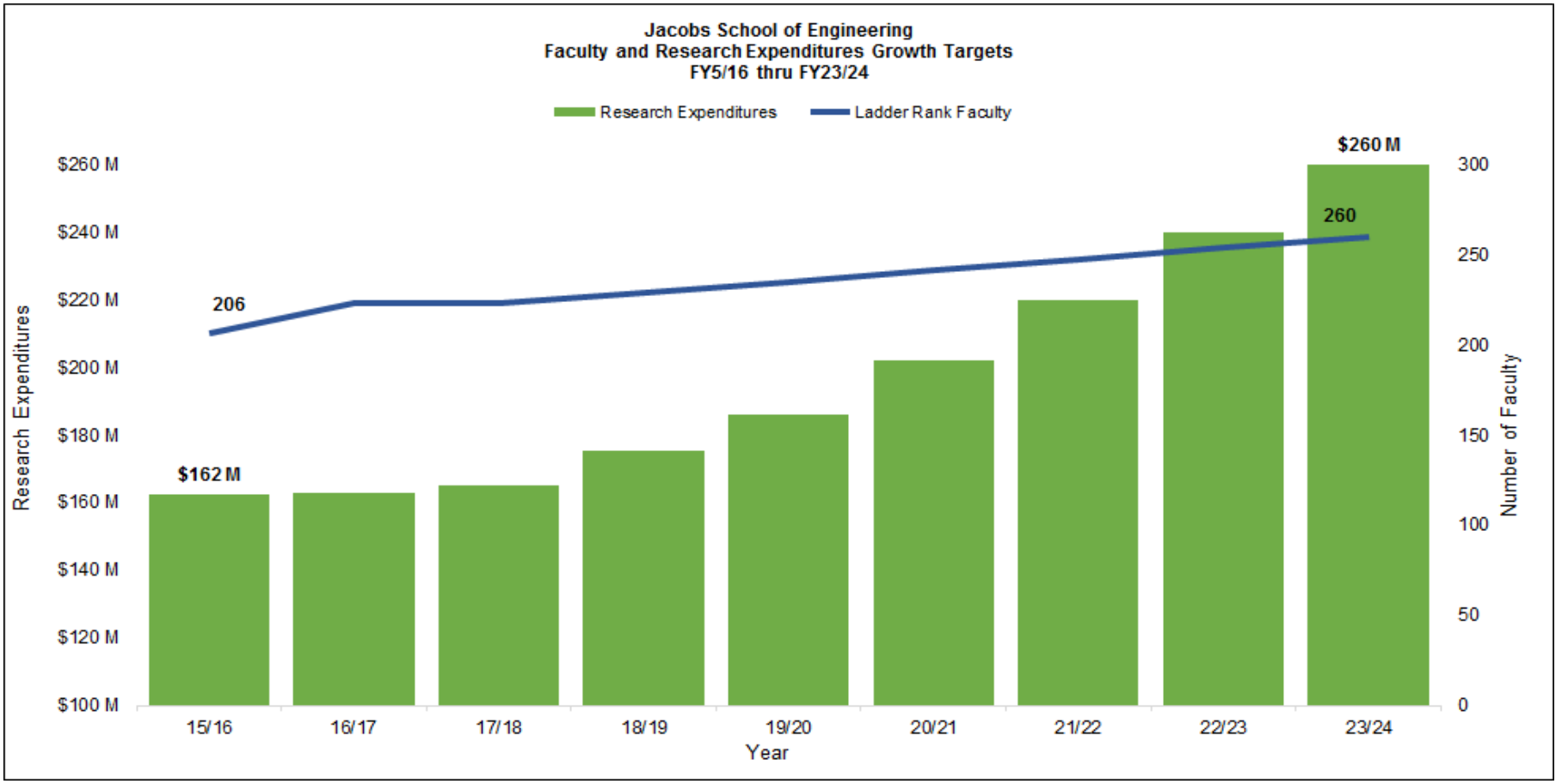
Faculty & Research Productivity Trajectory



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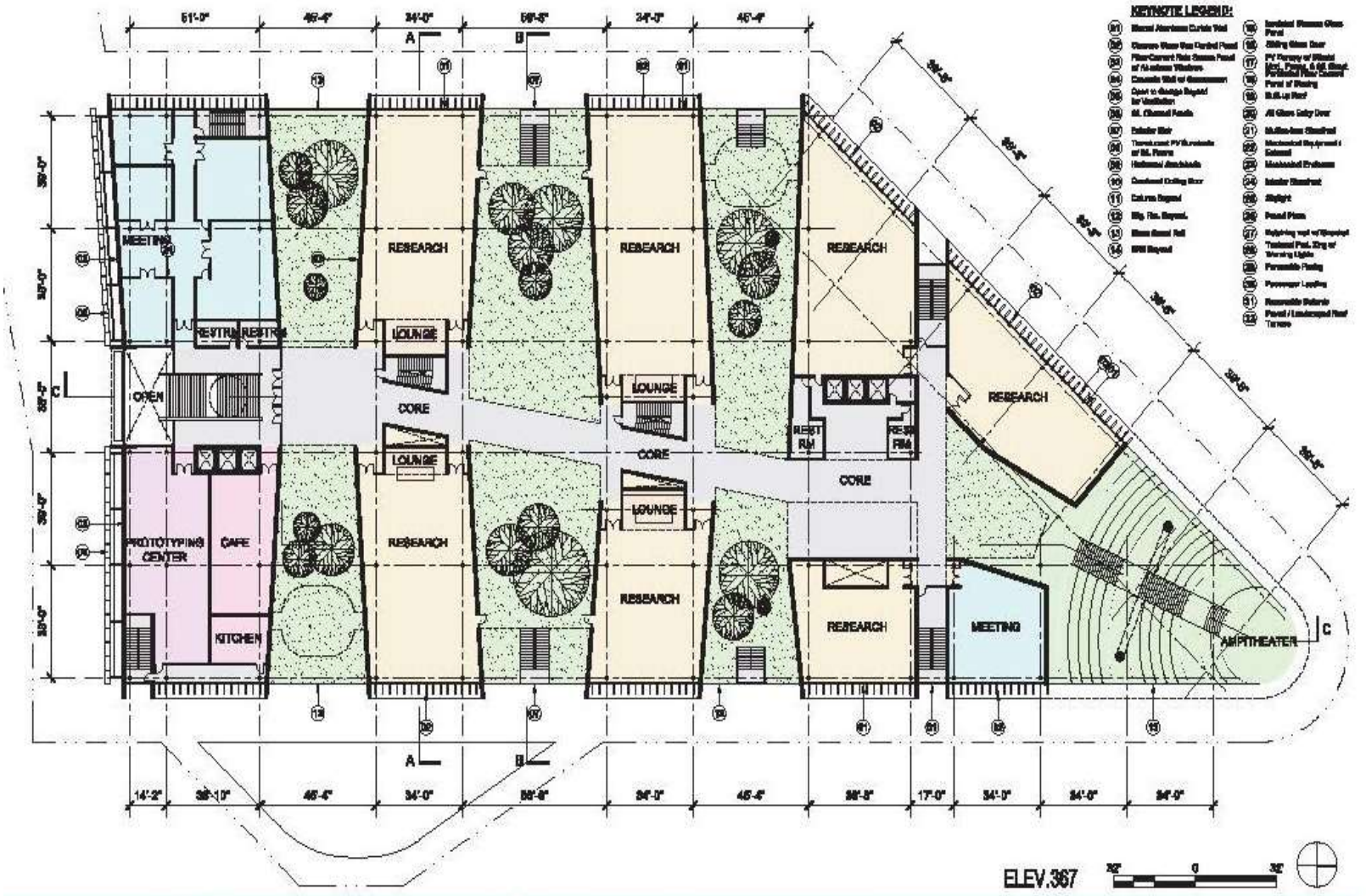
Master's Growth Initiatives

- Increasing Demand for Master's in All Departments
- North County Initiative led by City of Carlsbad and Industry Leaders ViaSat and Thermo Fisher (Data Sciences and Leadership)
- Los Alamos Labs Initiative to Educate High Potential Employees Awaiting Clearances
- Multidisciplinary Master's Complementary to Research Vision (MAS) (Medical Imaging, Robotics)
- Possible educational partnerships with Mexico Universities and Leading manufacturers in Mexico region to enhance talent pipeline and pool: (Software, RF, Materials)
- Joint Master's with Rady School: Technology Management and Leadership

Key Elements of Building Concept

- Accommodates 11 Centers & Institutes
- High Bay Lab, Prototyping and Design Facilities
- Executive Education Center
- Meeting rooms: small (15), medium (50), and large (100) room capacity
- 275 seat lecture hall
- 1.5 acres of outdoor park-like open spaces, café
- LEED Platinum
- 110 net new parking spaces over current P502 capacity

Concept Study: Level 3 Floor Plan



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Institute for the Global Entrepreneur

Future influential engineering leaders will drive innovation from concept to commercialization using principles of engineering, business, and practical entrepreneurial thinking.

Desired Outcomes

- Train global engineering leaders who catalyze new products and directions in organizations large and small
- Drive exponential economic growth by developing entrepreneurs who translate university discoveries to the commercial market

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Contextual Robotic Systems Institute

Mission: Advance leading edge research in contextual robotic systems and build a talent and innovation pipeline to fuel the emerging robotics industry sector

Medical and Flexible Robotics

Dexterous, snake-like robot for navigating within the vessels of the human body for minimally-invasive surgery

Michael Yip, ECE

Environmental Sensing Swarms

Hundreds of sensor balloons release into a developing hurricane, communicating via cellphones

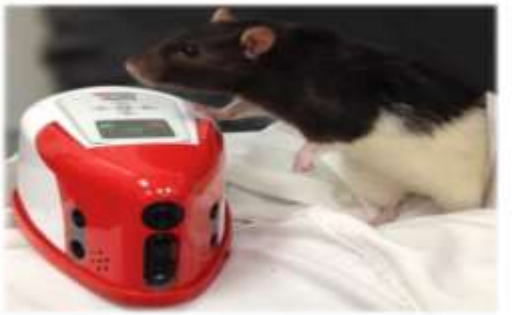
Thomas Bewley, MAE

Tensegrity Duct-Climbing Robot

Batteries, electronics, motors and sensors are embedded within aluminum tubes to shield them from gas or liquid that may be flowing within ducts during the inspection.

Jeffrey Friesen (GSR) & Thomas Bewley, MAE

Animal Model for Contextual Robotics



iRat collaboration, cognitive scientists and bioengineers, Robot-mammal interactions, Social neurosciences for robots

Andreas Chiba, CogSci; Todd Coleman, BE; Janet Wiles, UQueensland

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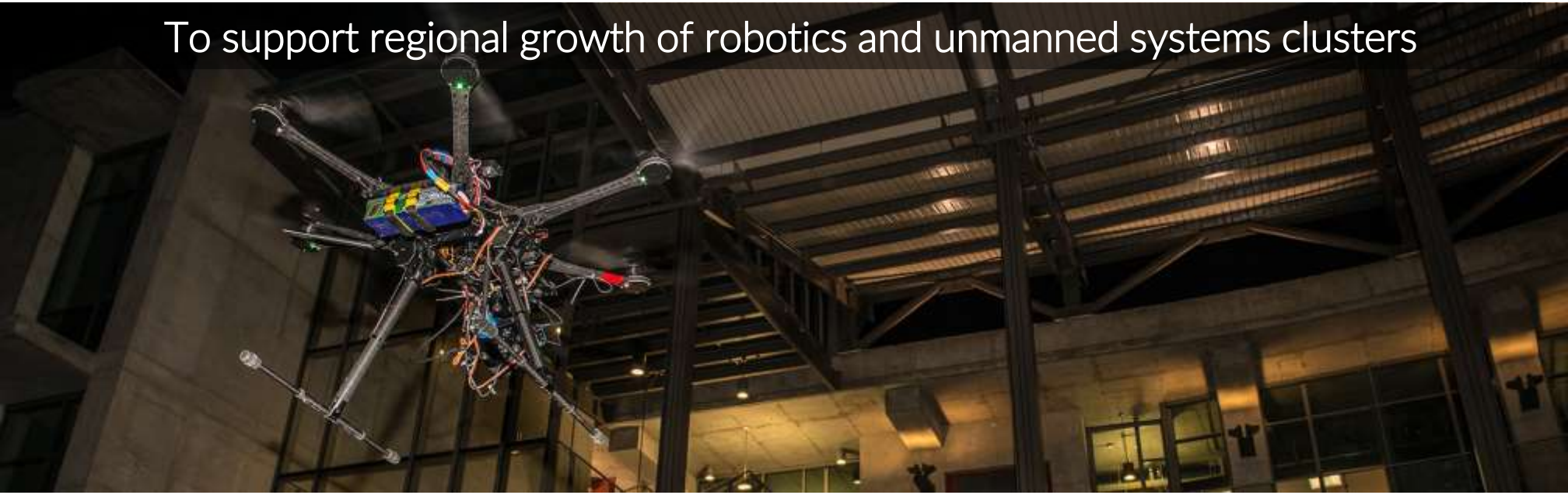
Aerodrome to be among largest in nation



- 100 ft high, 100 ft long, 30 ft wide
- Flight platforms with stair access
- Optical tracking and motion capture system to record and analyze flights
- Machine shop equipped for pre-flight prep/calibration and on-mission modification/repair
- High-bandwidth Internet access
- Meeting space

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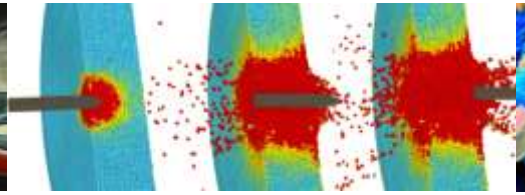
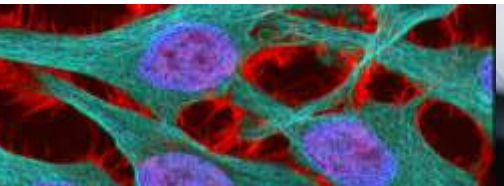
Agile Centers Update

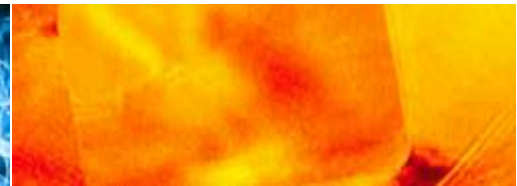





Highly Responsive to Industry and Ready for Research Opportunities

- Center for Wearable Sensors (CWS)
- Center for Extreme Events Research (CEER)
- Center for Visual Computing (CVC)
- Sustainable Power and Energy Center (SPEC)
- CHO Systems Biology Center
- Cali-Baja Center for Resilient Materials and Systems
- Center for Microbiome Innovation (CMI)
- Center for Engineered Natural Intelligence



Center for Microbiome Innovation

Accelerate new methods for manipulating microbiomes to improve human health and benefit the environment

Front End:

Sample to Data

- Sample Collection
- Sample Prep
- Sample Analysis

Middle:

Data to Insight

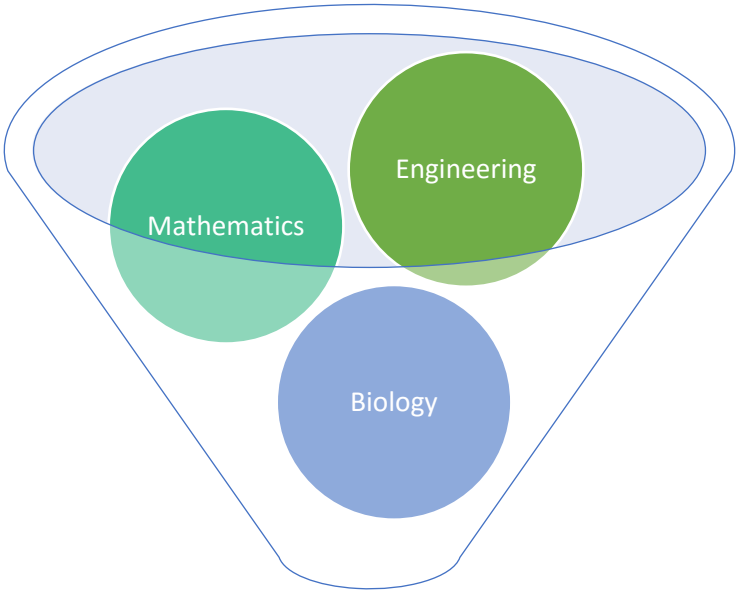
- User Interface
- Machine Learning

End:

Applications

- Agriculture
- Pharma
- Food
- Cosmetics
- Energy

Center for Engineered Natural Intelligence



Novel Neural Network Architectures and Approaches

Advanced context-aware search and decision aid, and near-real-time advisor

Novel Chip Architectures

Real-time threat ID and avoidance

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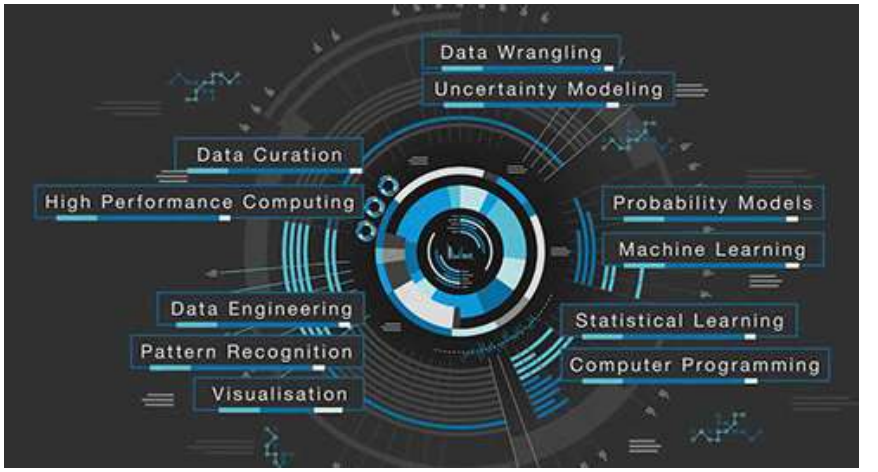
Data Science Engineering - update

Computer Science, Math, San Diego Supercomputer Center

Data Science Professional:

- Software Programmer, Statistical Analysis, Machine Learning
- Create Mathematical Models of Data, Identify Trends, Visualize, Secure and Authenticate
- Core knowledge includes abstraction, modeling, statistical analysis, algorithms, data mining and databases
- Deep knowledge of the physical world



APPROVED

B.S. and Minor in Data Science (CSE, ECE and Math Department)

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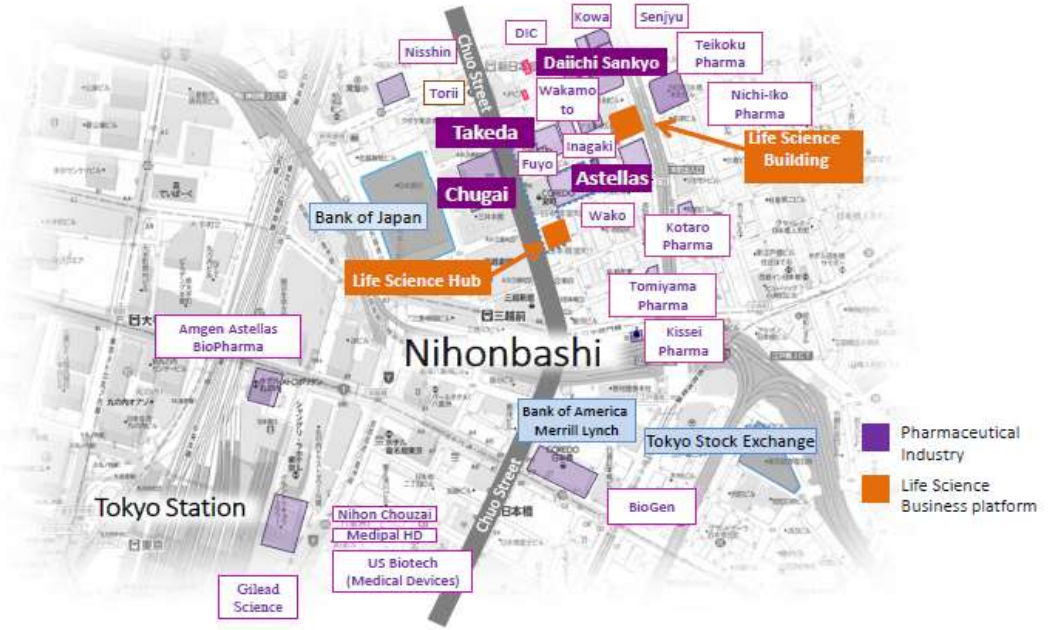
Going Global – Tokyo

Grand Opening: July 26, 2016

Nihonbashi: Cluster of Life Science Industry



Life Science Building: Entrance

Life Science Building: 9F Reception

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FACULTY PRESENTATION

Falko Kuester

Professor, Structural Engineering

Engineering a Future for the Past: Preserving Cultural Heritage through Advanced Imaging, Robotics, Visualization, Rapid Prototyping, and Beyond

CISA3

Engineering a Future for the Past

Innovation Powered by STEAM

Falko Kuester

Director, CISA3-CHEI, IGERT-TEECH, DroneLab
Calit2 Professor for Visualization and Virtual Reality
Professor, Department of Structural Engineering

Center of Interdisciplinary Science for Art, Architecture and Archeology (CISA3)
Cultural Heritage Engineering and Innovation (CHEI)
University of California, San Diego
http://chei.ucsd.edu

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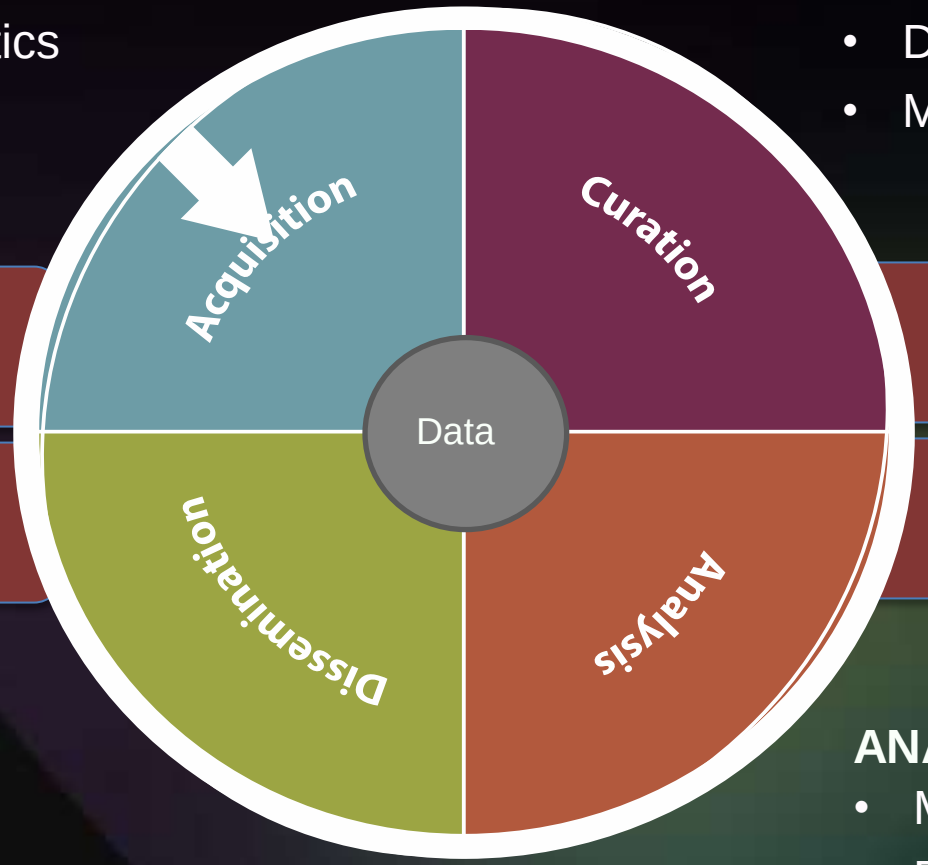
Video

ACQUISITION

- Diagnostic Imaging & Sensing
- Analytical Diagnostics
- Communications
- Robotics

CURATION

- Data Storage
- Data Bases
- Meta Data Augmentation



Rapid Response

Mainstream Media

Community Database

Cyber Infrastructure

DISSEMINATION

- Field Testing
- Training
- Publishing
- 3D Printing
- Citizen Science

ANALYSIS

- Modeling & Simulation
- Data Fusion
- Visual Analytics
- Virtual Reality
- Augmented Reality

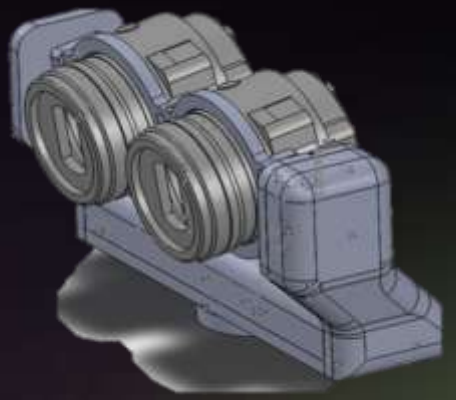
CAVEcam: Spherical Stereo Image Capture

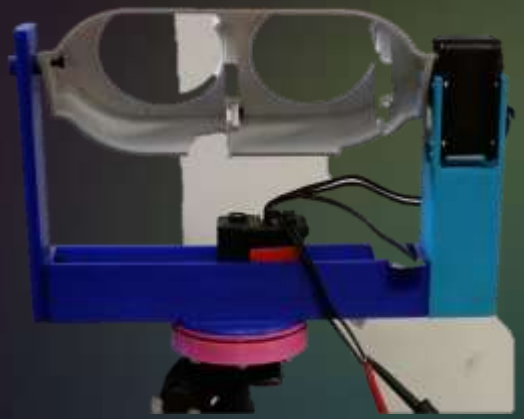
- Robotic motion platform (pan, tilt)
- Stereo camera pair

Courtesy: Tom DeFanti

CAVEcam-X: Spherical Stereo Image Capture

- Compact
- Ruggedized
- 3D Printable
- Extended Sensor Payload





Courtesy: Dominique Meyer & Dimitri Scheiber

CAVEcam: Spherical Stereo Image Processing

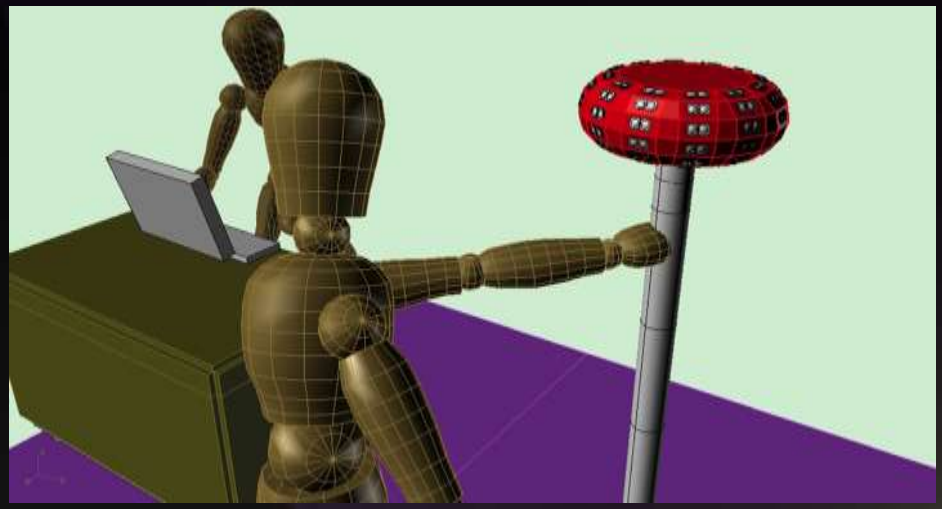
Captures:

- 144 images (72 per eye)
- 1 gigapixel worth of data (1/2 gigapixel per eye)

Courtesy: Chris McFarland

Cyber-Archaeology: Analyzing Historic Landmarks (Calabria, Italy)

Camlot Concept for Spherical Video Capture



Courtesy: Tom DeFanti, Greg Dawe, Dan Sandin

Here Come the Drones

Life Among The Drones

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The Good

- Aerial imaging
- Videography & Cinematography

- Search and rescue
- Disaster and post-disaster reconnaissance

- Environmental and habitat monitoring
- Precision farming

- Marketing
- Real-estate
- Pickup and delivery

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The Bad

The Ugly


NEW THIS MORNING
FIGHTING DRONES OVER SUPERSTAR HOMES
NEW TOOL BEING USED BY PAPARAZZI
abcNEWS.com

From Cyber to Physical

Printable Robotics
From Concept to Innovation

Model → Simulate → 3D Print

Test

(Courtesy: James Strawson, DroneLab)

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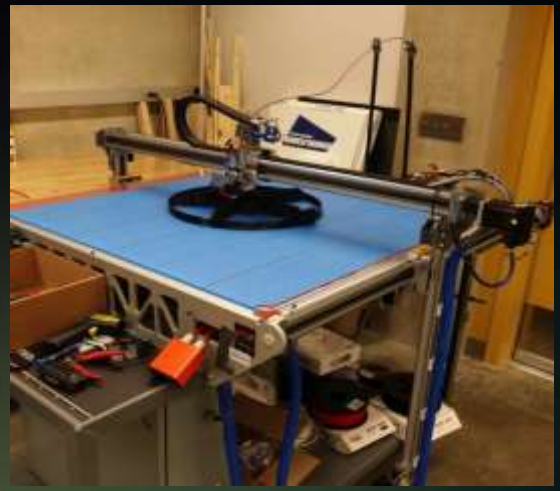
Printable Robotics
From Concept to Innovation



Model → Simulate → 3D Print

Test

(Courtesy: Dominique Meyer, DroneLab)

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“Printing the Future”

- Complex shapes that simplify designs
- Reduced part count
- Simplified assembly if any
- Improved tolerance
- Rapid turnaround
- Elegance

“Form Follows Function”

Example: BeagleRover

- Hyper-articulated steering
- Entirely 3D printed

(Courtesy: James Strawson, UCSD DroneLab)

BeagleMiP

BeagleRover

BeagleMAV

ParaDrone

Hydrocopter

Modular Hexacopter

Travelcopter

3D Printing as a Catalyst for Innovation

SE207 – Printable Robotics – Term Project

3D Printing as a Catalyst for Learning

Example: BeagleMIP used by 50 students in MAE143c

- One 3D printed robot per student
- In-house designed development board and curriculum





(Courtesy: James Strawson, UCSD DroneLab)

From Images to 3D Scenes

Courtesy: Vid Petrovic

Hybrid Rendering from CAVEcam Collections

Courtesy: Vid Petrovic

From Macro to Micro

Video

Courtesy: Dominique Meyer

Cyber-Archaeology: Exploring and Analyzing Archaeological Sites (Guatemala)
(Data Courtesy of Cyark)

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Calit2

Calit2

Visual Analytics

Calit2

Visual Analytics

Astrophysics: Image Mosaic Acquired by Mars Rover
Data courtesy of NASA

Calit2

Visual Analytics

Astrophysics: Eta Carinae Nebula imaged by the Hubble Space Telescope
Data courtesy of NASA

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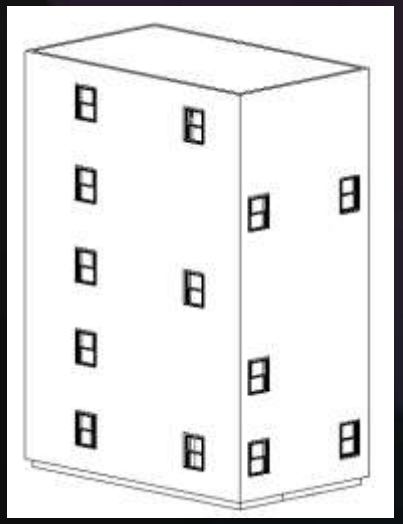
Video

Emerging Opportunity at UCSD

- Full-scale 6-story building
- CFS-framed & sheathed
- Earthquake resiliency testing
- Fire resiliency testing

- Comprehensive UAV test bed



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Acknowledgements

This work was supported the National Science Foundation (NSF) under award #DGE-0966375, "Training, Research and Education in Engineering for Cultural Heritage Diagnostics," and award #CNS-1338192, "MRI: Development of Advanced Visualization Instrumentation for the Collaborative Exploration of Big Data." Additional support was provided by the Kinsella Expedition Fund, the Qualcomm Institute at UC San Diego and the World Cultural Heritage Society. Opinions, findings, and conclusions from this study are those of the authors and do not necessarily reflect the opinions of the research sponsors.

Learn More

CHEI @ CISA3

chei.ucsd.edu

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CAP BUSINESS

Cody Noghera

Director, Corporate Affiliates Program, Jacobs School of Engineering

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Jacobs School of Engineering

UC San Diego
Jacobs School of Engineering

RESEARCH EXPO

APRIL 14, 2016



Thank You Research Expo Sponsors and Corporate Affiliates Program Members

This Year We Welcomed over 600 Attendees

ViaSat

CUBIC

leidos

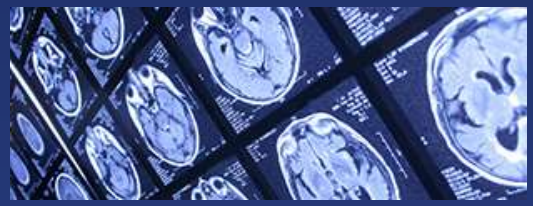
CYMER
An ASML company

Master of Advanced Study Turns 5!

Wireless Embedded Systems

Data Science and Engineering

- Master's degrees at the Jacobs School for working engineering professionals
- Launched 5 years ago in 2011 @ Jacobs
- 303 graduates from the MAS programs since 2012
- Students representation from more than 100 local companies



Medical Device Engineering

Architecture-based Enterprise Systems Engineering

MAS Accepting Applications for Fall 2016

- Information Session @ UC San Diego
  - June 22, 2016 @ 5:30pm
- For more information
  - JacobsSchool.ucsd.edu/MAS
  - jacobsmas@eng.ucsd.edu

Wireless Embedded Systems Graduating Class 2016

2016 Team Internship Program

42 Companies -- 89 Teams -- 309 Students

TIP Leadership Training Event

Saturday June 4th 8am-2pm

- More than 125 students attended
- Welcome from Dean Albert P. Pisano
- Business Basics Presentation
- Generational Differences in the Workplace, Leadership Style Activity and DISC Assessment
- Team Dynamics + Working With Diverse Teams Presentation

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Professional Evening with Industry 2016

- ***PEI*** is an annual engineering Dinner & Career Fair coordinated by students from NSBE, SHPE, SWE, and the IDEA Student Center
- ***Monday, November 7, 2016, 5:30-8:30pm***
- ***Sponsorship Levels:***
  - Corporate: $2,500.00
  - Gold: $1,500.00
  - Silver: $900.00; Early Bird Rate $800
- Registration opens mid-summer
- Your sponsorship supports year-long community engagement, outreach, and programmatic efforts for NSBE, SHPE and SWE
- View last year's event at http://jacobsschool.ucsd.edu/events/pei/

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Dates to Remember

September 6, 2016	“Spirit of Solar” CAP Executive Cruise
October 5, 2016	CAP Board Meeting
October 14, 2016	Contextual Robotics Forum
October 13-14, 2016	Center for Networked Systems Fall Research Review
November 3, 2016	Jacobs School New Faculty Reception
November 9, 2016	Center for Wearable Sensors Summit

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Please Join Us for the Tour