Welcome CAP Executive Board

February 7, 2008
CAP 2008 - 2009
Leadership

CAP Chairman

Rich Goldberg
VP, Corporate Quality, Cisco
CAP Vice Chairman

Danny Brown

VP, Technology Development, Cymer
Welcome Distinguished Students

Jacobs School Scholars and Fellows

Triton Engineering Student Council (TESC) - Jeffrey Mounzer '08, President
Triton Engineering Student Council

- Leadership, integrity, and service
- Representation for engineering students
- Traditions and student culture
- Talent and technology for the future
“The Quest for the Golden Calculator”

Tuesday, February 19, 2008

- 16 Engineering Organizations
- 3 Mind-Melting Competitions
- 1 Golden Calculator
- And LOTS of Free Food
Wednesday, February 20, 2008

**Highlights**

- 400 middle school students coming to campus for a day
- 100 UCSD student volunteers
- Experiments, lab and campus tours, and a design competition

**Gompers Middle School**

**PERSHING MIDDLE SCHOOL**

**BAE SYSTEMS**

**LOCKHEED MARTIN**

**GCM**

**talent and technology for the future**
Thursday, February 21, 2008
8:30–2:00pm
Warren Mall

www.jacobssschool.ucsd.edu/re/
talent and technology for the future

Facility Capacity

Number of Companies Attending
Number of CAP Companies Attending

23% Increase in Number of Companies Attending

- Recruiter-Volunteer Mixer
- Updated Resume CDs
- Pre-DECaF Workshop Series
- Even More Students and Student Volunteers in Attendance

2008 Highlights

<table>
<thead>
<tr>
<th>Year</th>
<th>Attendance</th>
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</thead>
<tbody>
<tr>
<td>2006</td>
<td>70</td>
</tr>
<tr>
<td>2007</td>
<td>90</td>
</tr>
<tr>
<td>2008</td>
<td>90</td>
</tr>
</tbody>
</table>
Welcome New CAP Members!
One World-Class Team
Focused on Customer Success and Flawless Performance

Lockheed Martin MS2
MS2 Products and Services

Tactical Systems
- Ruggedized Computing Infrastructures
- Comm / C3 Systems
- Airborne Mission Systems
- Tactical Avionics
- Customer Support Services
- Adjacent Markets

Undersea Systems
- Undersea Warfare Systems
- Mine Warfare Systems
- Unmanned Maritime Vehicles
- Advanced Acoustic Systems & Sensors
- Navigation Systems
- Train Control Systems
- Maritime C2
- Trident Valve

Leadership in Systems Integration

Radar Systems
- Air, Ground & Naval Radar
- Weather Radar
- Over-the-Horizon Radar
- Air & Missile Defense
- CG(X)
- Electronic Warfare
- Gravity Sensors

Defense and Surveillance Systems
- High Altitude Airship
- Aerostat Persistent Surveillance Systems
- Rapid-response Gun Systems
- Anti-submarine Rockets
- Airborne Sensors
- Airborne and Ship-based EO/IR Laser Self-Protection Systems

MS2 Overview, 112607 14
World-Class Talent

- **Diverse Workforce of more than 12,000**
- **Educated Workforce**
  - Bachelors 58%
  - Masters 31%
  - Doctorate 3%
- **Continuing Employee Training and Development**
  - Program Management
  - Functional and Technical
  - Leadership
  - Ethics & Federal Law Compliance
  - Energy, Environment, Safety and Health
  - Online Learning Management
talent and technology for the future

Parand Darugar, Ph.D. UCSD ‘93
System Architect
Dean’s Report:
Jacobs School of Engineering
Dean Frieder Seible
Faculty Hires
Engineering in Medicine

Shyni Varghese, Asst. Prof.
Bioengineering
Ph.D. National Chemical Laboratory, India, 2002
Regenerative medicine, stem cells.

Kun Zhang, Asst. Prof.
Bioengineering
Ph.D. University of Texas, 2003
Genomics, synthetic biology, neuroscience.

Juan Carlos del Alamo, Asst. Prof.
Mechanical and Aerospace Engineering
Ph.D. Polytechnic University of Madrid, 2005
Bioengineering, fluid dynamics, massively-parallel computer simulations.

Karen Christman, Asst Prof.
Bioengineering
Ph.D. UC Berkeley & SF, 2003
Systems biology, bio-nanotechnology, biomaterials.

Gaurav Arya, Asst. Prof.
Mechanical and Aerospace Engineering
Ph.D. University of Notre Dame, 2003
Chemical engineering, nanomembranes, polymers and biomaterials.

Eric Lauga, Asst. Prof.
Mechanical and Aerospace Engineering
Ph.D. Harvard University, 2005
Continuum mechanics applied to biological problems, biophysical fluid dynamics.

Alison Marsden, Assist. Prof.
Mechanical and Aerospace Engineering
Ph.D. Stanford University, 2005
Cardiovascular mechanics, bio-fluid mechanics and biomedical devices technology relating to vascular surgery.
Faculty Hires

Information Technology and Applications

Hovav Shacham, Asst. Prof.
Computer Science and Engineering
Ph.D. Stanford University, 2005
Applied cryptography systems security, and tech policy.

Ryan Kastner, Assoc. Prof.
Computer Science and Engineering
Ph.D. University of California Los Angeles, 1999
VLSI computer-aided design, sensor networks, radiolocation, computer architecture, security, embedded systems.

Control Systems and Dynamics

Jorge Cortés, Asst. Prof.
Mechanical and Aerospace Engineering
Ph.D. Universidad Carlos III de Madrid, 2001
Systems and control, robotics, cooperative motion control of unmanned vehicles.
Jacobs School Graduate Enrollment

Graduate Major Headcount

- BENG
- CSE
- ECE
- MAE
- SE

FA2002
- 116
- 74
- 171
- 214
- 100
- 102

FA2003
- 154
- 251
- 214
- 274
- 100
- 154

FA2004
- 170
- 274
- 205
- 280
- 91
- 145

FA2005
- 181
- 280
- 210
- 386
- 90
- 191

FA2006
- 198
- 293
- 230
- 388
- 86
- 248

FA2007
- 194
- 276
- 393
- 393
- 102
- 393
Department of NanoEngineering

- Established July 1, 2007
- Both undergraduate and graduate education
- Goal: 20 faculty, 400 undergraduate, 120 graduate students
## Department of NanoEngineering

<table>
<thead>
<tr>
<th>RANK</th>
<th>NAME</th>
<th>DEPARTMENT</th>
<th>APPOINTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arya, Gaurav</td>
<td>NE</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>Buckley, S</td>
<td>MAE</td>
<td>50%</td>
</tr>
<tr>
<td>3</td>
<td>Chau, Pao</td>
<td>NE</td>
<td>100%</td>
</tr>
<tr>
<td>4</td>
<td>Esener, Sadik</td>
<td>NE</td>
<td>50%</td>
</tr>
<tr>
<td>5</td>
<td>Fullerton, Eric</td>
<td>ECE</td>
<td>50%</td>
</tr>
<tr>
<td>6</td>
<td>Heller, Mike</td>
<td>NE</td>
<td>34%*</td>
</tr>
<tr>
<td>7</td>
<td>Herz, Richard</td>
<td>NE</td>
<td>100%</td>
</tr>
<tr>
<td>8</td>
<td>Jin, Sungho</td>
<td>MAE</td>
<td>50%</td>
</tr>
<tr>
<td>9</td>
<td>Meyers, Marc</td>
<td>MAE</td>
<td>50%</td>
</tr>
<tr>
<td>10</td>
<td>Talbot, Jan</td>
<td>NE</td>
<td>100%</td>
</tr>
<tr>
<td>11</td>
<td>Vecchio, Ken</td>
<td>NE</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Heller - new .33 FTE from NE to be filled later making him 67% NE - 33% BE

## APPROVED NE AFFILIATES

<table>
<thead>
<tr>
<th>RANK</th>
<th>NAME</th>
<th>DEPARTMENT</th>
<th>AFFILIATION</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Bandaru, Prab</td>
<td>MAE</td>
<td>NE affiliate</td>
</tr>
<tr>
<td>2</td>
<td>Christman, Karen</td>
<td>BE</td>
<td>NE affiliate</td>
</tr>
<tr>
<td>3</td>
<td>Cohen, Seth</td>
<td>Chem/Biochem</td>
<td>NE affiliate</td>
</tr>
<tr>
<td>4</td>
<td>Fox, Marye Anne</td>
<td>Chem/Biochem</td>
<td>NE affiliate</td>
</tr>
<tr>
<td>5</td>
<td>Kummel, Andy</td>
<td>Chem/Biochem</td>
<td>NE affiliate</td>
</tr>
<tr>
<td>6</td>
<td>Lo, Yu-Hwa</td>
<td>ECE</td>
<td>NE affiliate</td>
</tr>
<tr>
<td>7</td>
<td>Sailor, Mike</td>
<td>Chem/Biochem</td>
<td>NE affiliate</td>
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<tr>
<td>8</td>
<td>Silva, Gabriel</td>
<td>BE</td>
<td>NE affiliate</td>
</tr>
<tr>
<td>9</td>
<td>Subramaniam, S.</td>
<td>BE</td>
<td>NE affiliate</td>
</tr>
<tr>
<td>10</td>
<td>Varghese, Shyni</td>
<td>BE</td>
<td>NE affiliate</td>
</tr>
<tr>
<td>11</td>
<td>Whitesell, James</td>
<td>Chem/Biochem</td>
<td>NE affiliate</td>
</tr>
<tr>
<td>12</td>
<td>Yu, Paul</td>
<td>ECE</td>
<td>NE affiliate</td>
</tr>
</tbody>
</table>
Structural and Materials Engineering Building

(EBU IV)

- Construction Bid: June 2008
- Construction: Sept 2008
- Building Open: 2010

- 110,000 a.s.f.

- Structural Engineering, NanoEngineering, Visual Arts

- Architect: Miller|Hull Partnership, LLP and Safdie Rabines Architects
Sustainability Highlights of Current Design

• Dynamic shading devices respond to the position of the sun, as calculated through computer modeling. All windows and doors exposed to sun have fixed and/or dynamic shades.

• Office heating achieved hydronically through a radiant device which is 4 times more effective than heating by air.

• Waste return air from offices used to cool electrical room.

Designed to LEED Certified Standard

Structural and Materials Engineering Building
talent and technology for the future
talent and technology for the future
talent and technology for the future
talent and technology for the future
talent and technology for the future
talent and technology for the future
CISA3 Reception – January 23, 2008
American Society for Engineering Education

Engineering Deans Institute

“Strategic University-Industry Collaboration for Innovation”

March 30-April 2, 2008
Hilton La Jolla Torrey Pines
CAP EXECUTIVES INVITED TO RECEPTION FOR ENGINEERING DEANS ON MONDAY, MARCH 31, 2008 6:00–8:00 PM ENGINEERING COURTYARD
Faculty Research:
*Jacobs School Leading the Way in Clean Tech – Green Tech*
Faculty Research

Paul Linden
Chairman, UCSD Mechanical & Aerospace Engineering
Professor, Mechanical & Aerospace Engineering
pflinden@ucsd.edu
Green technology in MAE

- DEMROES
- Water
- Green Buildings
- Bioenergy
Jan Kleissl  
DEMROES  
Paul Linden

Decision Making using Real-time Observations for Environmental Sustainability

Planned scope of DEMROES meteorological station network on UCSD campus. Green: existing stations, blue: lamppost stations, red: rooftop stations

MAE and BioEng students assembling a DEMROES station
DEMROES Goals

- Quantify the spatial distribution of meteorological conditions (e.g. sea breeze) on campus
- Use the network as a demo and integrative educational and research system for UCSD students and faculty.
- Inform UCSD energy management system for building energy conservation and irrigation control.
- Evaluate solar power potential in coastal environments. Simulate mini-grid control.
Measurements

* Air temperature and humidity
* Global solar radiation (pyranometer)
* Solar panel temperature, power output
* for large arrays: inverter efficiency
* One site: rotating shadowband radiometer
Temperature Vs. Enthalpy

Temperature Average

Temperature (°F)

Time

Air Enthalpy Average

Enthalpy

Time (Hourly)
Results - NSRDB

- Average effect of marine layer on monthly global horizontal radiation at coast is <20% (vs IPL) and <6% (vs MIR)
- Effect is strongest 9-11am in June, July
UCI – UCSD
collaborating for
Raytheon Satellites for Hydrology
NGST remote and in-situ soil water measurements

Legend:
- Scanning IR radiometer
- Weather station
- RC plane w/ IR, T, RH, GPS
- Mobile TDR, alb.
Equipment – Continuous Measurements

Scanning infrared (IR) radiometer:
- Apogee IR surface temperature sensor
- Servos and servo controller

Weather station on Rimac building S of field = CIMIS
- IR surface temperature
- Wind speed & direction
- Air temp. and humidity
- Rain gauge
- Solar radiation

Weather station on lamppost E of field
- All of the above and
- 2 soil moisture sensors
- 2 soil moisture, temperature, and electric conductivity sensors
Equipment – Occasional spatial measurements

RC Airplane (pseudo satellite)
• 20 min endurance
• Datalogger at up to 40 Hz
• IR radiometer
• Pitot tube
• Thermocouple
• GPS

Student
• GPS
• Albedometer
• CS616 water content reflectometer (30 cm rods)
RIMAC Rooftop station

• RIMAC rooftop station real-time results online
  – http://maereresearch.ucsd.edu/kleissl/demroes
  – Integrated into HIS (Ilya Z)
Scanning IR Radiometer Test Facility

Potentiometer measures azimuth angle. 100 points per 180°
WHY GREEN BUILDINGS?

• Occupants love operable windows

• HVAC engineers hate them

• Only 11% of US office buildings meet ASHRAE standards of acceptability
WHY GREEN BUILDINGS?

Current buildings are responsible for

- 65.2% of total US electricity consumption
- > 36% of total US primary energy use
- 30%/50% of total US/UK greenhouse gas emissions

![Bar chart showing productivity in Old Building, Productivity during move, and Productivity in New Building with numbers 100, 70, and 116 respectively.](image)

West Bend Mutual Insurance Company (West Bend, WI)
Positive proof of global warming.
Larkin Building 1904

Frank Lloyd Wright – 1st fully air conditioned office building
Buoyancy

San Diego Children’s Museum – Rob Wellington Quigley
San Diego Children’s Museum - design concept
Variation of maximum and minimum temperature (degrees F) in San Diego for the two weather years used in the analysis. The x-axis gives the day number for the two years starting on January 1. In this and the following plots red corresponds to the maximum temperature and black to the minimum temperature.
San Diego Children’s Museum – climate analysis
Evaluation of potential for wind assisted ventilation

Hourly correlation during museum opening hours, between temperature (in red), and wind during warm days for two typical years of San Diego weather.
EnergyPlus Geometry
<table>
<thead>
<tr>
<th>Percentage of hours</th>
<th>$T_{IN} &lt; 66$ (F)</th>
<th>$66 &lt; T_{IN} &lt; 75$ (F)</th>
<th>$75 &lt; T_{IN} &lt; 81$ (F)</th>
<th>$81 &lt; T_{IN} &lt; 86$ (F)</th>
<th>$T_{IN} &gt; 86$ (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cold</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMS controlled</td>
<td>5.8 %</td>
<td>56.5 %</td>
<td>23.7 %</td>
<td>12.1 %</td>
<td>1.9 %</td>
</tr>
<tr>
<td>Stack driven flow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Comfortable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMS and USER</td>
<td>6.6 %</td>
<td>66.0 %</td>
<td>20.4 %</td>
<td>5.2 %</td>
<td>1.8 %</td>
</tr>
<tr>
<td>controlled</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Stack and wind</td>
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<tr>
<td><strong>Warm</strong></td>
<td></td>
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<td></td>
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<tr>
<td>driven flow</td>
<td></td>
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<tr>
<td><strong>Hot</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Very hot</strong></td>
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</table>
Resource Center for Alcohol Fuels: $3M from U.C. Discovery and West Biofuels

• Public / private partnership funded by U.C. Discovery Grant
• Providing research and development opportunity for students and industry
• Fusion of biochemistry, fuels chemistry, chemical processing, and process control faculty
• Led by Prof. Bob Cattolica

Building a pilot scale plant for alcohol fuels from cellulosic feedstock
UC Discovery/West Biofuels Biomass to Mixed Alcohol
Three Stage Process

C + \text{H}_2\text{O} \rightarrow \text{Gasifier} \rightarrow \text{Gasification Reactor} \rightarrow \text{CO, H}_2, \text{CO}_2, \text{CH}_4

\text{Syngas with sulfur OK} \rightarrow \text{Reforming Catalyst} \rightarrow \text{Reformer Reactor} \rightarrow \text{CO + H}_2

\text{MoS Catalyst} \rightarrow \text{Synthesis Reactor} \rightarrow \text{Mixed Alcohol}
Faculty Research

Edward Yu
Professor, Electrical & Computer Engineering
etyu@ucsd.edu
CAP Business:
Anne O’Donnell
Director, Corporate Affiliates Program (CAP)
CAP Business:
Funding your Innovation
UC Discovery and Opportunity Grants

Mona D. Lee, Ph.D.
Research Development Officer
UC Discovery Grant
monadlee@ucdiscoverygrant.org
CAP Business:
Thank you for supporting Jacobs School Paver Program

Contact: Tatis Cervantes
NOW ACCEPTING PROJECTS
Ruth Kiefer, TIP Manager
rkiefer@ucsd.edu
CAP Business: Custom Programs

ViaSat Fest 2008
Raise your company’s profile: Sponsor an event

Research Expo: Thursday, February 21, 2008

Promote corporate visibility to M.S./Ph.D. students, faculty, engineers and technology leaders.
CAP Business:
Anne O’Donnell, Director

Dates to Remember in 2008:

February 21       Research Expo
February 22       Disciplines in Engineering Career Fair (DECaF)
March 30          ASEE Engineering Deans Institute Reception, Torrey Pines Hilton
April 18          Analytics Tutorial
May 23            Biennial Recognition Banquet
June 5            CAP Executive Board Meeting