

The background of the slide is a photograph of a modern, multi-story building with a grid-like facade of windows and balconies. The entire image is tinted with a deep blue color. The building is seen from a low angle, looking up towards the sky.

UC San Diego

JACOBS SCHOOL OF ENGINEERING  
Corporate Affiliates Program

# Welcome CAP Executive Board

October 10, 2019

# CAP Chairman and Vice Chairman



**Nik Devereaux**

Director of Software Engineering  
Viasat



**GB Singh**

Director, Package & Systems Engineering  
Solar Turbines

Welcome

# WELCOME NEW CAP PARTNERS



# WELCOME TRITON ENGINEERING STUDENT COUNCIL

# TESC

Triton Engineering Student Council

We empower engineers.

Jonathan Luck, President; Senior, Computer Science  
Summer Batasin, VP External; Senior, Bioengineering

# What is TESC?

The Triton Engineering Student Council (TESC) empowers UC San Diego engineering students by connecting them with impactful communities, projects, and career building opportunities.

We do this through:

1. Hosting events for engineering students
2. Supporting 40+ engineering student organizations
3. Advocating for engineering students



# Connect with Us & Our Community!



TESC always values insight and support from industry. Working with industry partners enables us to support the engineering community and prepare students for their post-college careers.

Interested in collaborating?

[sponsor@tesc.ucsd.edu](mailto:sponsor@tesc.ucsd.edu) -- TESC Sponsorship Team

[summer@tesc.ucsd.edu](mailto:summer@tesc.ucsd.edu) -- TESC VP External

[jonathan@tesc.ucsd.edu](mailto:jonathan@tesc.ucsd.edu) -- TESC President

# WELCOME SOLAR TURBINES CO-OP TEAM

## **Solar<sup>®</sup> Turbines**

*A Caterpillar Company*

Garrett Tse, Senior, Environmental Engineering

Kenneth Icyan, Senior, Aerospace Engineering



# UC San Diego Jacobs School of Engineering Co-op Additive Manufacturing

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Garrett Tse, Senior, Environmental Engineering  
Kenneth Icayan, Senior, Aerospace Engineering





# PROJECT OVERVIEW

## How do we utilize 3D Printers to:

- Improve design
- Reduce cost
- Increase production



*Picture of Printed Swirler*

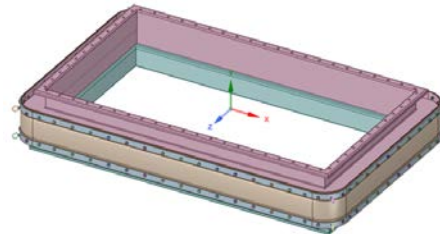
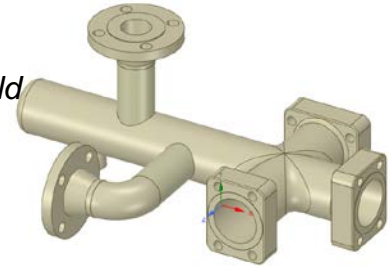


*AM Concept Laser Machine*

## Project Goals:

- Explore a list of parts
- Provide a process map for AM
- Outline overall benefits

1) Lube Oil Manifold  
(Design Process)

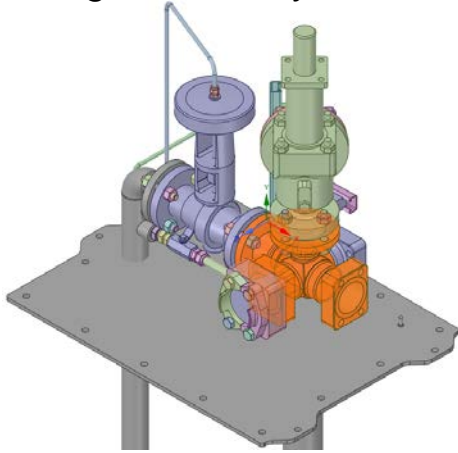


2) Exhaust Joint Bellow  
(Solving Specific Problems)

# LUBE OIL MANIFOLD

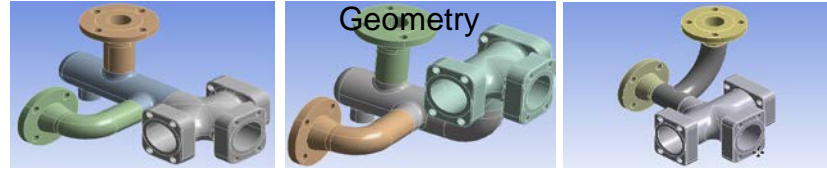
## Why Optimize:

- Strange Geometry
- Made from “off the shelf” parts
- Large Assembly



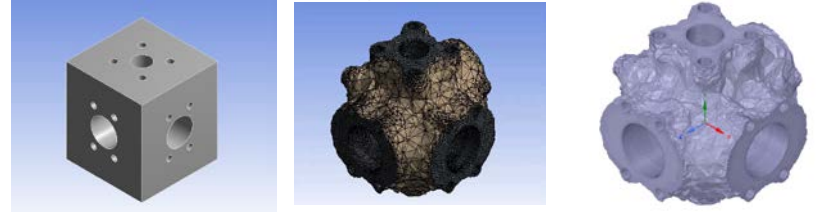
*Manifold shown in gold*

## Consolidating Parts/Reorganizing



## Geometry

## Topology Optimization



## Design for AM



## Evaluation



# EXHAUST JOINT

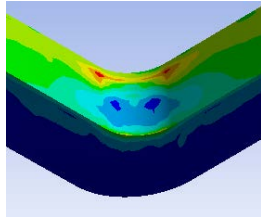
## Why Optimize:

- Thermal stress in corners
- Cracking in the metal frame
- Expensive: \$20000-\$50000

## Previous Findings:

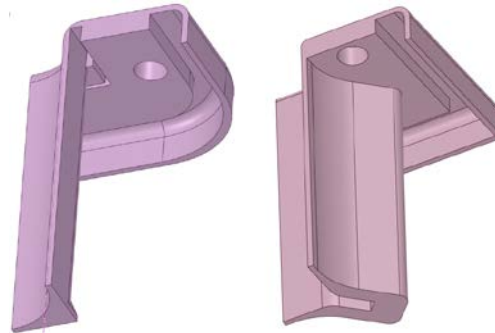
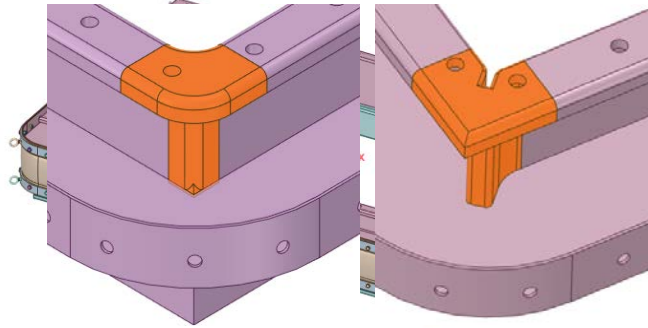
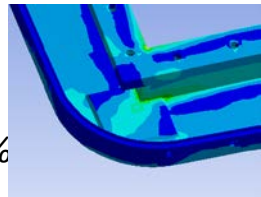
Rounding edges:

*Lowers max stress by 26%*



Adding mass at stress concentrations:

*Lowers max stress by 43%*



## Printing Corner Piece:

- ✓ Added mass support
- ✓ Rounded edges
- ✓ Increased wall thickness

50 - 60%  
Improvement!

# OVERCOMING CHALLENGES

## Project

### **New Technology:**

Prices are improving,  
analysis tools in  
development



### **Current Printing Size:**

Parts from Solar's Packaging  
are relatively large



### **Designing For AM:**

Understanding/applying  
printing limitations to designs



## Co-Op Experience

### **First industry experience:**

Applying concepts to real  
world situations



### **Learning New Software:**

Creo, ANSYS, FEA, CFD



### **Working Environment:**

Adapting from college to  
corporate environment



# CO-OP HIGHLIGHTS

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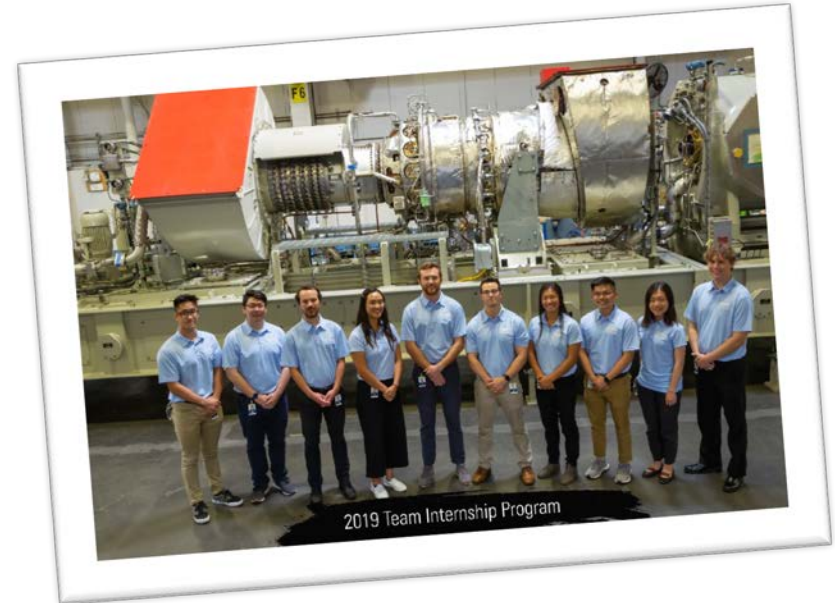
Working with a variety of  
engineers and manufacturers

Working with emerging technology

Free Coffee!

Thank you:

- Dean Pisano and MAE Chair Coimbra
- Corporate Affiliates Program
- GB Singh and Solar Turbines!



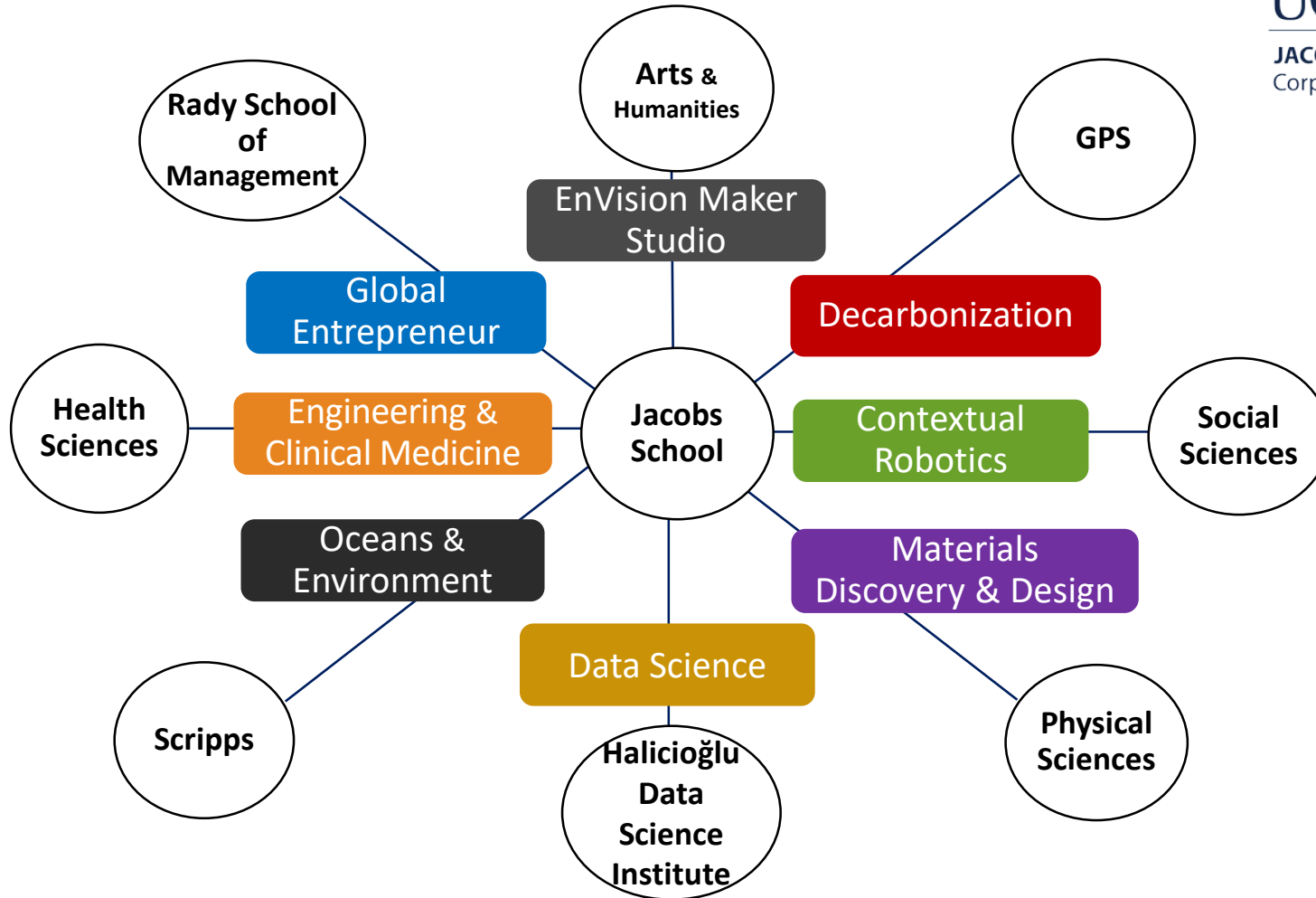
# Dean's Report

Albert P. Pisano

Dean, Jacobs School of Engineering

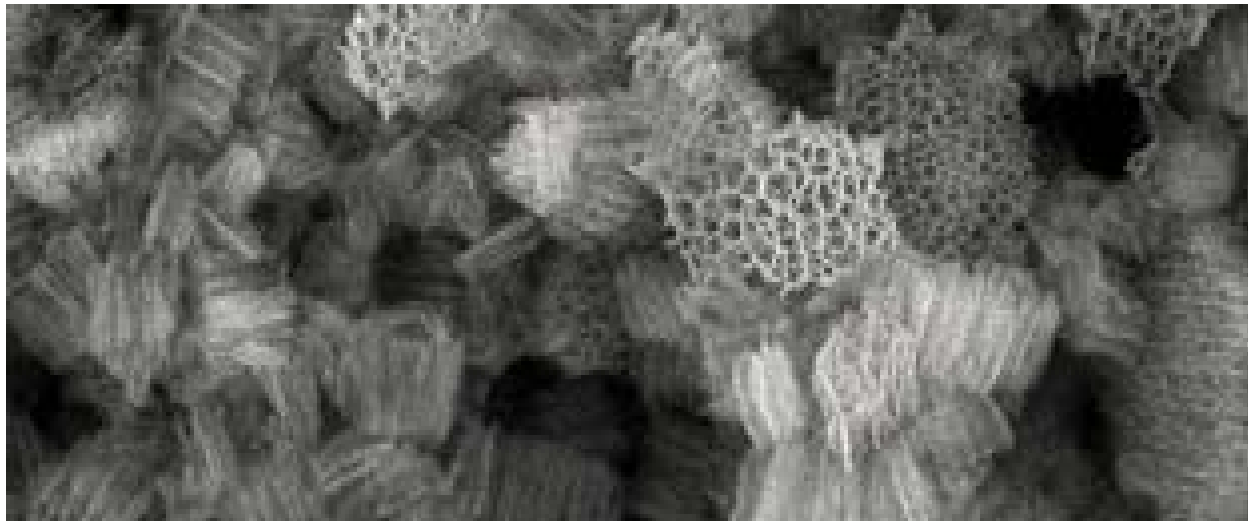


Accelerating the March to Cachet





# Institute for Materials Discovery and Design



Apply machine learning and rapid materials synthesis/characterization to accelerate development of novel functional materials for energy, information technology, medicine and more.



**Shirley Meng,**  
Prof of NanoEngineering



**Michael Sailor**  
Prof of Chemistry



## New Rady School of Management Dean Lisa Ordóñez



Continuing Partnership through  
**Institute for the Global Entrepreneur**

Please Join Us!

**IGE Technology Showcase**

November 1

Atkinson Hall

**Contact:**

Dennis Abremski

Executive Director, IGE

[dabremski@eng.ucsd.edu](mailto:dabremski@eng.ucsd.edu)

# Institute for the Global Entrepreneur

*Serving more than 100 Teams & Startups  
in Energy, Medtech, AI and Nanotech*

- **Technology Management & Entrepreneurism Education** with Rady School of Management
- **Technology Accelerator** – For teams to develop prototypes and validate with industry partners, refine business plans, build teams and engage investors.
- **MedTech Accelerator** – New Partnership with Altman Clinical Translational Research Institute to be announced November 1



*South 8 Technologies team  
developing lithium batteries  
for extreme cold*

# Convergent Systems Engineering Update

- Faculty Leadership:  
Cluster of 5 New Hires Underway
- Academic Coordinator (Rick Gessner) working with three departments on curricula plans: ECE, MAE, SE
- “Topics in Systems Engineering” industry guest lectures Fall 2019

## TOPICS IN SYSTEMS ENGINEERING

Professor Todd Hylton, Executive Director, Contextual Robotics Institute  
Professor David Whelan, Electrical and Computer Engineering

*Mondays, September 30–December 2, 2019  
Atkinson Hall Auditorium 5:00pm – 7:00pm*

14 October 2019

Sagnik Nandy – Google – “Handling Scale (System and Developer) and Reliability in Large and Critical Systems”

21 October 2019

David Whelan – UC San Diego – “An Integrated Medium Earth Orbit – Low Earth Orbit Navigation, Communication and Authentication System of Systems”

28 October 2019

David Harris – Cubic Transportation Systems – “The Cost of Taking Shortcuts”

04 November 2019

Srinivas Chennupati – Intel – “Scaling the Third Dimension in Silicon Integration”

18 November 2019

Nirmal Velayudhan – Viasat – “Applying a Decision Theoretic Framework for Evaluating System Trade-Offs”

25 November 2019

Robert Plummer – LLNL – “Systems Engineering the World’s Most Energetic Laser”

02 December 2019

Ariele Sparks – Northrop Grumman – “The Criticality of Systems Engineering to Autonomous Air Vehicle Development”

[cri-info@eng.ucsd.edu](mailto:cri-info@eng.ucsd.edu) - seminars open to public

# 2019 New Faculty Hires

UC San Diego

JACOBS SCHOOL OF ENGINEERING  
Corporate Affiliates Program



**ALYSSA POWELL**

NANOENGINEERING

**EXPERTISE**

Enzyme engineering and protein production

**MOST RECENTLY**

Lecturer, University of California San Diego



**MICHAEL R. DAVIDSON**

MECHANICAL & AEROSPACE ENGINEERING

**EXPERTISE**

Low-carbon energy at scale

**MOST RECENTLY**

Postdoctoral Research Fellow, Harvard Kennedy School



**JINGBO SHANG**

COMPUTER SCIENCE & ENGINEERING

**EXPERTISE**

Data-driven text mining

**MOST RECENTLY**

Ph.D. University of Illinois, Urbana-Champaign



**XIAOLONG WANG**

ELECTRICAL & COMPUTER ENGINEERING

**EXPERTISE**

Computer vision and machine learning

**MOST RECENTLY**

Ph.D. Carnegie Mellon University



**DAVID KAMENSKY**

MECHANICAL & AEROSPACE ENGINEERING

**EXPERTISE**

Computational mechanics

**MOST RECENTLY**

Postdoctoral researcher, Brown University



**MACHEL MORRISON**

STRUCTURAL ENGINEERING

**EXPERTISE**

Enhancing civil infrastructure resilience

**MOST RECENTLY**

Research Assistant Professor, North Carolina State University



**NADIA HENINGER**

COMPUTER SCIENCE & ENGINEERING

**EXPERTISE**

Security and cryptography

**MOST RECENTLY**

Assistant Professor, University of Pennsylvania



**LINGYAN SHI**

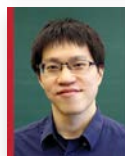
BIOENGINEERING

**EXPERTISE**

Visualizing complex biology in real time

**MOST RECENTLY**

Postdoctoral Research Associate, Columbia University



**ALBERT CHERN**

COMPUTER SCIENCE & ENGINEERING

**EXPERTISE**

Computational mathematics

**MOST RECENTLY**

Postdoctoral research, Technische Universität Berlin



**HANH-PHUC LE**

ELECTRICAL & COMPUTER ENGINEERING

**EXPERTISE**

Advanced electronic systems

**MOST RECENTLY**

Assistant Professor, University of Colorado Boulder



**PENGTAO XIE**

ELECTRICAL & COMPUTER ENGINEERING

**EXPERTISE**

Machine learning for healthcare

**MOST RECENTLY**

Senior Director, Petaum Inc



**GERALD SOOSAI RAJ**

COMPUTER SCIENCE & ENGINEERING

**EXPERTISE**

Computer science education for diverse learners

**MOST RECENTLY**

Ph.D. University of Wisconsin-Madison



**NIEMA MOSHIRI**

COMPUTER SCIENCE & ENGINEERING

**EXPERTISE**

Computational HIV epidemiology

**MOST RECENTLY**

Ph.D. UC San Diego



**HUIHUI QI**

MECHANICAL & AEROSPACE ENGINEERING

**EXPERTISE**

Sustainable engineering systems

**MOST RECENTLY**

Assistant Professor, Grand Valley State University



**EDWARD WANG**

ELECTRICAL & COMPUTER ENGINEERING

**EXPERTISE**

Intelligent mobile health monitors

**MOST RECENTLY**

Ph.D. University of Washington



**YIYING ZHANG**

COMPUTER SCIENCE & ENGINEERING

**EXPERTISE**

Hardware and software for next-gen data centers

**MOST RECENTLY**

Assistant Professor, Purdue University



**BORIS KRAMER**

MECHANICAL & AEROSPACE ENGINEERING

**EXPERTISE**

Methods to reduce computational complexity

**MOST RECENTLY**

Postdoctoral researcher, MIT



**PAT PANNUTO**

COMPUTER SCIENCE & ENGINEERING

**EXPERTISE**

Connecting digital and physical worlds

**MOST RECENTLY**

Ph.D. UC Berkeley

New Faculty Welcome:  
October 17, 2019 at 5:00pm



## Welcoming our Incoming Academic Leadership



**Christine Alvarado**  
*Associate Dean  
Students*



**Karen Christman**  
*Associate Dean  
Faculty Affairs & Welfare*

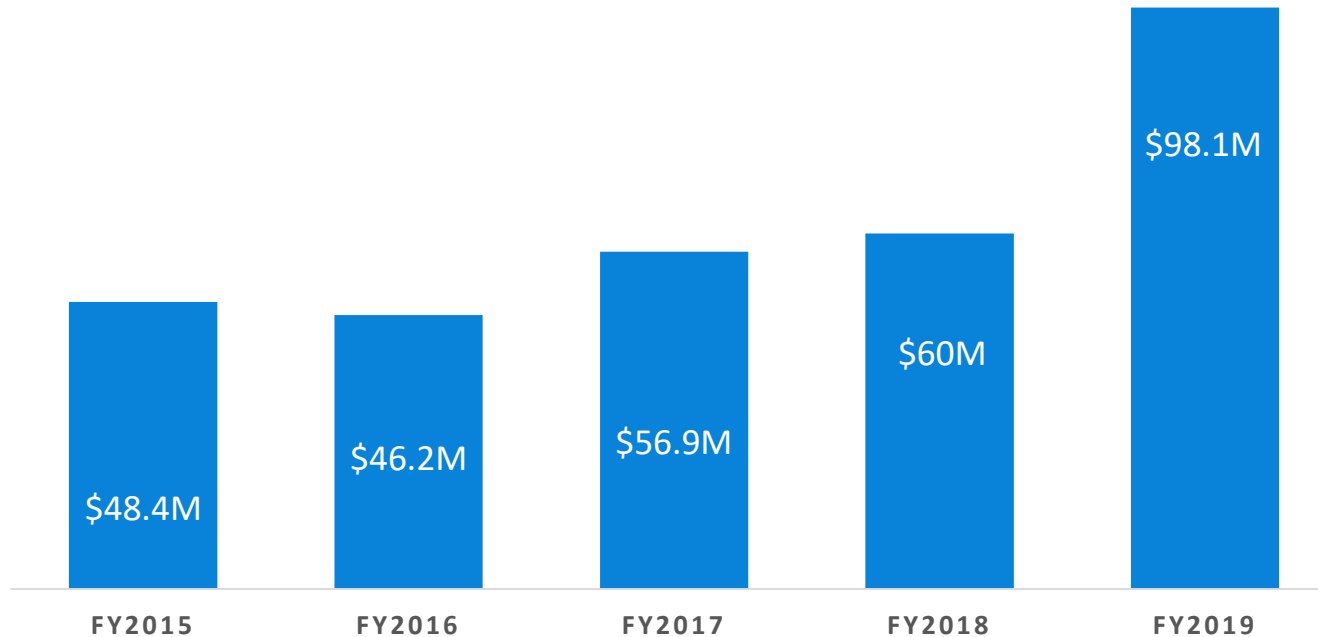


**Bill Lin**  
*Department Chair  
Electrical & Computer  
Engineering*



**Shaochen Chen**  
*Department Chair  
NanoEngineering*

## Research Funding Growth: New Awards



FY19Q2, Total Dollars Authorized by Sponsor, awards and supplements. Source, UC San Diego Office of Contract and Grant Administration

# The Jacobs School of the next Decade: 2020 Strategic Plan



**Sustained Performance**



**Reputation (10 Yrs)**

**Sustained Reputation**



**Cachet (20 Yrs)**

- One of the nation's largest engineering schools, providing leadership, talent and technology at scale.
- Graduates recognized for core engineering knowledge that enables them to solve new problems
- Working with industry is part of our DNA drive towards relevance and cachet
- No silver bullet—broad set of coordinated efforts
- Striving toward recognition (not ranking)

UC San Diego

JACOBS SCHOOL OF ENGINEERING

Corporate Affiliates Program



# Franklin Antonio Hall

GROUNDBREAKING CELEBRATION | NOVEMBER 15, 2019

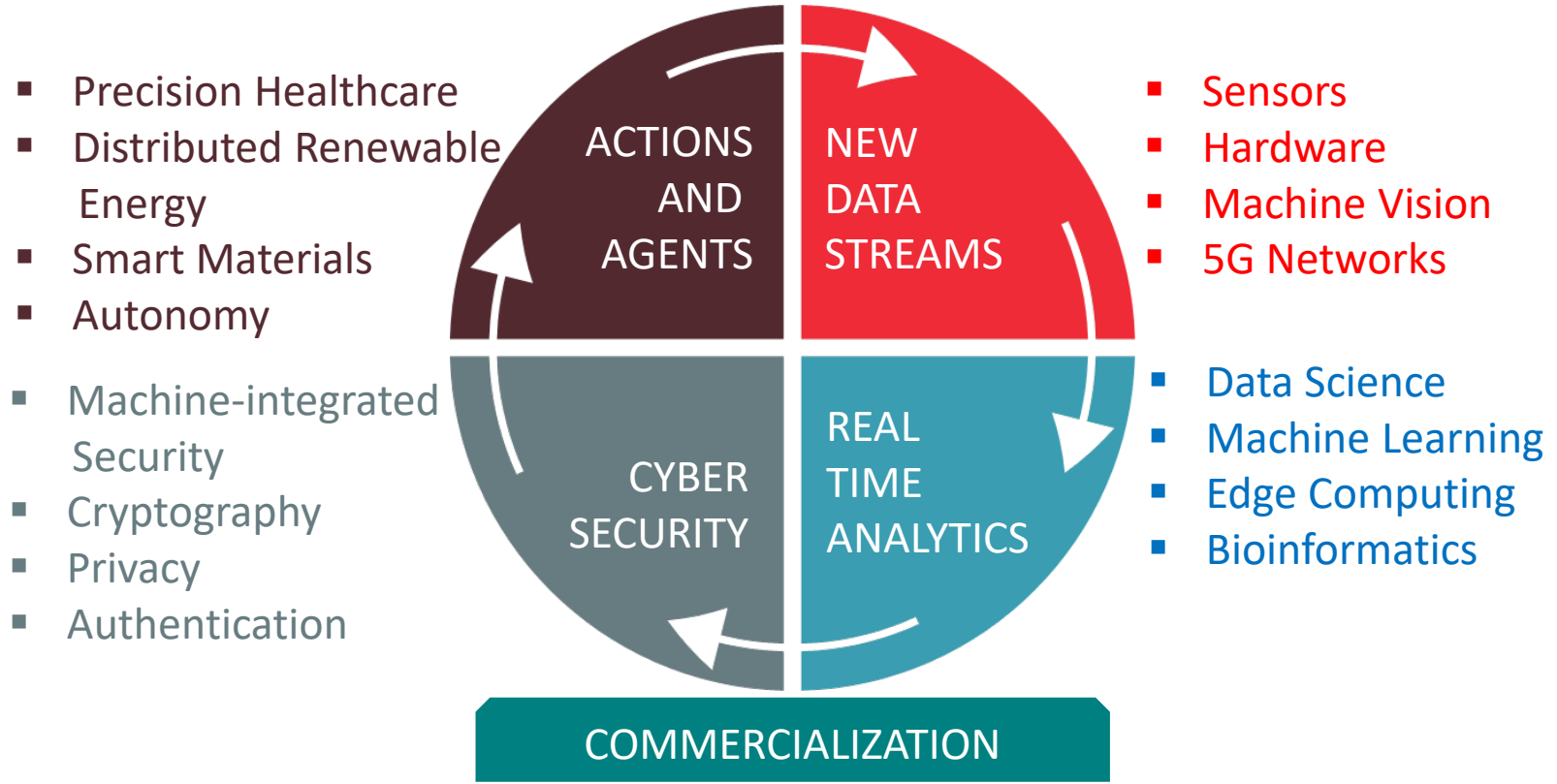


## Guidelines for Design

- Maximize the circulation of people and ideas
- Flexible laboratories to stand the test of time
- Welcoming to industry partners
- Benefits the entire Jacobs School



## Research Vision for the Digital Future



# Collaboratories for the Digital Future

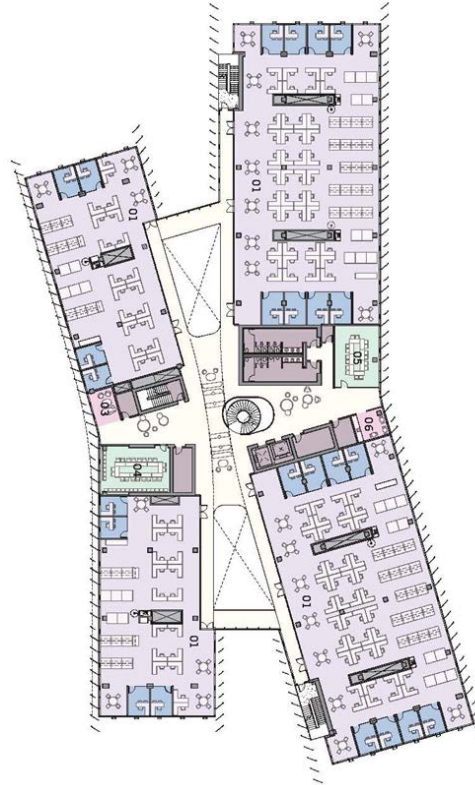
Machine-Integrated Computing  
and Security

Convergent Systems  
Engineering

Halıcıoğlu Data Science Institute

Wearable Sensors

High Energy Density Science



NanoImmuno Engineering | IEM

Precision Genomics | Salk

Contextual Robotics Institute

Sustainable Power and Energy

Wireless Communications



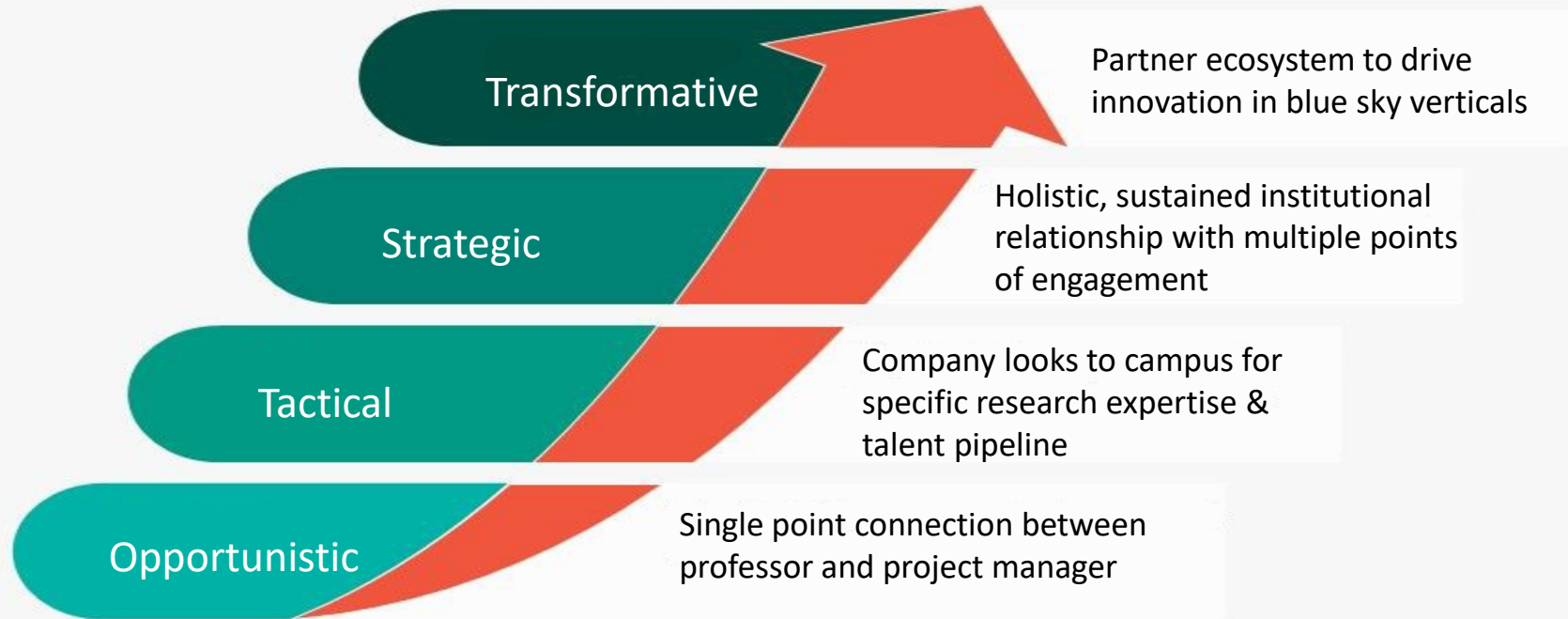


## Strategic University-Industry Relationships

**UC San Diego**

**JACOBS SCHOOL OF ENGINEERING**  
Corporate Affiliates Program

# Drive Relevancy and Ensure Exponential Impact



## A Single Point Connection with an Expert Faculty Member is Necessary, but not Sufficient

*“We sponsor more than 500 projects at about 100 universities.  
But somehow we feel we are not fully leveraging our investment.*

*We are changing course and instead building trusted strategic  
relationships with selected schools.”*

Global Partner Company in current  
negotiations with Jacobs School for  
strategic relationship

## Jacobs School Corporate Affiliates Program is a National Model for University-Industry Partnerships

- Dedicated team works with company to develop annual engagement plan
- 90% retention of industry members year over year
- Benchmarked by national engineering schools



# Jacobs School Corporate Affiliates Program: 75 Strategic Corporate Partners

UC San Diego  
JACOBS SCHOOL OF ENGINEERING  
Corporate Affiliates Program





# 16 Agile Research Centers and Institutes

## *New*

- Machine Integrated Computing and Security
- Wearable Sensors
- Contextual Robotics Institute
- Visual Computing
- Nano Immuno-Engineering
- Microbiome Innovation
- CHO Systems Biology
- Extreme Events Research
- Engineered Natural Intelligence (AI)
- Sustainable Power and Energy
- Institute for Materials Discovery and Design

## *Existing*

- Center for Wireless Communications
- Center for Networked Systems
- Institute for Engineering in Medicine
- Center for Memory and Recording Research
- Qualcomm Institute



# 70+ New Relationships Enable Use-Driven Research

UC San Diego

JACOBS SCHOOL OF ENGINEERING

Admiral  
INSTRUMENTS

Adobe

AMERICAN LITHIUM ENERGY

AMGEN

ARA

Arbin  
INSTRUMENTS

Argonne  
NATIONAL LABORATORY

AsahiKASEI

BASF

BMW  
GROUP

COGNEX

CUBIC

Daimler  
Mercedes-Benz

DANONE

dexcom

DSM

EMD  
SERONO

EVONIK  
POWER TO CREATE

ELSEVIER

ESKER

GM

HIDEN  
ANALYTICAL

HOLOGIC

HONDA

HORIBA

huami

Hydro  
Québec

IBM

iboss  
CYBERSECURITY

illumina

IMA LIFE  
Aseptic Processing & Freeze Drying Solutions

intel

IRIS  
TECHNOLOGY

janssen  
pharmaceutical companies  
a Johnson & Johnson company

KETI

KUREHA

Lawrence  
Livermore  
National  
Laboratory

LG Chem

leidos

Livent

Maxwell  
TECHNOLOGIES

Merck KGaA  
Darmstadt, Germany

Metagenics

Microsoft

新威  
NEWARE

Naval Research  
Corps  
Science & Technology

Pacific Northwest  
NATIONAL LABORATORY

panasas

PEC

PEPSICO

Pfizer

QIAGEN

QUALCOMM

Raytheon

سابك  
SABIC

SAMSUNG

Sandia  
National  
Laboratories

Sanitarium  
health is wellbeing

sartorius

SDGE  
Semptra Energy unit

SEED

Shell

SHIMADZU  
Excellence in Science

SK innovation

solid  
energy

SOLVAY

SONY

SOSSEC  
THE SYSTEM  
OF SYSTEMS  
CONSORTIUM

Thermo  
SCIENTIFIC

VIGOR  
TECHNOLOGY

GORE  
Creative Technologies  
Vibracore

Wildcat  
Discovery  
Technologies

XILTRIX

Zpower  
37

## Strategic Relationship Characteristics

- Clear sense of mutual benefit to both the Jacobs School and the Partner
  - Advances research and education mission for public good
  - Synergistic with corporate roadmap
- Holistic and coordinated institutional approach engaging multiple corporate divisions to reach goals.
  - Human Resources
  - Research and Development
  - Business Development
  - Community Relations
  - New Ventures
- Sustained, multi-year engagement with branded Corporate Presence on campus

# Collaboratories for the Digital Future: Innovation Ecosystems

1. Mobile AI at the Edge
2. Connected Health
3. Smart, Safe, Sustainable Mobility
4. Materials Design & Discovery



# Collaboratories for the Digital Future: Innovation Ecosystems

1. Mobile AI at the Edge
2. Connected Health
3. Smart, Safe, Sustainable Mobility
4. Materials Design & Discovery
5. Precision Medicine for Infections Diseases (?)



# Faculty Presentation

## Nicole Steinmetz

Professor, NanoEngineering

Director, Center for Nano Immuno-Engineering



NanoEngineering Gone #Viral

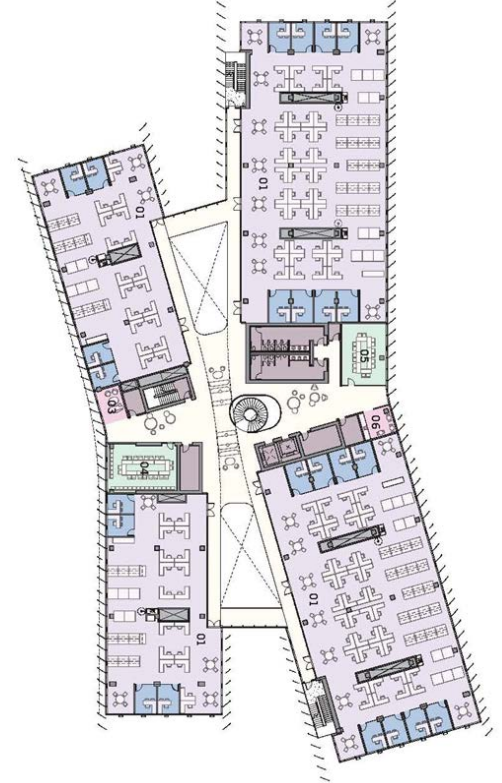
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Corporate Affiliates Program

# CAP Executive Input: Innovation Ecosystems

Discussion Topic:

What other emerging innovation ecosystems should the Jacobs School pursue?





# CAP Business



## Wil Dyer

Director, Corporate Affiliates Program

### CAP News & Updates



# Jacobs School Corporate Affiliates Program: 75 Strategic Corporate Partners

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Corporate Affiliates Program



# CAP Talent Programs

We help you define and execute your talent acquisition strategy on campus

- Corporate Day@Jacobs
- Tech Talks
- Information Sessions
- Professional Student Organizations
- Internships & Full-time jobs
- Team Internship Program (TIP)
- Cooperative Education (Co-op)



*Top CSE students network with CAP Partners  
at CSE Tutor Networking Night*

# Team Internship Program (TIP)

- 2-5 members; Undergraduate, Masters, and Ph.D. Levels
- All engineering majors - we encourage multi-disciplinary teams; other majors on occasion
- Paid Internships, 10-12 weeks over the summer
- Full-time, i.e., 40 hour/week commitment

# Cooperative Education (Co-op)

- First in the UC System
- Cohort #2: June-December 2020
- CSE, MAE, ECE only
- Full-time (30-40 hours per week) for up to 6 months - Summer and Fall quarters
- Undergraduate only - any year, international students included

Recruiting Timeline	
October - December	Companies include TIP/Co-op in budget planning. Companies define and submit projects and recruitment starts
January - March	Companies continue to submit their projects and recruitment continues; offers extended
April	Finalize recruitment & offers
May	Selections completed Intern pre-deployment training
June- December	TIP period during 10-12 consecutive weeks (Jun-Sept) Co-op period up to 6 months (Jun-Dec)

# New Jacobs School Student Recruitment Database

- Post full/part-time opportunities, internships, TIP & Co-op
- Proactively identify qualified students through tailored resume book
- Request/sign up for targeted recruiting events and promote to students

*More Information:*

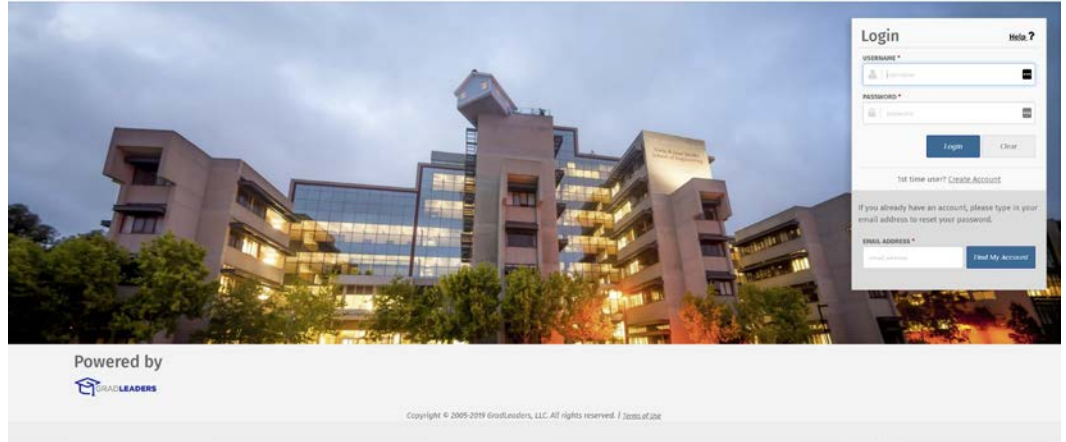
***Rocio de Lis***

*Assistant Director*

*Corporate Affiliates Program - Talent Programs*

***mdelis@eng.ucsd.edu***

UC San Diego  
JACOBS SCHOOL OF ENGINEERING



**<http://jacobsschool.ucsd.edu/talent>**

# Core Research Invitations for CAP Executives



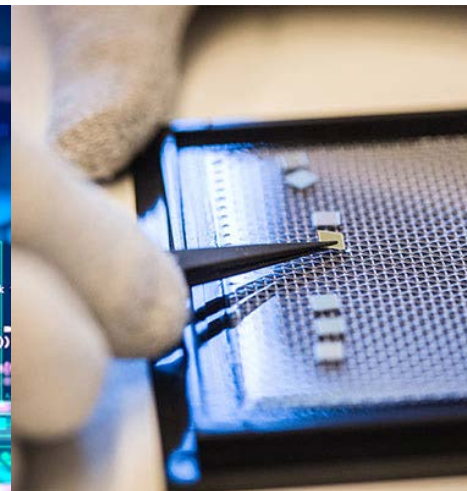
Center for Wearable  
Sensors  
(cws.ucsd.edu)  
*October 23, 2019*



Contextual Robotics  
Institute  
(cri.ucsd.edu)  
*November 7, 2019*



Machine-Integrated  
Computing & Security  
(mics.ucsd.edu)  
*November 13, 2019*



Center for Engineered  
Natural Intelligence  
(ceni.ucsd.edu)  
*January 28-29, 2020*



# RESEARCH EXPO

THURSDAY APRIL 16 2019 AT UC SAN DIEGO - [JACOBSSCHOOL.UCSD.EDU/RE](http://JACOBSSCHOOL.UCSD.EDU/RE)

200+

GRADUATE-LEVEL RESEARCH POSTERS

ENGINEERING FACULTY PRESENTATIONS

CONNECT WITH STUDENTS, FACULTY AND INDUSTRY!

Call for: 1. CAP Partner Sponsorship & 2. CAP Executive Distinguished Judges



**Get Inspired**  
230+ Research Posters



**Technology Roadmap**  
Ted-Style Talks by World-Renown Faculty



**Connect with Engineers**  
500+ Students, Alumni, Industry, Faculty

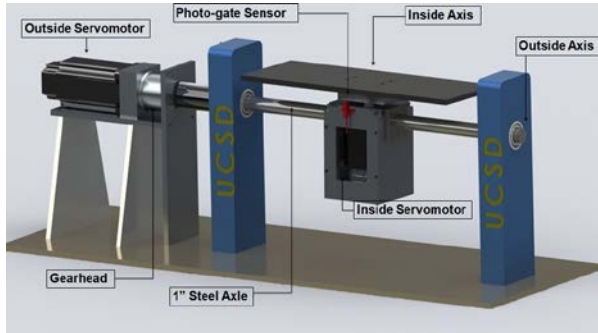


# MAE 156B: Senior Design Course

## Industry Sponsored Projects

### What the Course Provides

- Teams of 3-6 students
- 15 week project durations
- Deliver working prototype to sponsors
- IP assigned to sponsor
- Parts Budgets range: \$1,000 to \$10,000
- Shared Shop Expense: \$1,800
- Title due in October 7 and January 7



### Projects can be interdisciplinary

- Mechanical
- Electromechanical
- Fluid mechanics
- Heat transfer
- Computer Control

### For more information contact:

Nathan Delson PhD, [ndelson@ucsd.edu](mailto:ndelson@ucsd.edu)

Jerry Tustaniwskyj PhD, [jtust@eng.ucsd.edu](mailto:jtust@eng.ucsd.edu)

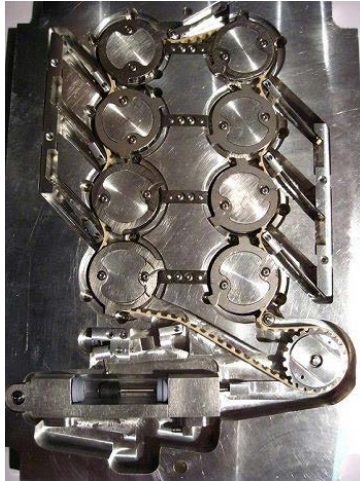
# Sample MAE 156B Projects

Teradata



Server Rack  
Cabinet Movers

Delta Design



IC Testing &  
Handling

NAVWAR



Surface Towed  
Geolocation  
System,  
Robotically  
Controlled ATV

ATA Engineering



Modal Analysis Shaker

# All Upcoming Events

October 14, 2019	Systems Engineering Seminar: Sagnik Nandy, Google
October 17, 2019	New Faculty Welcome
October 17-18, 2019	Center for Memory & Recording Research (CMRR.ucsd.edu) Research Review
October 23, 2019	Center for Wearable Sensors (CWS.ucsd.edu) Research Summit
October 25-27, 2019	SD Hacks – student-run hack-a-thon
November 1, 2019	Institute for the Global Entrepreneur (IGE.ucsd.edu) Start-up Showcase
November 7, 2019	Contextual Robotics Institute (CRI.ucsd.edu) Forum
November 13, 2019	Machine-Integrated Computing & Security (MICS.ucsd.edu) Research Summit
November 15, 2019	Franklin Antonio Hall Groundbreaking Ceremony – by CAP invitation only
November 20, 2019	Center for Wireless Communications (CWC.ucsd.edu) Research Review
December 5, 2019	National Academy of Engineers (NAE) Celebration
January 28-29, 2020	Center for Engineered Natural Intelligence (CENI.ucsd.edu) Research Summit
<b>February 6, 2020</b>	<b>Winter CAP Executive Board Meeting</b>
April 16, 2020	Jacobs School Research Expo

The background of the slide is a photograph of a modern, multi-story building with a grid-like facade of windows and balconies. The entire image is tinted with a deep blue color. The building is seen from a low angle, looking up, which emphasizes its height. The sky is a clear, solid blue.

UC San Diego

JACOBS SCHOOL OF ENGINEERING  
Corporate Affiliates Program

Thank you!  
Next Board Meeting:  
February 6, 2020