Welcome
CAP Executive Board
February 8, 2024
Welcome
Virtual Attendee Protocol

➔ 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.
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

clinicomp

dexcom
Welcome Guests

DOLBY

SAMSUNG

SHIELD AI
Welcome AMD Co-op Student
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 collect hardware performance data.
- 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.
Dean’s Report

Albert P. Pisano
Dean, Jacobs School of Engineering

Back Towards the Top 5
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
The Special Adviser to the Chancellor
Campuswide Strategic Initiatives

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
PRISM Center Launched

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.
Efforts towards Making California the Fusion State

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
Welcomed 15 New Faculty

160 faculty hires in 10 years

CLaire Acevedo
Assistant Professor
PhD, Ecole Polytechnique Fédérale de Lausanne, CH

YuFei Ding
Associate Professor
PhD, North Carolina State University

Wanlu Li
Assistant Professor
PhD, Tsinghua University, China

Yanran Li
Assistant Professor
PhD, UCLA

Jun-Kun Wang
Assistant Professor
PhD, Georgia Institute of Technology

Kiana Aran
Associate Professor
PhD, Rutgers University

QiPeng Liu
Assistant Professor
PhD, Princeton University

Haiwen Lu
Assistant Professor
PhD, Princeton University

Alejandro Marinoni
Assistant Professor
PhD, École Polytechnique Fédérale de Lausanne, CH

Rajeev Sahay
Assistant Teaching Professor
PhD, Princeton University

Fanny Chapelin
Assistant Professor
PhD, University of California San Diego

Parinaz Naghizadeh
Assistant Professor
PhD, University of Michigan

AboDaleye NdAO
Assistant Professor
PhD, Université de Franche-Comté, France

Alejandro Palermo
Assistant Professor
PhD, Politecnica di Milano, Italy

Zahra Sadeghzadeh
Assistant Teaching Professor
PhD, Missouri University of Science and Technology

Bioengineering

Mechanical & Aerospace Engineering

Computer Science & Engineering

Electrical & Computer Engineering

Mechanical & Aerospace Engineering
Pioneered Impactful Research Breakthroughs

Created a **handheld, non-invasive device** that can detect biomarkers for Alzheimer’s and Parkinson’s Diseases

Found a way to give **old smartphones a second life** by repurposing the phone processor

Developed the first **fully integrated wearable ultrasound system** for deep-tissue monitoring on-the-go

...and many more!
Looking ahead: 2024 and beyond
$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 applied-research projects in collaboration with industry partners.
Accelerating Interdisciplinary Research Collaborations for Early-Career Faculty

- 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

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

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

1. Maintaining graduate student excellence via Graduate Record Exams (GRE)

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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

Fare Evasion in Public Transportation

Shariqa Dowla
Director, Software Engineering
Cubic Transportation Systems

Nadir Weibel
Professor, Computer Science & Engineering
Associate Faculty Director, Design Lab
WHO WE ARE

We are the leading integrator of payment and information solutions and related services for intelligent travel applications in the transportation industry.

- **38M+** passengers use Cubic systems daily
- **1971** CTS launch date
- **$50M+** in revenues collected daily
- **20+** regional back-office systems in operation
- **130K+** devices installed
- **$8B+** in contracts awarded
- **2900+** employees worldwide
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 a passenger using public transit without paying the required fare or possessing the required fare media or valid proof of fare payment. 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.

Youtube link here
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
Human-Computer Interaction is a Key Discipline in Computer Science and Engineering
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 → HUMANITY-CENTERED DESIGN

Humanity-Centered Design

21st Century Design

Human-Centered Design

People-Centered Design

Interaction Design Foundation
interaction-design.org
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

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

**Research Collaboration**
E.g: across engineering and social science

**Design Programming**
E.g: the Pepper Canyon civic design-a-thon
How Can We Address this Problem?

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

Study current technical solutions and their flaws

**The Human-Machine Interaction 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
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
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
Jacobs School Corporate Affiliates Program
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

Contact Alice Grgas at agrgas@ucsd.edu

Learn more at jacobsschool.ucsd.edu/talent
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

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<tr>
<th>Jacobs School of Engineering</th>
<th>Format</th>
<th>Deadline to Submit Proposal</th>
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<tbody>
<tr>
<td>Bioengineering</td>
<td>1 year project</td>
<td>May 22, 2024</td>
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<tr>
<td>Electrical &amp; Computer Engineering</td>
<td>Spring Quarter</td>
<td>March 25, 2024</td>
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<tr>
<td>Master of Science in Business Analytics (MSBA)</td>
<td>Spring Quarter</td>
<td>February 23, 2024</td>
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Contact Alice Grgas at agrgas@ucsd.edu
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

jacobsschool.ucsd.edu/mas
RESEARCH EXPO 2024

WEDNESDAY, APRIL 17

https://jacobsschool.ucsd.edu/research-expo
CAP Partner Invitations to Research Reviews

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

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

Contact: Wil Dyer, wdyer@ucsd.edu
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
Thank you!

Next CAP Executive Board Meeting:
June 13, 2024