

## Welcome CAP Executive Board February 8, 2024

## **CAP** Director

Wil Dyer Director, Corporate Affiliates Program

#### Welcome







#### **Virtual Attendee Protocol**

- $\rightarrow$  We will be recording this meeting
- → You will be muted; Use chat box for questions & comments
- → We will create a Zoom room for the discussion portion of the meeting, please turn on your cameras at that time.



#### UC San Diego

#### JACOBS SCHOOL OF ENGINEERING

Corporate Affiliates Program

#### Agenda

5:00-5:05pm	Welcome
	Wil Dyer
	Director, Corporate Affiliates Program
5:05-5:15pm	Cooperative Education (Co-op) Presentation
	Madison Lee, 4th Year Ph.D student
	Electrical & Computer Engineering
5:15-5:35pm	Dean's Report
	Al Pisano
	Dean, Jacobs School of Engineering
	Special Adviser to the Chancellor for Campuswide Strategic Initiatives
5:35-5:55pm	Faculty + CAP Partner Presentation: Fare Evasion Project
	Nadir Weibel
	Professor, Computer Science & Engineering, Jacobs School of Engineering
	Shariqa Dowla
	Director of Software Engineering, Cubic
5:55-6:20pm	Executive Input: Cross Campus Initiatives
6:20-6:30pm	CAP Business
	Wil Dyer
	Director, Corporate Affiliates Program
6:30pm	Adjournment



#### Welcome New CAP Partners



# Dexcom<sup>®</sup>



#### Welcome Guests

DOLBY

SAMSUNG

SHIELD AI



#### Welcome AMD Co-op Student

# AMD

#### AMD Co-Op Experience: Madison Lee

Bio: 4th year ECE PhD Student, advised by Tara Javidi

**Research**: Black-Box Function Optimization



#### AMD Co-Op Experience: Madison Lee

Goals:

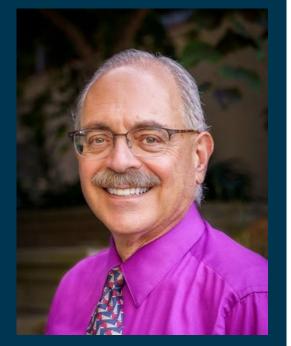
- Use black-box optimization techniques to <u>collect hardware performance data</u>.
- Use performance data to recommend an optimal hardware configuration to users with low probability of system failure

#### AMD Co-Op Experience: Madison Lee

#### Accomplishments:

- Developed statistical model of hardware failure in terms of system configuration and runtime duration.
- Designed and implemented a black-box optimization algorithm for efficient data collection.
- Tested our designs using both synthetic and real hardware data.
- Connected our algorithm to an automatic data collection routine.





## Albert P. Pisano

Dean, Jacobs School of Engineering

Back Towards the Top 5



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## I'm sharply focused on my **next 5 years** as Dean of the Jacobs School, and my **new role** as Special Adviser to the Chancellor for Campuswide Strategic Initiatives

Phase three begins!

## The 8 Point Dean's Plan

- Continue momentum for engineering diversity
- Build more multi-faceted campus partnerships
- Enhance undergrad education

• Drive graduate education quality

- Accelerate faculty career growth and impact
- Implement "Leviathan Project"

• Accelerate fundraising

• Build cachet



**Corporate Affiliates Program** 

JACOBS SCHOOL OF ENGINEERING

## The Special Adviser to the Chancellor Campuswide Strategic Initiatives



JACOBS SCHOOL OF ENGINEERING Corporate Affiliates Program

#### Lifting the Campus with the Power of Engineering

- Transforming Healthcare
- Carbon-negative Biomanufacturing
- Fusion Engineering
- Mobile Edge-to-Cloud Networks

#### What we accomplished in 2023



Corporate Affiliates Program

#### **PRISM Center Launched**



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The \$50.5M funded Processing with Intelligent Storage & Memory (PRISM) center to focus on novel memory and storage devices and circuits; next generation architectures; systems and software; and grand challenge applications in drug discovery and data analysis



## **Contributors in DoD Microelectronics Commons Project**

We are accelerating development and manufacturing of microelectronics in the U.S. focusing on 5G/6G technologies as part of the California Defense Ready Electronics and Microdevices Superhub (DREAMS) in Southern California.



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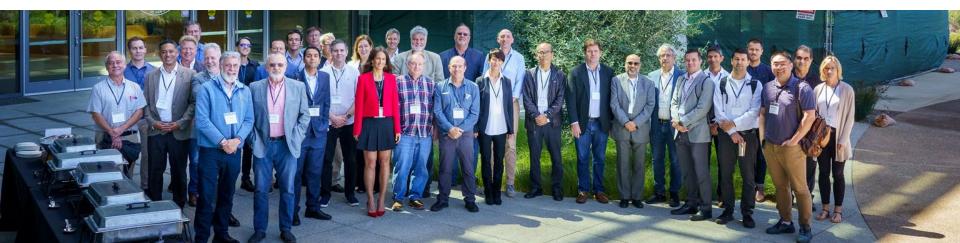
## Efforts towards Making California the Fusion State



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We hosted the California Fusion Technology, Research and Engineering (FUTRE) workshop, bringing together industry, government and academic experts.

Additionally, our Center for Matter Under Extreme Conditions received \$12.5M to maintain a center of excellence, and we are collaborating with San Diego Supercomputer Center and General Atomics to develop a Fusion Data Platform (FDP).



## **Celebrated 25 years as the Jacobs School of Engineering**



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## **Welcomed 15 New Faculty**

#### 160 faculty hires in 10 years

UC San Diego

#### JACOBS SCHOOL OF ENGINEERING Corporate Affiliates Program

CLAIRE ACEVEDO YUFEI DING WANLU LI YANRAN LI JUN-KUN WANG Assistant Professor Assistant Professor Associate Professor Assistant Professor Associate Professor PhD: École Polytechnique Fédérale de Lausanne, CH Acevedo investigates mechanisms of Li drives eco-friendly innovation by designing Wang specializes in optimization and machine Li, a synthetic biologist, blends chemistry deformation, fracture and biological response Ding specializes in programming systems. catalysts and materials for sustainable energy and biology to study plants using engineering learning. His research aims to make algorithms in skeletal tissues and biomaterials from the techniques. Li's group creates microbial cell faster; build robust theoretical foundations; and influencing realms from machine learning to applications using quantum mechanics, molecular level to macro scales. She works to quantum computing. As a leader in intelligent molecular dynamics and machine learning. As a factories to gain insights into plant metabolism overcome issues such as model mis-specification unravel the origins of bone fragility, skeletal foundation for this work, Li's research focuses or distribution shifts that arise during real-world programming, her work delves deeply into and immunity. The goal is to cultivate sturdier disease and to inform design principles of domain-specific language innovations, GPUon investigating the electronic structure, plants that are better equipped to withstand deployment of machine learning methods. He biomaterials-bringing together materials holds a joint appointment with the Halicioğlu optimized library development, and cutting-edge chemical bonding and environmental effects of a range of challenges, from pests to changing mechanics, biology and experimental MECHANICAL compiler and architecture designs. nanoclusters and condensed phases. environmental conditions. Data Science Institute & AEROSPACE ENGINEERING high-energy X-ray physics. ANOENGINEERIN JANOENGINEERING jkw005@ucsd.edu yufeiding@ucsd.edu wal019@ucsd.edu val152@ucsd.edu @LabAcevedo | csacevedo@ucsd.edu QIPENG LIU HAIWEN LUAN **RAJEEV SAHAY KIANA ARAN** ALESSANDRO MARINONI Assistant Professor Assistant Professor Assistant Teaching Professor Associate Professor Assistant Professor Liu focuses on quantum computing, quantum Luan merges intelligent electronics and Sahay's research lies at the intersection of Aran develops bioelectronics for multi-omics Marinoni primarily studies magnetically information and cryptography in a quantum microfluidics into living systems to create biomachine learning and networking. This work studies, targeted drug delivery, and studying the controlled nuclear fusion. His research focuses integrated, multifunctional microsystems that focuses on two main areas: cellular networks, mechanisms of aging. She pioneers approaches world. His research includes analyzing and on understanding plasma turbulence and ways understanding how safe existing cryptographic can be used to address medical challenges. These with the goal of improving communication to fuse CRISPR and electronics to improve the to control it. This involves developing innovative systems will be once quantum computing systems mimic living tissues, possess complex efficiency in congested networks, and social quality of genotyping and gene editing. She diagnostic systems for nuclear fusion devices. becomes widely available. He also works to build 3D geometries, respond to mechanical input. learning networks, which are deployed in the is a founder of two San Diego biotechnology designing experiments within them, and using and improve our ability to sense and regulate cryptography powered by quantum computing classroom to foster student interaction and aid companies and holds a joint appointment with UC advanced modeling tools for data analysis. MECHANICAL & AEROSPACE MECHANICAL & AFROSPACE and information. processes in biological systems. effective learning. San Diego School of Medicine. SCIENCE & amarinoni@ucsd.edu COMPUTER gipengliu@ucsd.edu @HaiwenLuan | haiwenluan@u.northwestern.edu r2sahav@ucsd.edu Kiana\_Aran@kgi.edu FANNY CHAPELIN ALESSANDRO PALERMO ZAHRA SADEGHIZADEH PARINAZ NAGHIZADEH ABDOULAYE NDAO Assistant Professor Professor Assistant Teaching Professor Assistant Professor Assistant Professor PhD: Politecnico di Milano, Italy Chapelin develops non-invasive MRI methods Palermo's world-leading expertise covers design-Sadeghizadeh aims to create and promote Naghizadeh develops mathematical models and Ndao's research merges theory, simulations, to track immune cell migration to foci of oriented resilient and sustainable engineering evidence-based teaching approaches that can analytical tools to predict and influence human nanofabrication and device integration to nflammation in different conditions. Study areas solutions for earthquake damage protection. advance engineering curriculum, particularly and/or algorithmic behavior in complex networks. develop smaller, lighter, more efficient optical nclude cell therapy distribution, fate and efficacy He intends to continue researching on novel in aerospace engineering. Her pedagogical Applications include enhancing the security of devices without compromising on functionality. preclinical studies; inflammation processes in low-carbon concrete technologies and advanced methods foster active and hands-on learning; vber-physical systems and designing ethical Applications include sensors that can detect umor progression: stem cell transplant and graft engineered timber. Palermo's research will deep understanding of complex concepts; and Al algorithms for systems involving human biological activity at single-cell resolution and /s host disease; and cell interactions in vivo. She cover modern construction methods for timber essential problem-solving skills, enhancing interaction, such as in hiring, banking and school components for building photonic quantum has a joint appointment with the UC San Diego buildings and concrete bridges including the use students' success in their academic and ELECTRICAL 8 admissions. MECHANICAL circuits. STRUCTURAL Department of Radiology. of digital construction techniques. & AEROSPACE professional paths. ENGINEERING pnaghizadeh@ucsd.edu alndao@ucsd.edu alpalermo@ucsd.edu zsadeghizadeh@ucsd.edu fachapelin@ucsd.edu

## Pioneered Impactful Research Breakthroughs

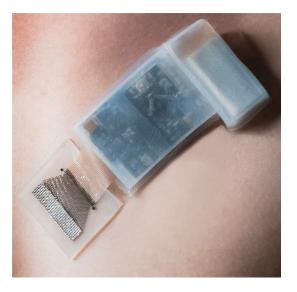
Created a <u>handheld, non-invasive device</u> that can detect biomarkers for Alzheimer's and Parkinson's Diseases

Found a way to give <u>old smartphones a second life</u> by repurposing the phone processor

Developed the first <u>fully integrated wearable</u> <u>ultrasound system</u> for deep-tissue monitoring onthe-go



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...and many more!

#### Looking ahead: 2024 and beyond



Corporate Affiliates Program

## \$3M to support Sustainable Power & Energy Center

Through his company CorDx, entrepreneur and philanthropist Aiiso Yufeng Li (Jeff) and Dongdong Guo (Doreen) have pledged \$3 million to support the Sustainable Power and Energy Center (SPEC). This research center serves as an interdisciplinary hub for advancing battery, solar cell and other sustainable energy technologies through a mix of fundamental research and appliedresearch projects in collaboration with industry partners.



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Ping Liu, nanoengineering professor and director of the Sustainable Power and Energy Center (SPEC); Aiiso Yufeng Li (Jeff), Founder and Chief Strategy Officer (CSO) of CorDx; Albert P. Pisano, Dean and Special Adviser to the Chancellor; Liangfang Zhang, professor and chair of the nanoengineering department

## Accelerating Interdisciplinary Research Collaborations for Early-Career Faculty

UC San Diego JACOBS SCHOOL OF ENGINEERING Corporate Affiliates Program

- Goal: help early-career faculty build interdisciplinary research collaborations to the point that they are competitive for multi-year research funding.
- Program provides funding that enables graduate students from two different labs to begin new research collaborations.
- At least one of the two UC San Diego Jacobs School of Engineering faculty must be an early-career professor.



Read more here

## Microbiome leader elected to National Academy of Engineering



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Rob Knight, Professor of Bioengineering, Computer Science & Engineering, and faculty director for the Center for Microbiome Innovation

Recognized for his pioneering leadership and "for understanding microbiomes and their application to healthcare and sustainability"



#### Leviathans



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The Jacobs School Leviathan Initiative is a major project, spanning the interests of several faculty across all six departments which could command a grant in the size of \$50M-\$100M over a 5-year period.

**Engineering an End to Cancer** Adam Engler, Ph.D. Bioengineering

**Grounded, Aligned, & Rational Intelligence** Sorin Lerner, Ph.D., Mohan Paturi, Ph.D. Computer Science and Engineering

**II7: Interactive Intelligence for 7G & Beyond** Farinaz Koushanfar, Ph.D. Electrical & Computer Engineering **Engineering Human Resilience** James Friend, Ph.D. Mechanical and Aerospace Engineering

**Biomanufacturing of Intelligent Living Materials** Shaochen Chen, Ph.D. Nanoengineering

**Digital Twins for Comprehensive Infrastructure Asset Management & Optimization** John McCartney, Ph.D. Structural Engineering

## Four Tenants of Achieving Top 5 in 5

- 1. Maintaining graduate student excellence via Graduate Record Exams (GRE)
- 2. Drive faculty recognition via National Academy of Engineering (NAE) memberships
- 3. Enhance excellence and relevance of talent flow to our corporate partners
- 4. Landing leviathan research programs





## Four Tenants of Achieving Top 5 in 5



JACOBS SCHOOL OF ENGINEERING Corporate Affiliates Program

- 1. Maintaining graduate student excellence via Graduate Record Exams (GRE)
- 2. Drive faculty recognition via National Academy of Engineering (NAE) memberships
- 3. Enhance excellence and relevance of talent flow to our corporate partners
- 4. Landing leviathan research programs

What cross-disciplinary, cross-campus initiatives or projects could we launch that would be relevant to your company?



#### **Questions/Comments about Dean's Report?**

## **Special Project Presentation**



Shariqa Dowla Director, Software Engineering Cubic Transportation Systems Nadir Weibel Professor, Computer Science & Engineering Associate Faculty Director, Design Lab

#### Fare Evasion in Public Transportation



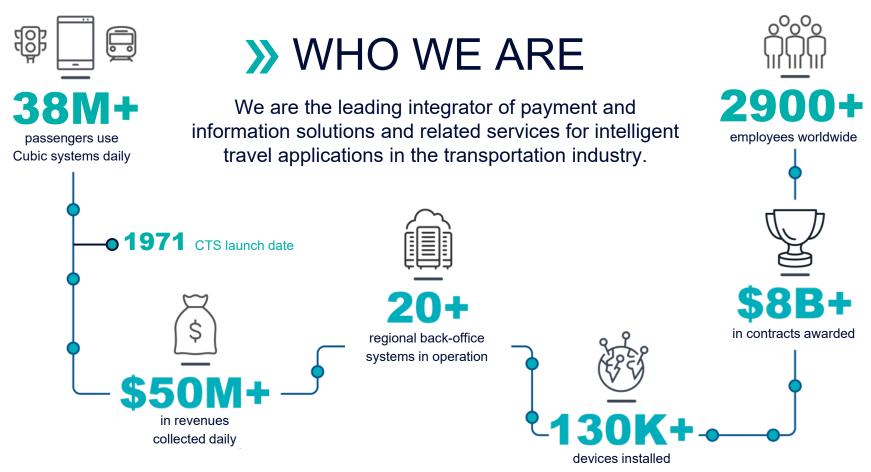
JACOBS SCHOOL OF ENGINEERING Corporate Affiliates Program

#### CUBIC<sup>®</sup> Transportation Systems

## CUBIC-UCSD Fare Evasion Project

CAP Winter Executive Board Meeting February 8<sup>th</sup> 2024





#### >> OUR GLOBAL IMPACT

- » 2,900+ employees worldwide
- » 50+ years of transportation experience
- » Long-term customer partnerships of **25+ years**
- » Collect over \$20 billion in transit revenue annually
- » Process 24+ billion transactions annually
- » Project deployments on six continents
- » HQ in San Diego, California with manufacturing in Tennessee



#### Problem Statement

» Fare evasion is generally defined as <u>a passenger using public transit without paying the required fare or possessing the required fare media or valid proof of fare payment</u>. It has significant implications for the financial sustainability of transit systems.

» Here is a video highlighting fare evasion in New York and the projected revenue loss in NY alone.





Confidential Internal Use Only

#### Project Objective

- » Objective: Reduce / deter fare evasion using a combination of behavioral science and technical toolsets.
- » Methodology
  - Students/Researchers can study the various fare gates that Cubic provides
  - We have city labs setup at our office to simulate almost any
  - Fare evasion can also be observed and studied at live stations.
- » Challenge:
  - Find with unique and easy to implement ideas to deter nonpayment .

See white paper from National Academies (2022) outlining the measurement and management of fare evasion as well as the Cubic white paper (2022)

#### How Do We Approach this Problem?

Through strategic partnerships between the Jacobs School of Engineering and other multidisciplinary entities at UC San Diego working at the intersection of engineering, behavioral, and social sciences



Nadir Weibel, PhD Professor of Computer Science and Engineering Associate Faculty Director, The Design Lab JACOBS SCHOOL OF ENGINEERING UC SAN DIEGO

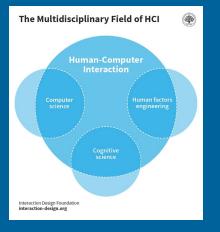








#### Human-Computer Interaction is a Key Discipline in Computer Science and Engineering





































# **THE DESIGN LAB** UC San Diego

#### MISSION

To foster design-driven transformation by imagining alternative futures, empowering designers, and equipping people and communities with the knowledge, tools, and opportunities to tackle the most pressing societal challenges.

#### VISION

To transcend disciplinary boundaries and spearhead new frontiers in design research, education, and practice to create inclusive, just, and sustainable future for people and the planet.

#### WE INCUBATE, ACCELERATE, & SCALE DESIGN INNOVATIONS

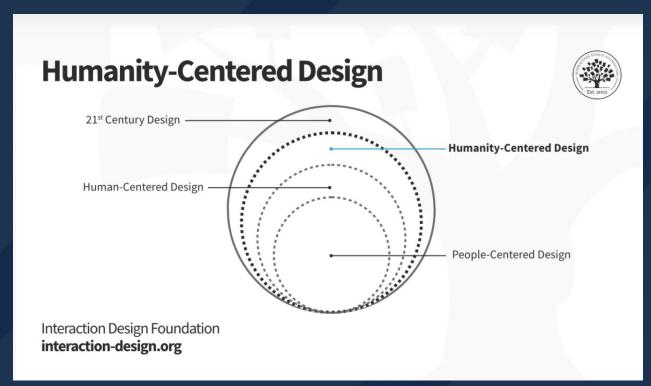




### **HISTORY OF DESIGN LAB**

- Started in 2015, Chancellor initiative, Founding Director: Don Norman
- Inter- and Transdisciplinary Research, Teaching, and Community Engagement
- Design for 21st Century Social Transformation
- UC San Diego's Uniqueness: unconventional, non-traditional, entrepreneurial, audacious

#### WHO WE ARE...HUMAN-CENTERED $\rightarrow$ HUMANITY-CENTERED DESIGN





#### PEOPLE

- 50+ affiliated Faculty
  - Students, Researchers, Staff
- 6 Different Schools/Divisions
  - Arts and Humanities
  - Engineering
  - Public Health and Human Longevity
  - Rady School of Management
  - School of Medicine
  - Social Sciences
- Common Thread: Work on complex issues that will address systemic and structural problems



### COMMUNITY

- Community-Driven Design is a central tenet: *by, for, and WITH community*
- Design Lab STUDIOS
- Interdisciplinary Research
  - Futures Labs (Health, Indigenous, Plastics)
  - Just Transitions Institute
  - Bioregional Center
  - Housing Alliance
  - Design4SD
- Rapid Prototyping (ideas/innovations)

### **CONSULTING:** Thought Leaders

- Civic Institutions
- Industry Partners
- University Partners
- Non-profits



#### How does the Design Lab work?

#### Industry partnerships E.g: Sonos Lab engagement



Research Collaboration E.g: across engineering and social science



Stakeholders Engagement E.g. Creating access pathways with IBM to activate capacity for real world design research



Design Programming E.g: the Pepper Canyon civic design-a-thon





#### How Can We Address this Problem?

#### <u>The Technical</u> <u>Problem</u>

- Current barriers
  are easy to avoid
- Physical-Digital systems
- Barriers need to be built within existing systems

Study current technical solutions and their flaws

#### <u>The Human-</u> <u>Machine Interaction</u> Problem

- People need effective ways to pay
- Payment systems should not be in the way of traveling
- Different people have different needs

Research issues for humans to interact with the real-world system

#### The Social Problem

- Everyone wants to save money when they can
- People might not want to be tracked
- Some people might not be able to pay

Understand the root motivation of different groups of people

#### JACOBS SCHOOL OF ENGINEERING

UC SAN DIEGO





#### How do we Plan to Address this Problem?

#### The Technical Problem

- San Diego Cubic Lab
- Different systems
- Different cities



Study current technical solutions and their flaws

Propose real-world engineering adaptations

#### The Human-Machine Interaction Problem

- Cubic Payment Machines
- Public Transportation Apps
- Different ways of paying fares



Research issues for humans to interact with the real-world system

#### Propose novel interaction paradigms

#### The Social Problem

- Observing real behavior on-site (SD + LA)
- Analyzing Cubic logs
- Engaging with community and civic stakeholders



Understand the root motivation of different groups of people



### Propose solutions that scale to different needs

## Questions / Discussion



#### CUBIC... Transportation Systems

JACOBS SCHOOL OF ENGINEERING UC SAN DIEGO





## **CAP Executive Board Input:**

- What cross-disciplinary, cross-campus initiatives or projects could we launch that would be relevant to your company?
- Who are the company and campus players within this initiative that we should engage?
- What role would you play?



## **CAP** Business

Wil Dyer Director, Corporate Affiliates Program

### **CAP** Updates



**Corporate Affiliates Program** 



## **Jacobs School Corporate Affiliates Program**



#### **CAP** Talent Programs - There is still time to recruit students!

Send us the description(s) and we'll take care of the rest!

- → Team Internship Program (TIP)
- → Cooperative Education (Co-op)
- → Individual Internships
- → Full-time/Part-time jobs
- → Alumni for experienced roles







Learn more at jacobsschool.ucsd.edu/talent

Contact Alice Grgas at <u>agrgas@ucsd.edu</u>

#### Senior (Capstone) Design Projects

#### Why a capstone project?

- → Team of 3-6 students
- → Student skills & fresh ideas in action on your technology
- → Mentor students
- → IP assigned to sponsor

Jacobs School of Engineering	Format	Deadline to Submit Proposal
Bioengineering	1 year project	May 22, 2024
Electrical & Computer Engineering	Spring Quarter	March 25, 2024

Rady School of Management	Format	Deadline to Submit Proposal
Master of Science in Business Analytics (MSBA)	Spring Quarter	February 23, 2024

Contact Alice Grgas at <u>agrgas@ucsd.edu</u>

## **Professional Master Degrees**

- Convergent Systems Engineering (CoSE)
  - AESE Technical Leadership program
  - Value Supply Chains (VSC)
  - Cyber-Physical-Social Systems (CPSS)
- Data Science and Engineering (DSE)
- Wireless Embedded Systems (WES)

Contact: Gary Henderson Director, Engineering Professional Education grhenderson@ucsd.edu



## Accepting applications now! jacobsschool.ucsd.edu/mas

## UC San Diego

JACOBS SCHOOL OF ENGINEERING

# RESEARCH EXPO 2024

#### WEDNESDAY, APRIL 17

https://jacobsschool.ucsd.edu/research-expo

☑ CAP Executive Judges

☑ Ph.D Recruitment

CAP Partner Sponsors

## **CAP** Partner Invitations to Research Reviews



Center for Microbiome Innovation cmi.ucsd.edu/cimm March 12-14, 2024

Contact: Wil Dyer, wdyer@ucsd.edu

## SUPPLY CHAIN FORUM

APRIL 9-10, 2024 San Diego, California

Institute for Supply Chain Excellence & Innovation ISEI.ucsd.edu/supply-chain-forum April 9-10, 2024

## **Current Slate of Important Dates**

- February 18-23 Information Theory and Applications Workshop
- February 26 Honors Networking Event hosted by Eta Kappa Nu (HKN) and Tau Beta Pi
- March 12-14 Center for Microbiome Innovation International Microbiome Meeting
- March 12-15 Kyoto Prize Symposium
- March 19 Stanford S. and Beverly P. Penner Endowed Chair in Engineering or Applied Sciences James Friend
- March 27 Shu Chien-Gene Lay Department of Bioengineering Celebration
- April 2 Pierre M. Galletti Professor of Bioengineering Innovation Karen Christman
- April 9-10 Institute for Supply Chain Excellence & Innovation (ISEI) Supply Chain Forum
- April 13-14 H.A.R.D. Hack hardware-focused hack-a-thon hosted by HKN, IEEE, and Triton NeuroTech
- April 17 42nd Annual Jacobs School Research Expo
- April 30 Harry E. Gruber Professor of Computer Science Chair Barna Saha
- May 18-19 TritonHacks: High school hackathon targeting underrepresented student populations
- June 13 Spring CAP Executive Board Meeting
- June 15-16 Commencement



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## Thank you! Next CAP Executive Board Meeting: June 13, 2024