

# ***Welcome CAP Executive Board***



*February 7, 2008*



## **CAP 2008 - 2009 Leadership**

**CAP Chairman**

***Rich Goldberg***  
***VP, Corporate Quality, Cisco***

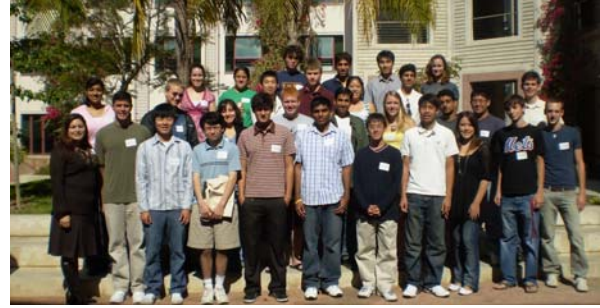


**CAP Vice Chairman**

***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
- Professionalism and student culture

Society of Hispanic Professional Engineers

ASME

AICHE® UCSD

QSP  
san diego



UCSD PMES



*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**

*and technology for the future*





Wednesday, February 20, 2008

- 400 middle school students coming to campus for a day
- 100 UCSD student volunteers

LOCKHEED MARTIN

BAE SYSTEMS

- Experiments, lab and campus tours, and a design competition

teamed up with college students

SWINERTON  
MANAGEMENT  
& CONSULTING

**PERSHING MIDDLE SCHOOL**

*HOME OF THE PANTHERS*

8204 SAN CARLOS DRIVE, SAN DIEGO, CA 92119 - (619) 465-3234

Gompers Middle School

**GCMS** a UCSD Partnership

UCSD Jacobs Corporate Affiliates Program

*talent and technology for the future*

# RESEARCH EXPO

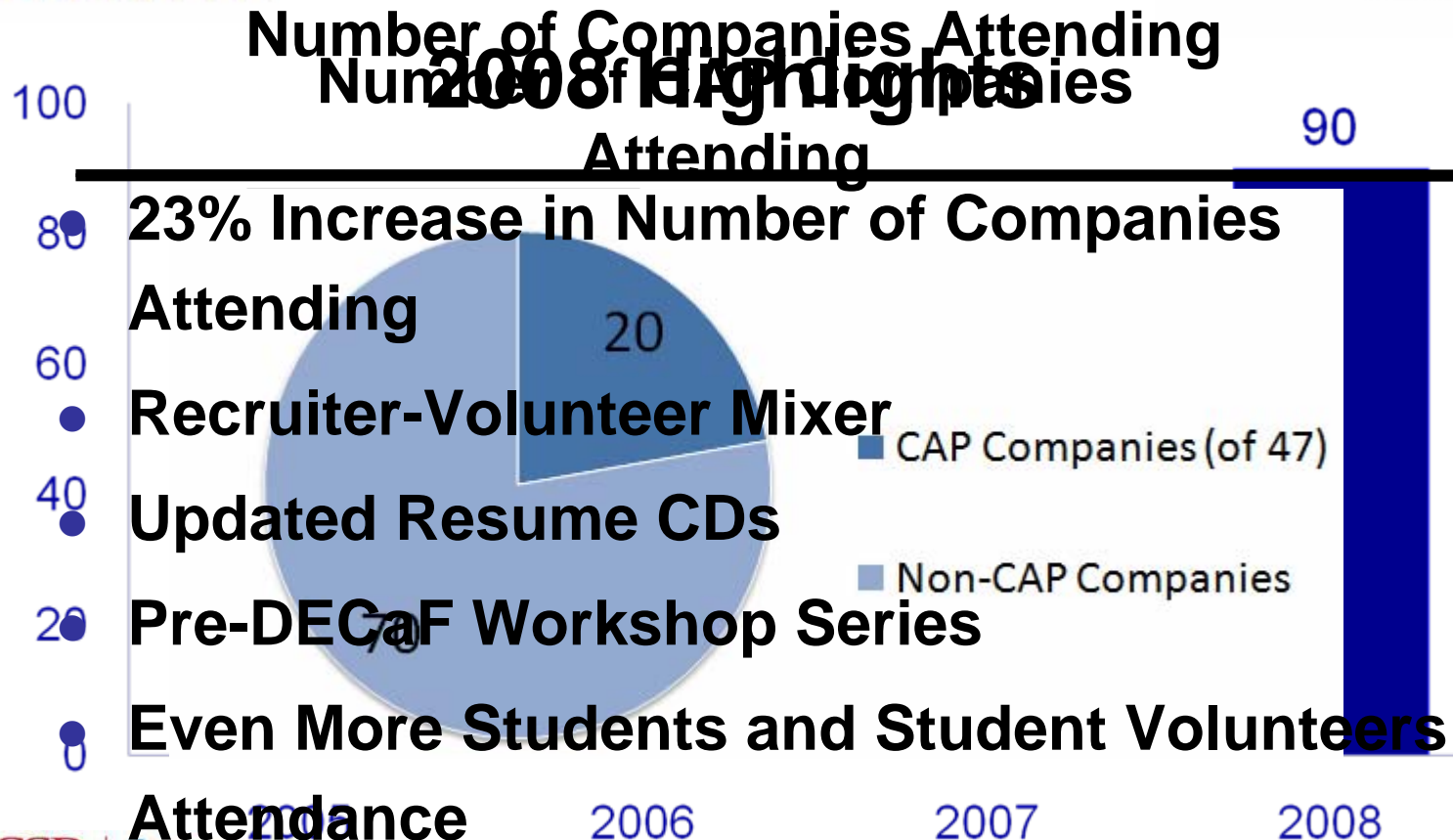
Thursday, February 21, 2008

8:30–2:00pm

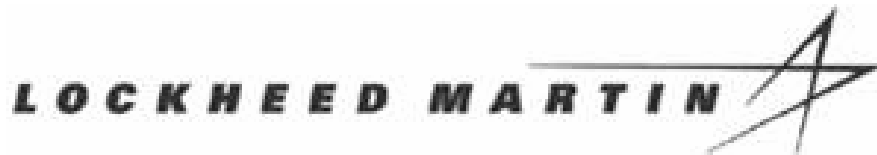
Warren Mall

[www.jacobsschool.ucsd.edu/re/](http://www.jacobsschool.ucsd.edu/re/)





# Welcome New CAP Members!





Derrick Oien  
President



# One World-Class Team Focused on Customer Success and Flawless Performance

*Lockheed Martin MS2*







## Aeronautics



## Electronic Systems



## Information Systems & Global Services



## Space Systems



# 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*

## *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



## *Radar Systems*

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





# 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**









**Parand Darugar, Ph.D. UCSD '93**  
**System Architect**

**Dean's Report:**  
***Jacobs School of Engineering***  
***Dean Frieder Seible***

# Faculty Hires

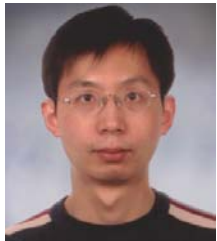
## Engineering in Medicine



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



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



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



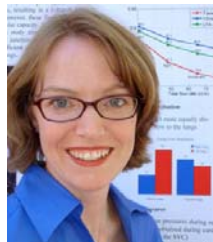
**Gaurav Arya, Asst. Prof.**  
**Mechanical and Aerospace Engineering**  
Ph.D. University of Notre Dame, 2003  
**Chemical engineering, nanomembranes, polymers and biomaterials.**



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



**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.**

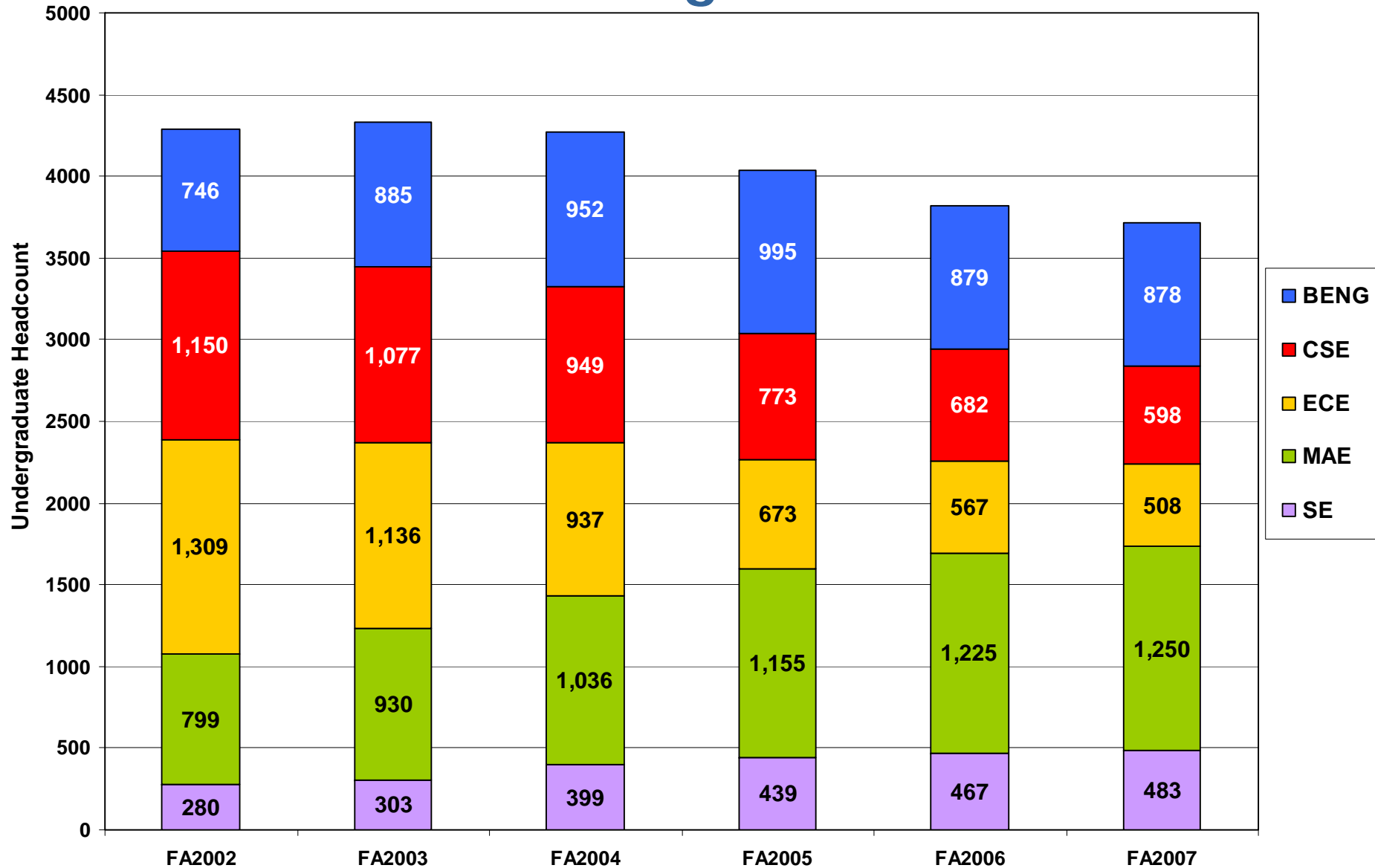
## Control Systems and Dynamics



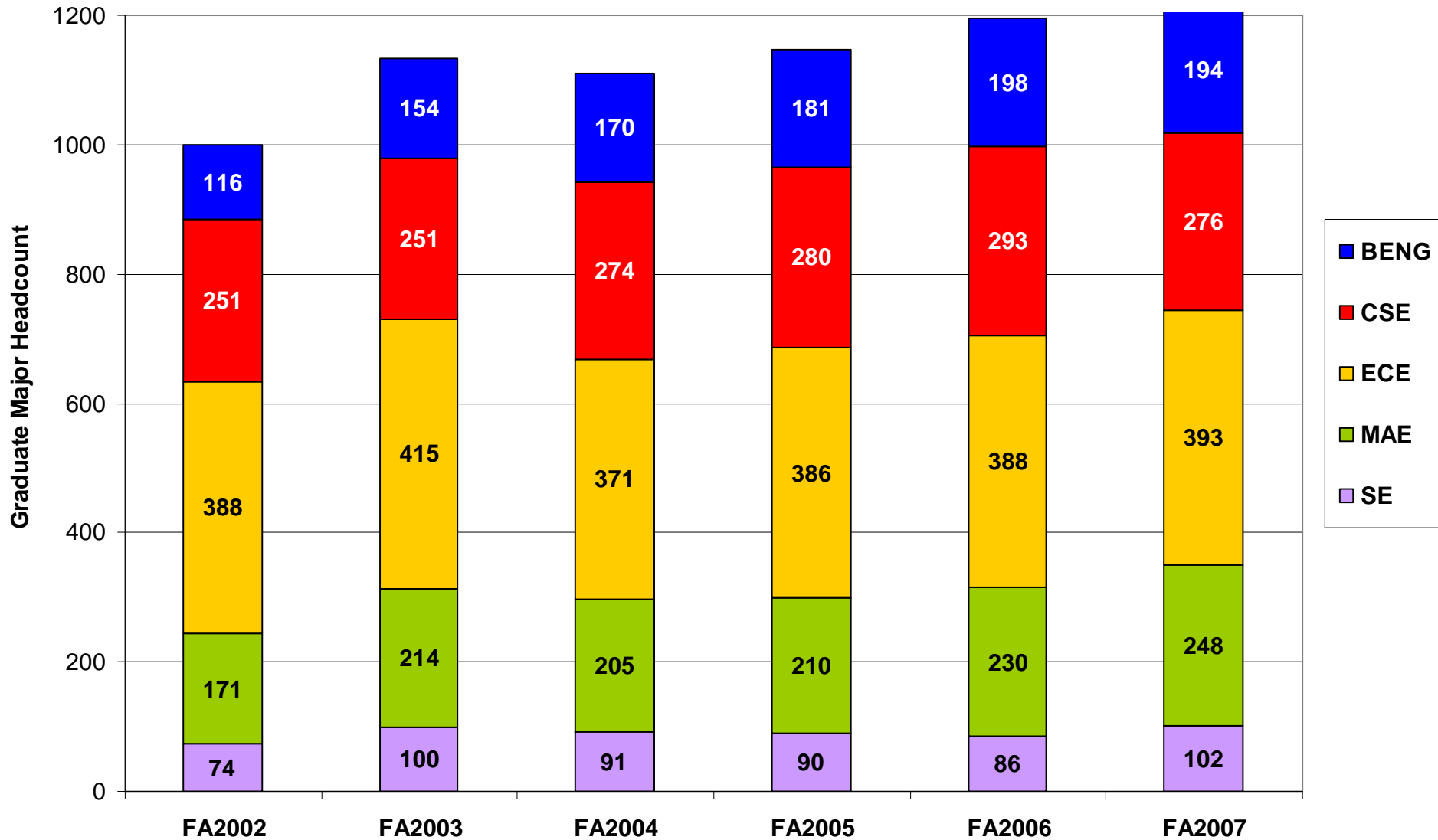
**Jorge Cortés, Asst. Prof.**  
**Mechanical and Aerospace Engineering**  
Ph.D. Universidad Carlos III de Madrid, 2001  
**Systems and control, robotics,  
cooperative motion  
control of unmanned vehicles.**

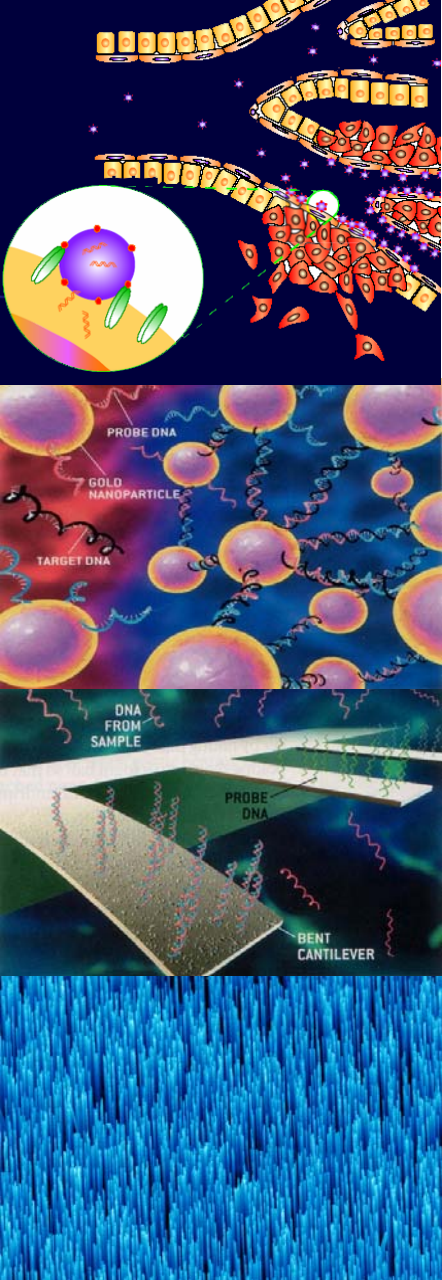


# Jacobs School Undergraduate Enrollment



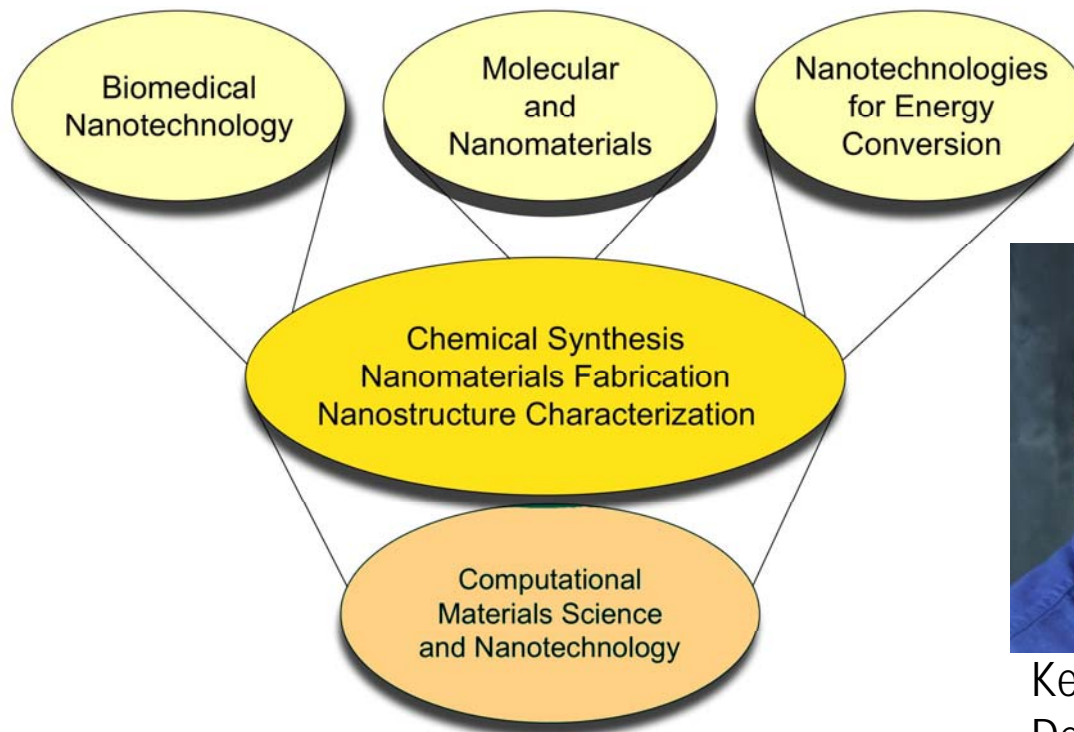
# Jacobs School Graduate Enrollment





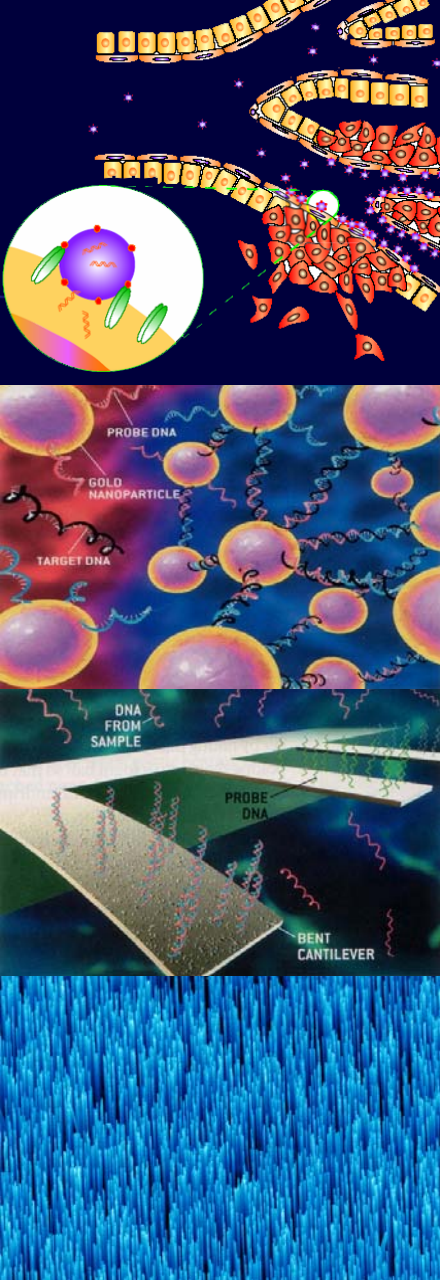
# Department of NanoEngineering

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



Kenneth Vecchio  
Department Chair



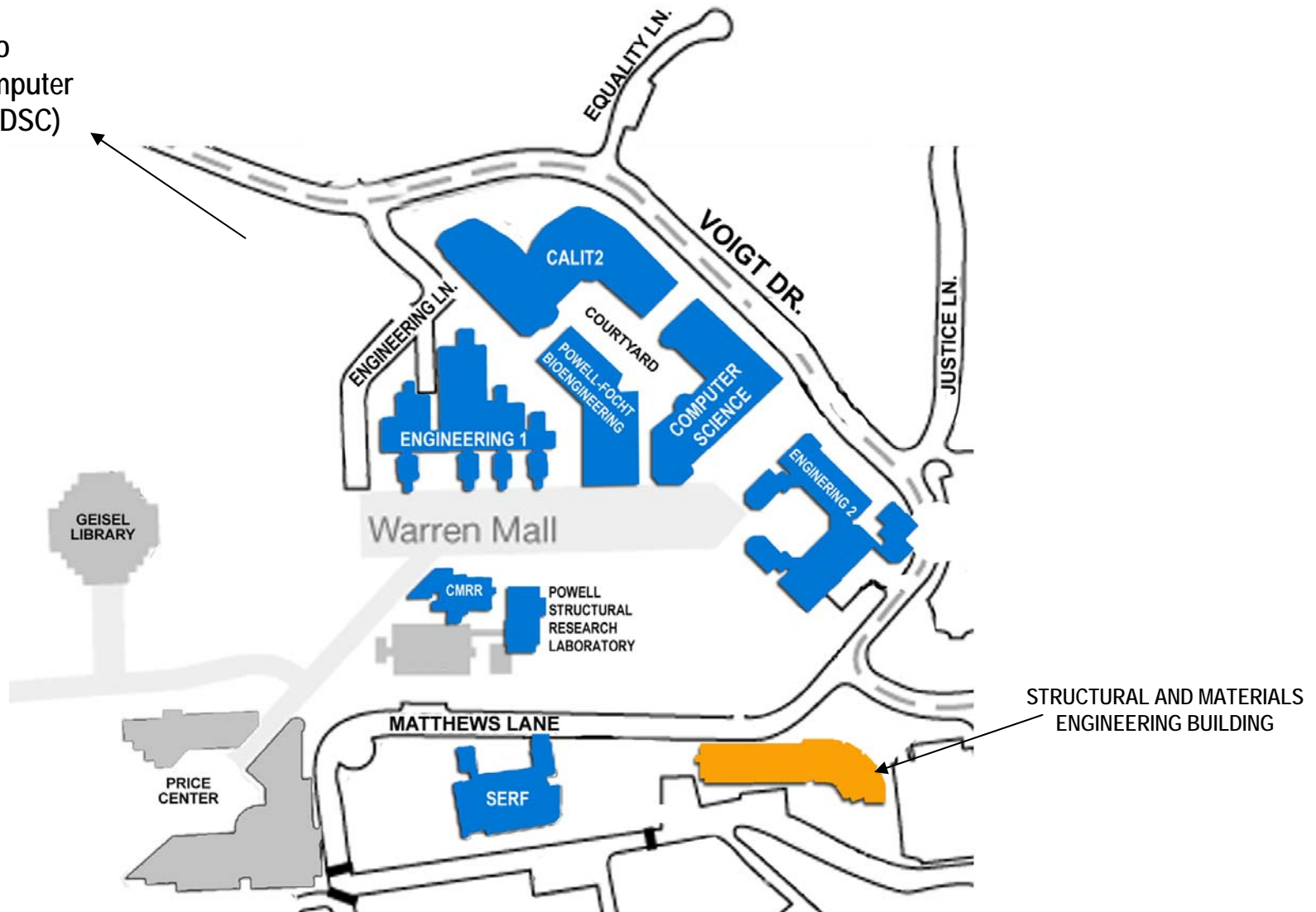


# Department of NanoEngineering

	CORE FACULTY	APPOINTMENT		
1	Arya, Gaurav	NE 100%		
2	Buckley, S	MAE 50%	NE 50%	Home = MAE
3	Chau, Pao	NE 100%		
4	Esener, Sadik	NE 50%	ECE 50%	Home = NE
5	Fullerton, Eric	ECE 50%	NE 50%	Home = ECE
6	Heller, Mike	NE 34%*	BE 33%	HOME = NE
7	Herz, Richard	NE 100%		
8	Jin, Sungcho	MAE 50%	NE 50%	Home = MAE
9	Meyers, Marc	MAE 50%	NE 50%	Home = MAE
10	Talbot, Jan	NE 100%		
11	Vecchio, Ken	NE 100%		
*Heller - new .33 FTE from NE to be filled later making him 67% NE - 33% BE				
	<b>APPROVED NE AFFILIATES</b>			
1	Bandaru, Prab	MAE	NE affiliate	
2	Christman, Karen	BE	NE affiliate	
3	Cohen, Seth	Chem/Biochem	NE affiliate	
4	Fox, Marye Anne	Chem/Biochem	NE affiliate	
5	Kummel, Andy	Chem/Biochem	NE affiliate	
6	Lo, Yu-Hwa	ECE	NE affiliate	
7	Sailor, Mike	Chem/Biochem	NE affiliate	
8	Silva, Gabriel	BE	NE affiliate	
9	Subramaniam, S.	BE	NE affiliate	
10	Varghese, Shyni	BE	NE affiliate	
11	Whitesell, James	Chem/Biochem	NE affiliate	
12	Yu, Paul	ECE	NE affiliate	

# Engineering Neighborhood

San Diego  
Supercomputer  
Center (SDSC)



# 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

























































# 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



UCSD | School of  
Jacobs Engineering

UCLA

The Henry Samueli  
School of Engineering  
and Applied Science

UCIrvine

THE HENRY SAMUELI  
SCHOOL OF ENGINEERING





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

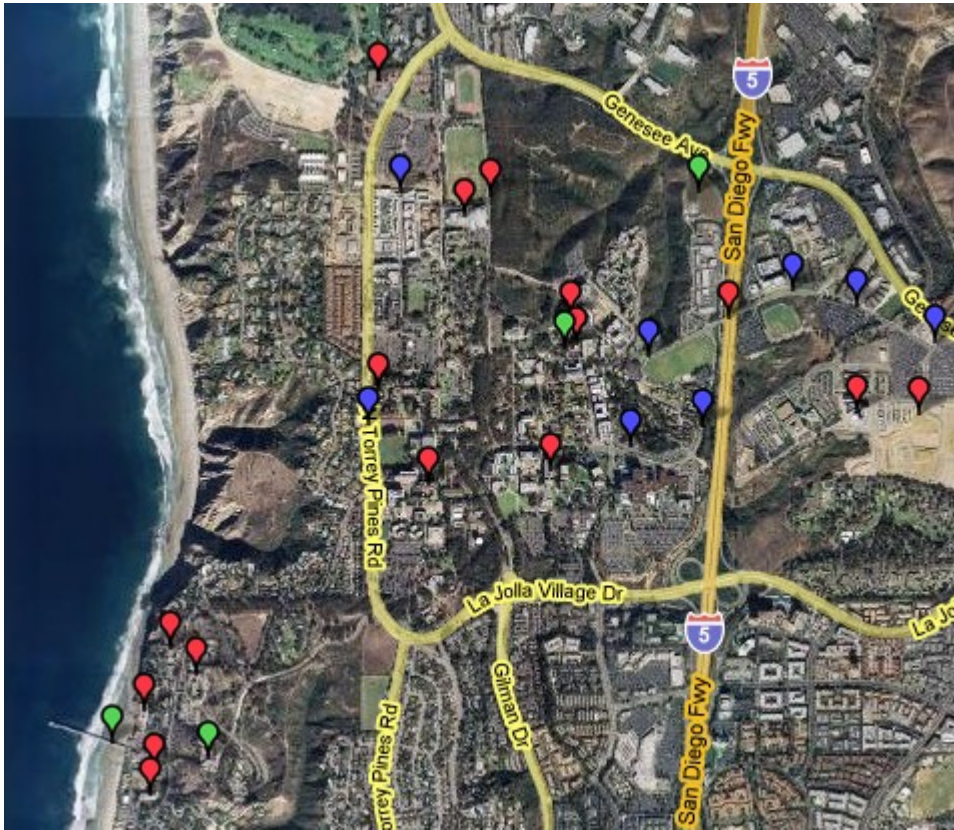
- DEMROES
- Water
- Green Buildings
- Bioenergy

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



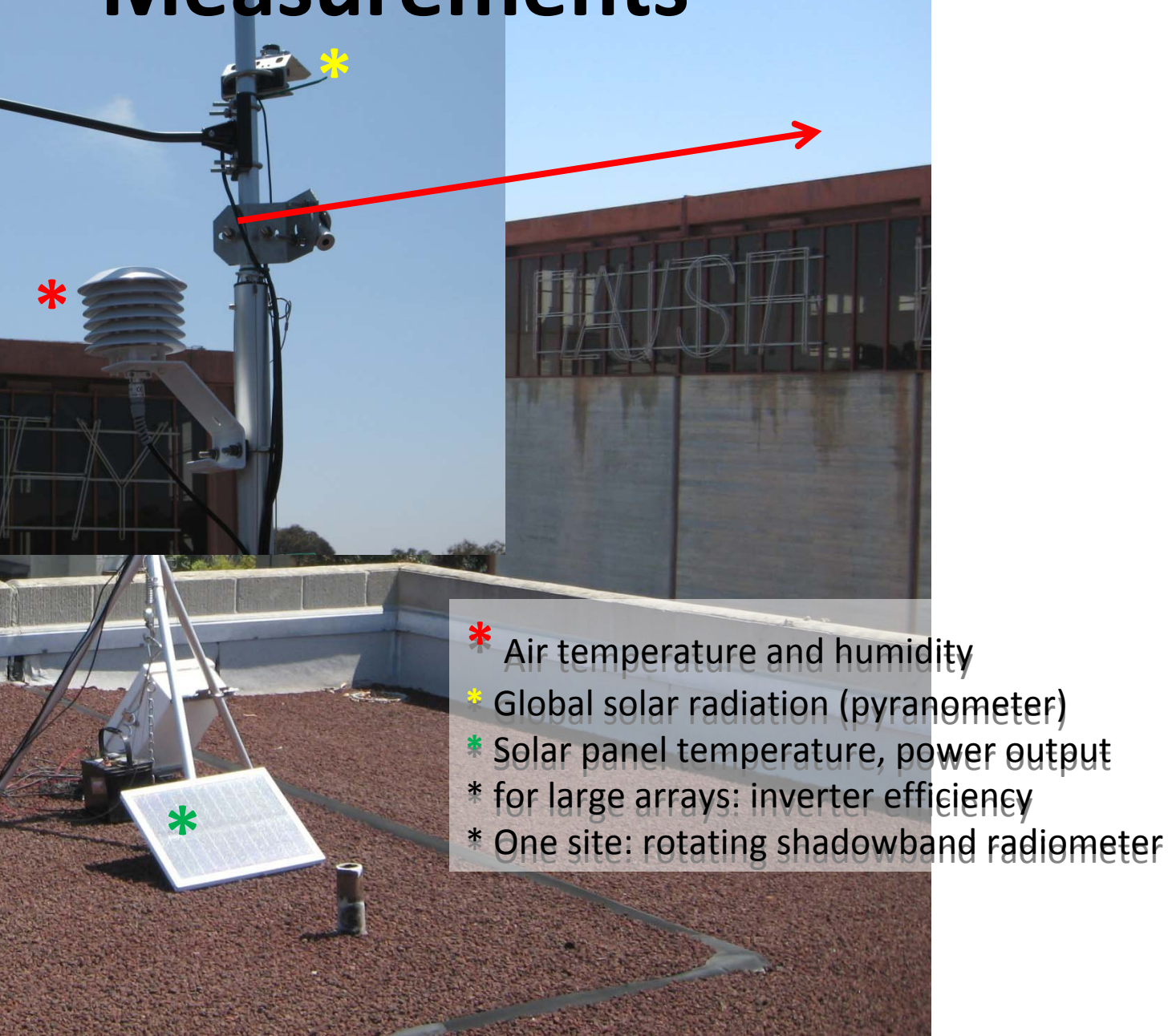


Environment and Sustainability at UCSD

# DEMROES Goals

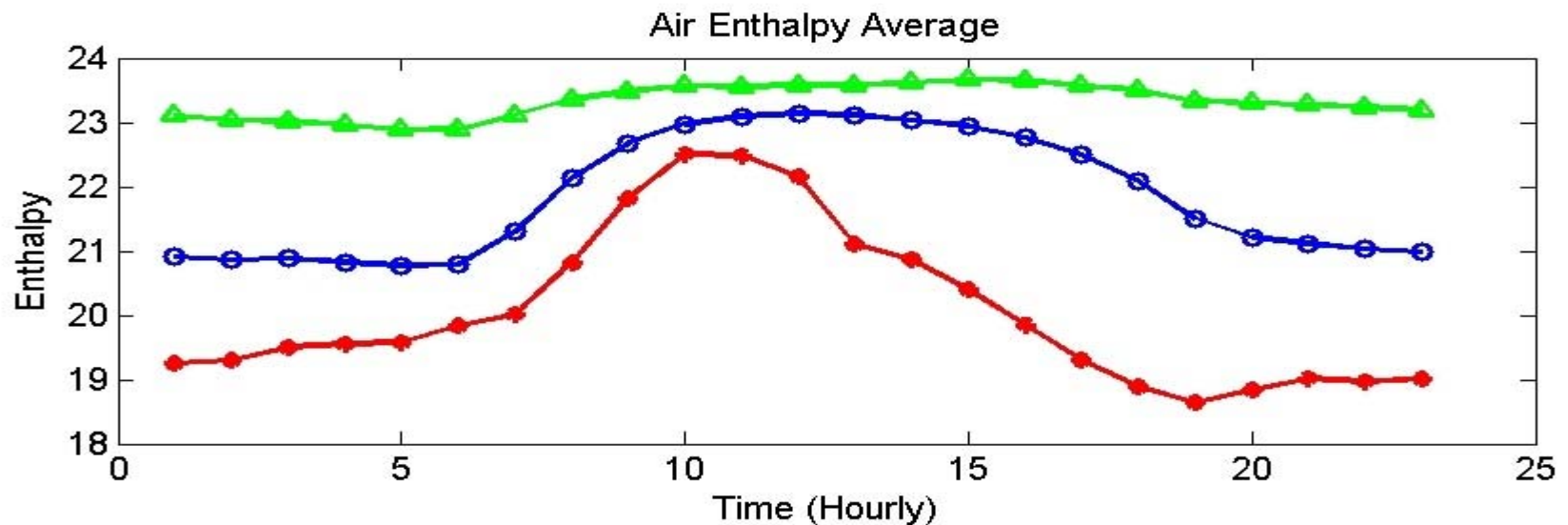
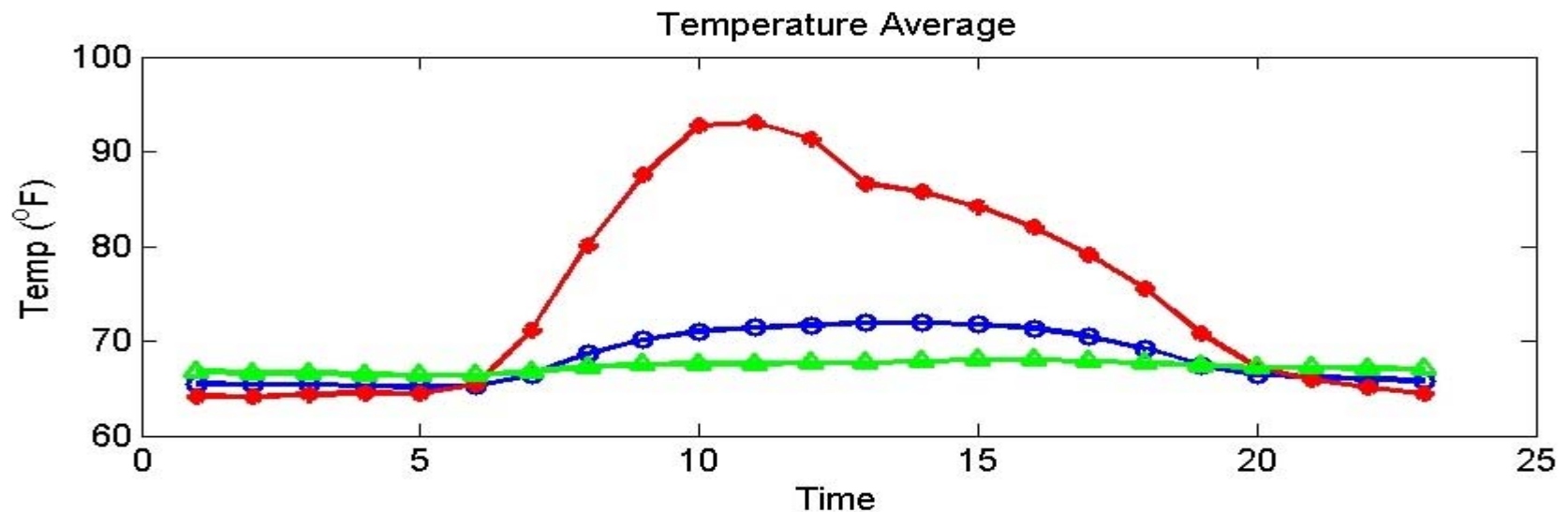
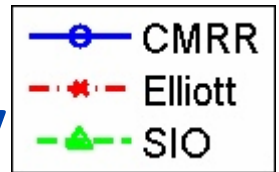
- Quantify the spatial distribution of meteorological conditions (e.g. sea breeze) on campus
- Use the network as a demo and integrative educational and research system for UCSD students and faculty.
- Inform UCSD energy management system for building energy conservation and irrigation control.
- Evaluate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

# Measurements



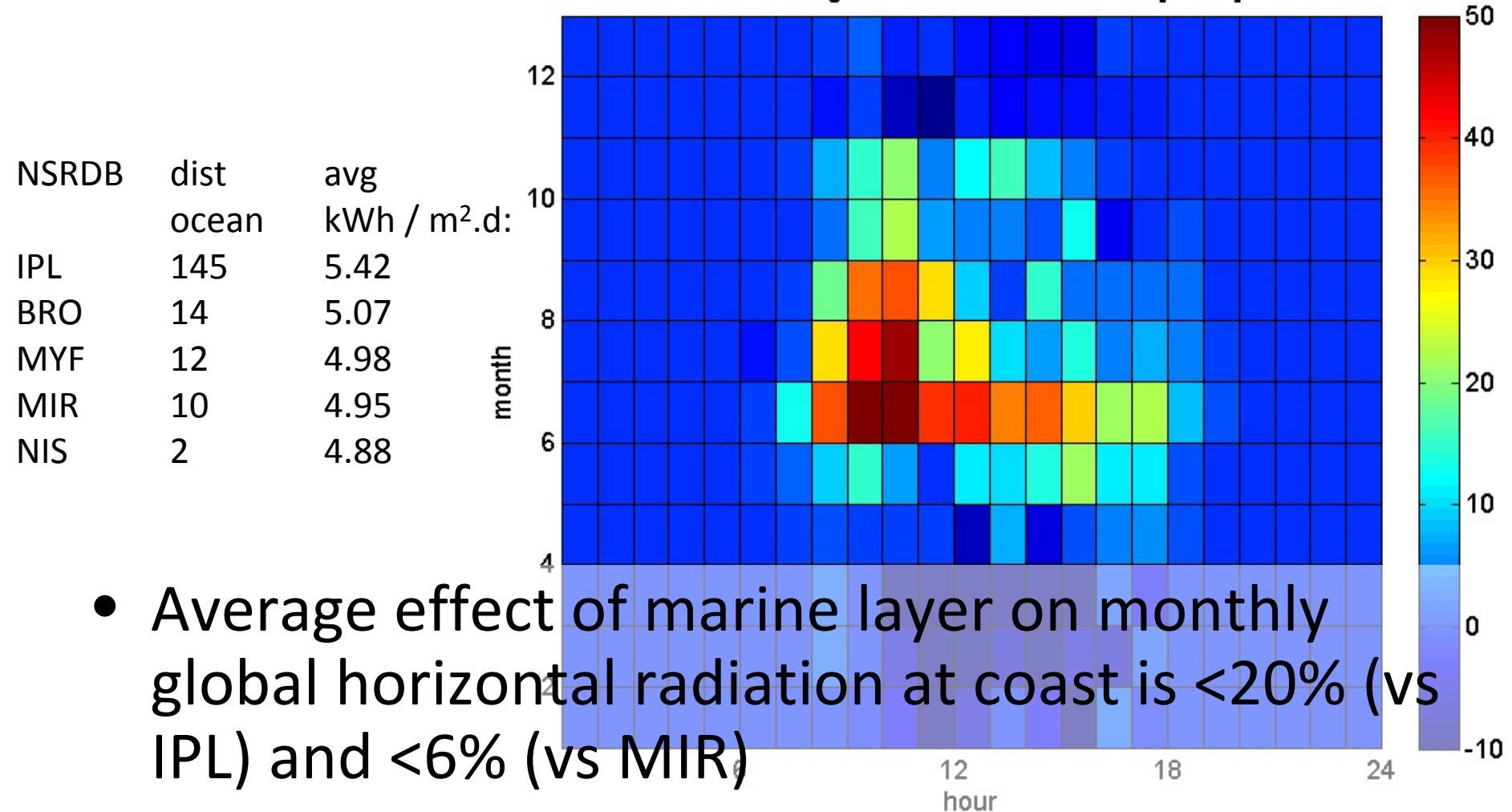


# Temperature Vs. Enthalpy



# Results - NSRDB

Difference global radiation MIR vs NIS [W/m<sup>2</sup>]



NSRDB	dist	avg
	ocean	kWh / m <sup>2</sup> .d:
IPL	145	5.42
BRO	14	5.07
MYF	12	4.98
MIR	10	4.95
NIS	2	4.88

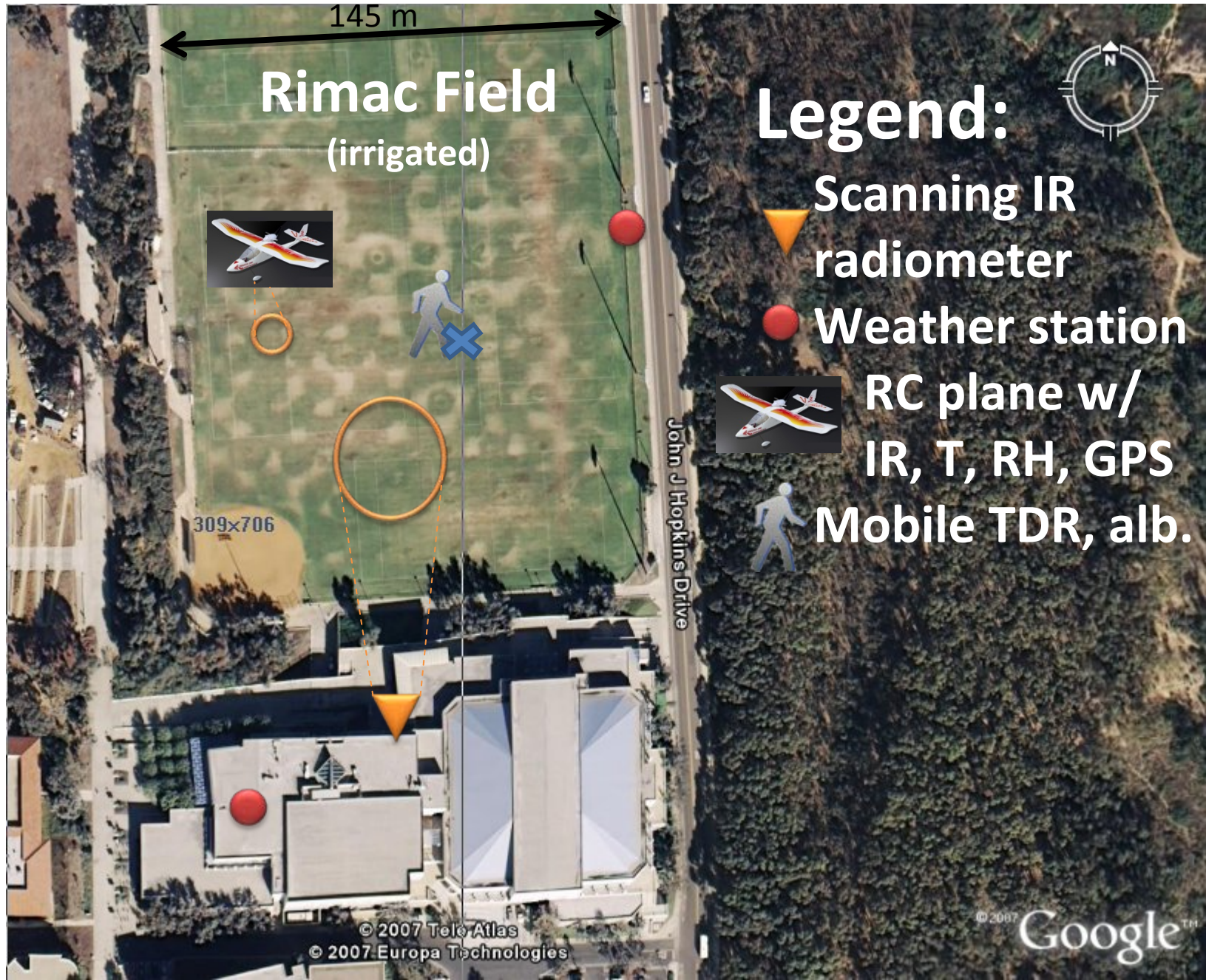
- Average effect of marine layer on monthly global horizontal radiation at coast is <20% (vs IPL) and <6% (vs MIR)
- Effect is strongest 9-11am in June, July



UCI – UCSD  
collaborating for

Raytheon Satellites for Hydrology

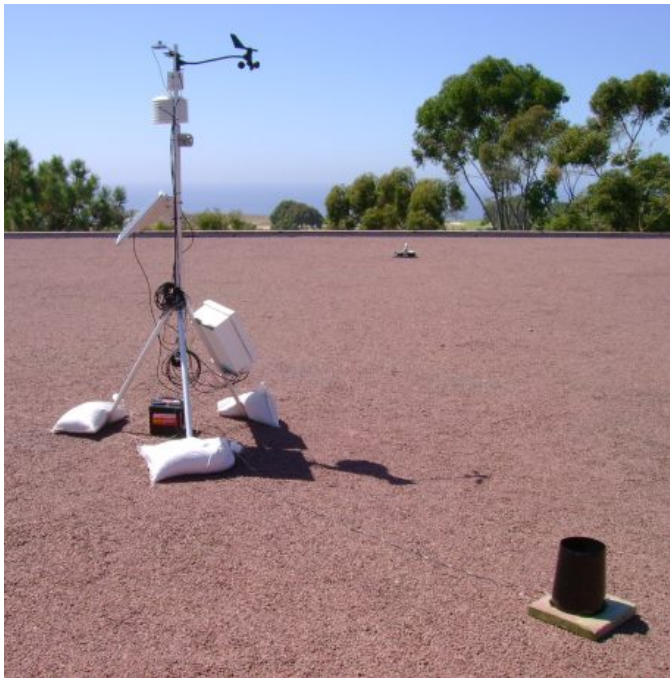
# NGST remote and in-situ soil water measurements





# Equipment – Continuous Measurements

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



- Weather station on Rimac building 3 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)



Student

- 20 min endurance
- Datalogger at up to 40 Hz
- IR radiometer
- Pitot tube
- Thermocouple
- GPS

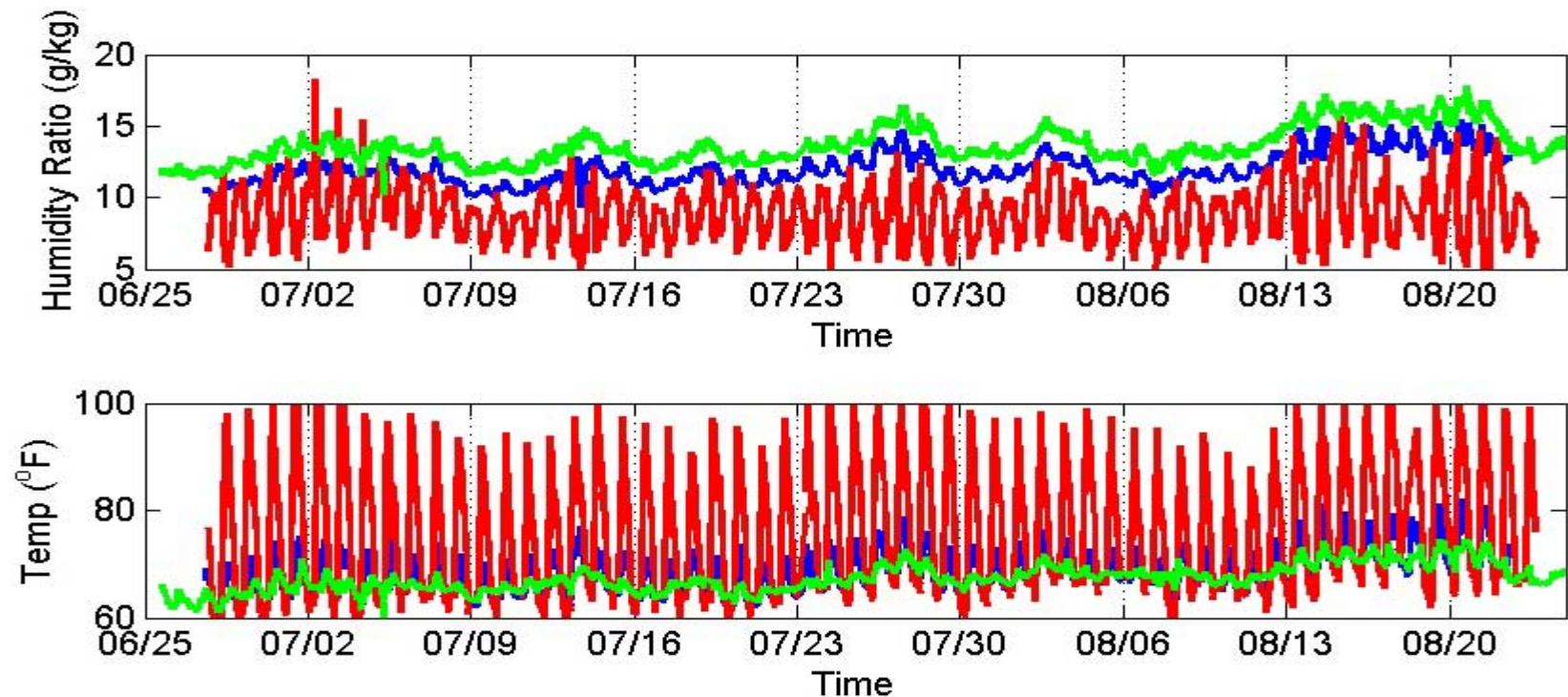
- GPS
- Albedometer
- CS616 water content reflectometer (30 cm rods)





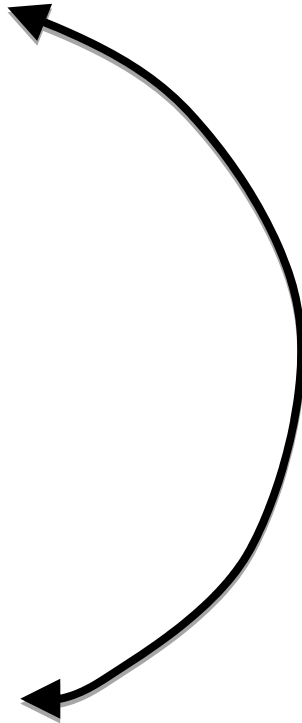
# RIMAC Rooftop station

- RIMAC rooftop station real-time results online
  - <http://maeresearch.ucsd.edu/kleissl/demroes>
  - Integrated into HIS (Ilya Z)



# Scanning IR Radiometer Test Facility

Bird's eye



Hot surface



Vertical cross-section



3 tilt levels



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

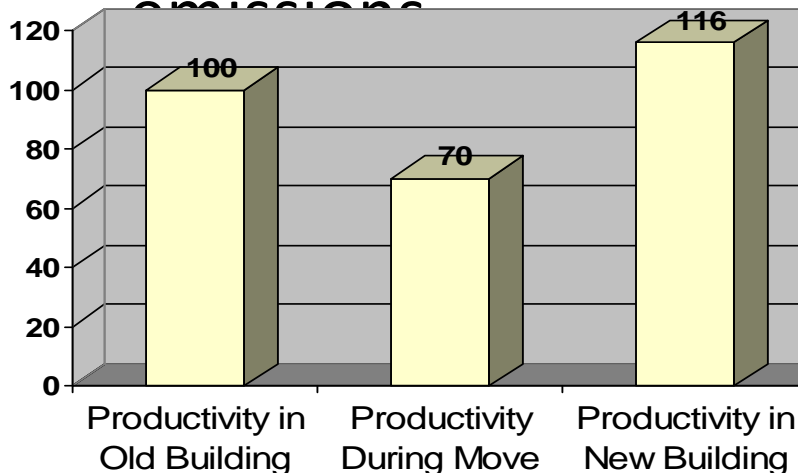
# WHY GREEN BUILDINGS?

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



West Bend Mutual  
Insurance Company  
(West Bend, WI)





***Positive proof of global warming.***



1800's

1900's

1950

1970

1980

1990

## Larkin Building 1904



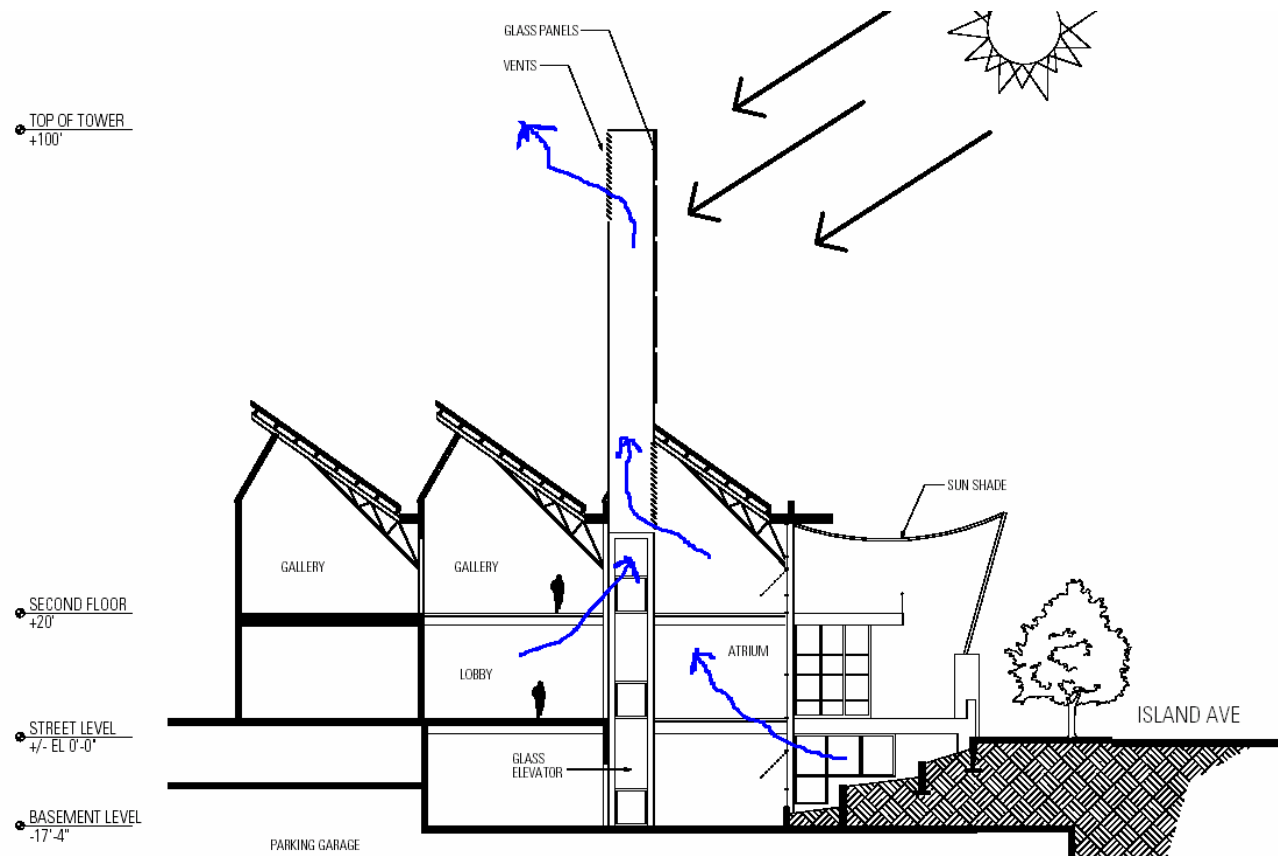
Frank Lloyd Wright – 1<sup>st</sup> fully air conditioned office building



# Buoyancy



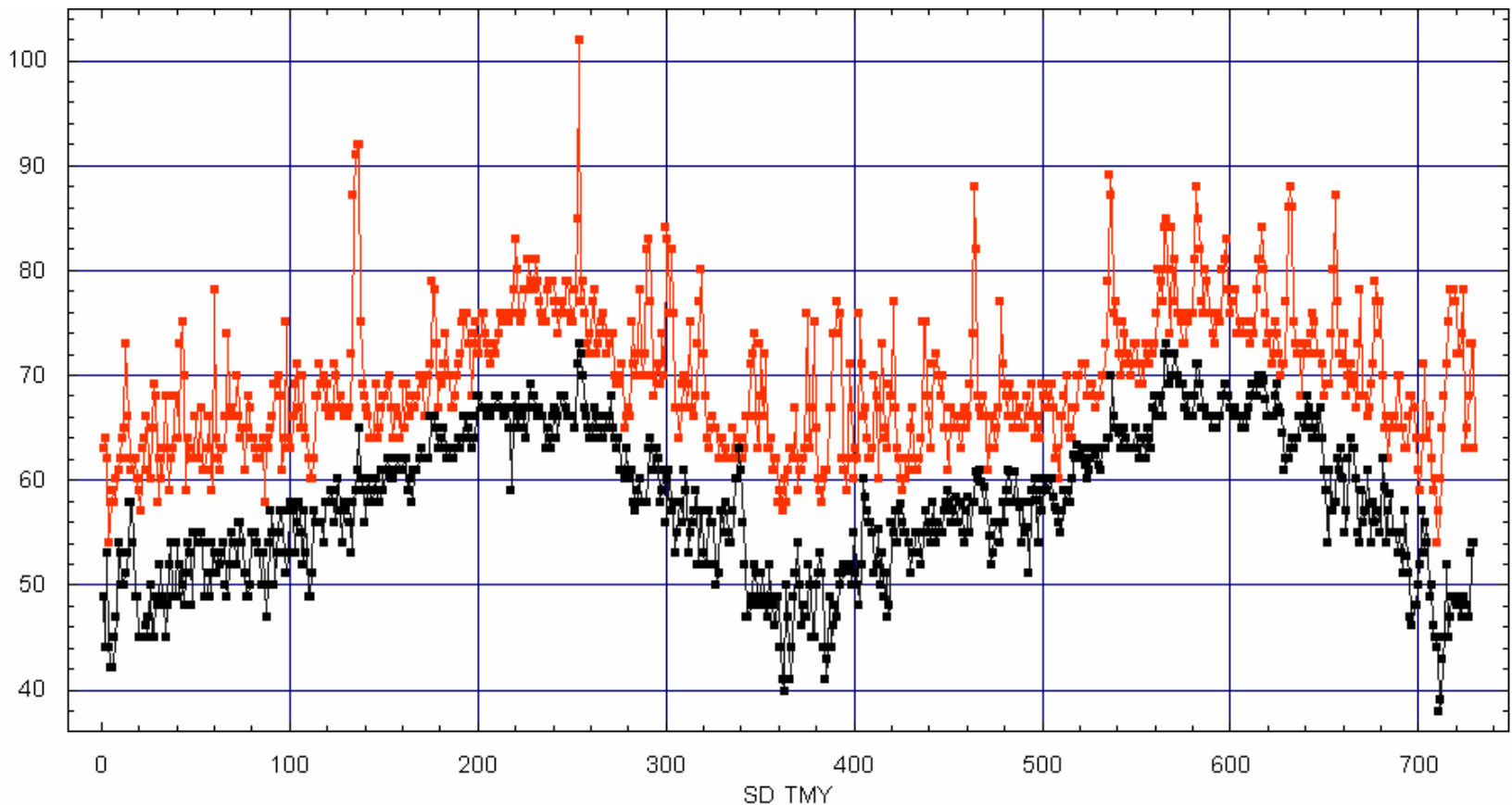
San Diego Children's Museum – Rob Wellington Quigley



**San Diego Children's Museum - design concept**



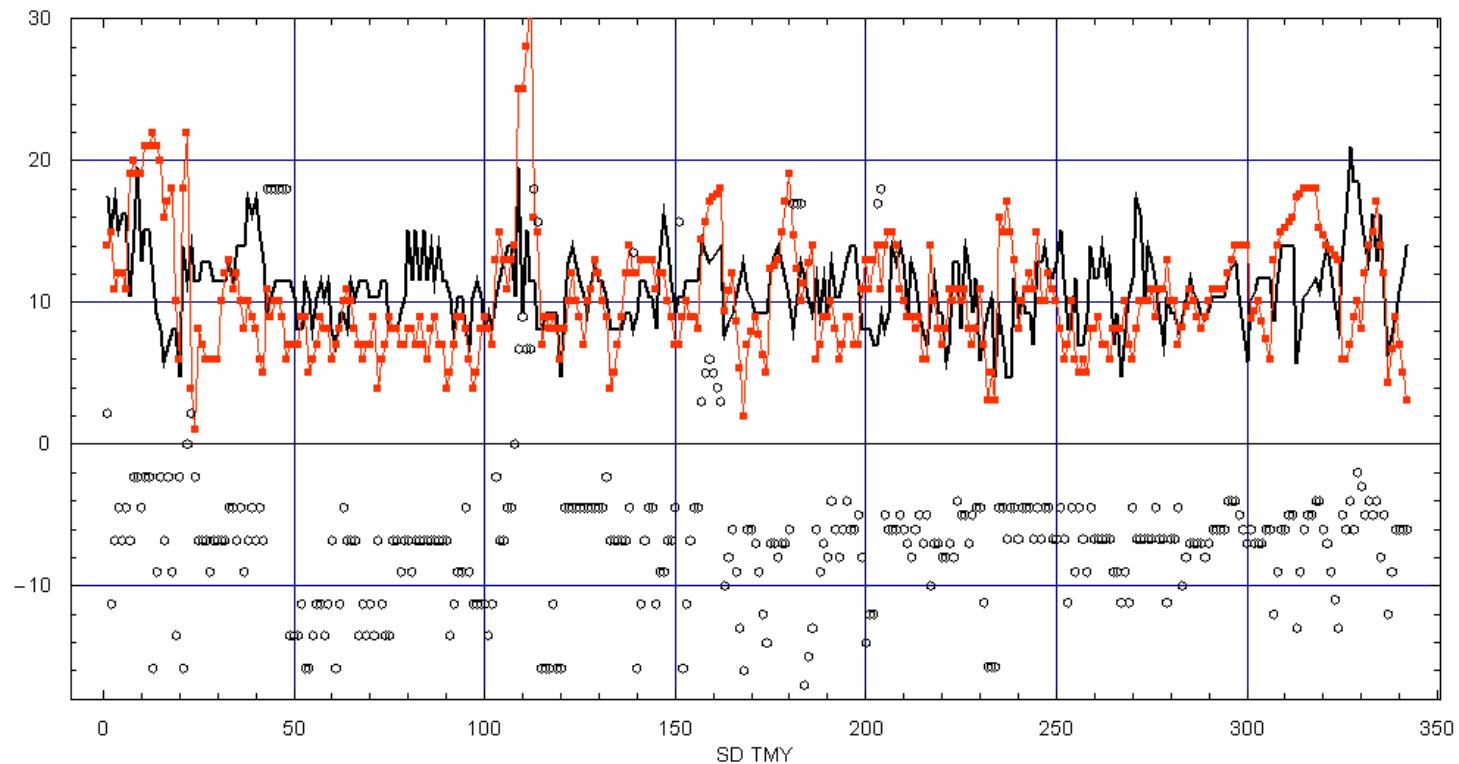
## San Diego Children's Museum – climate analysis



**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

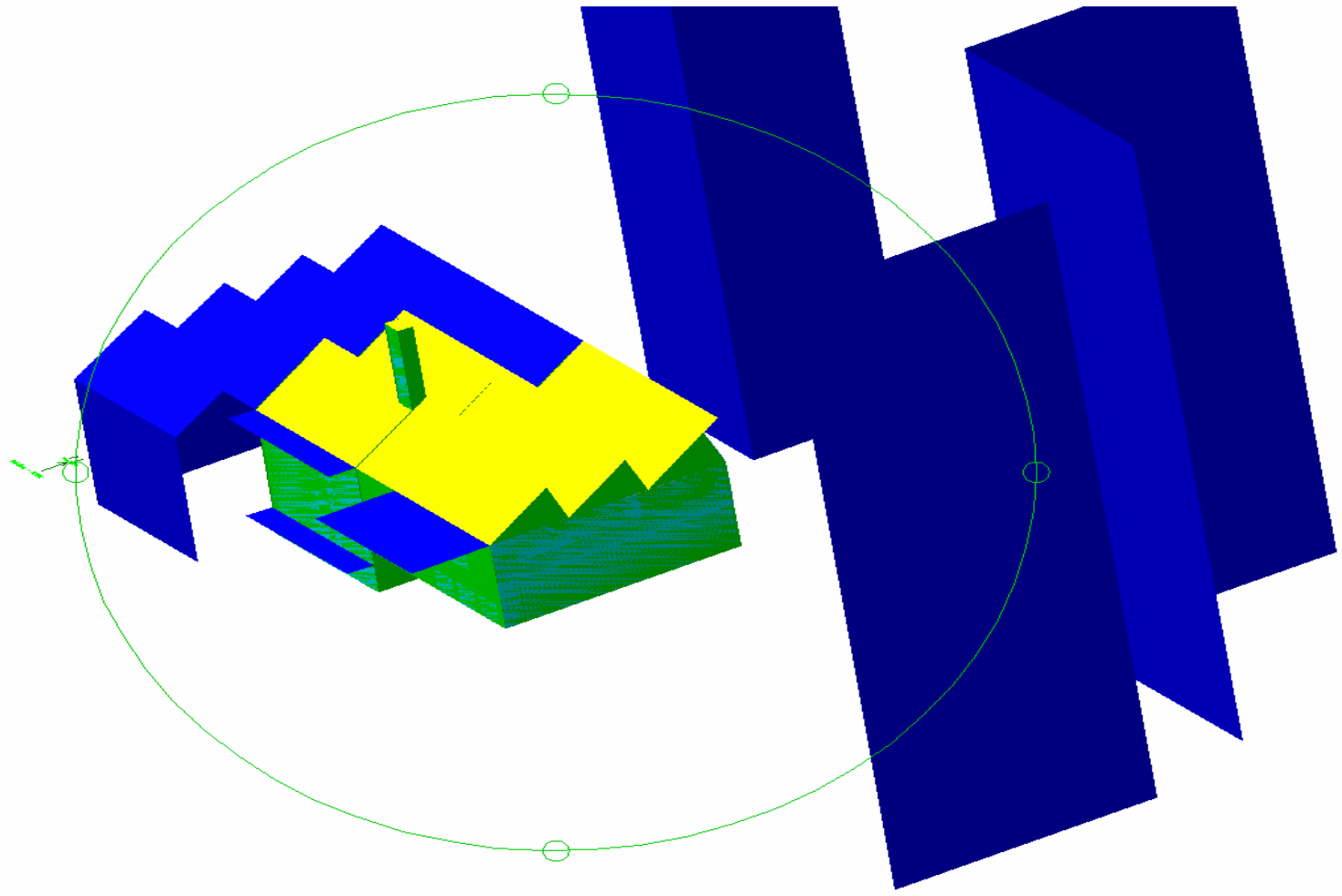
### Evaluation of potential for wind assisted ventilation

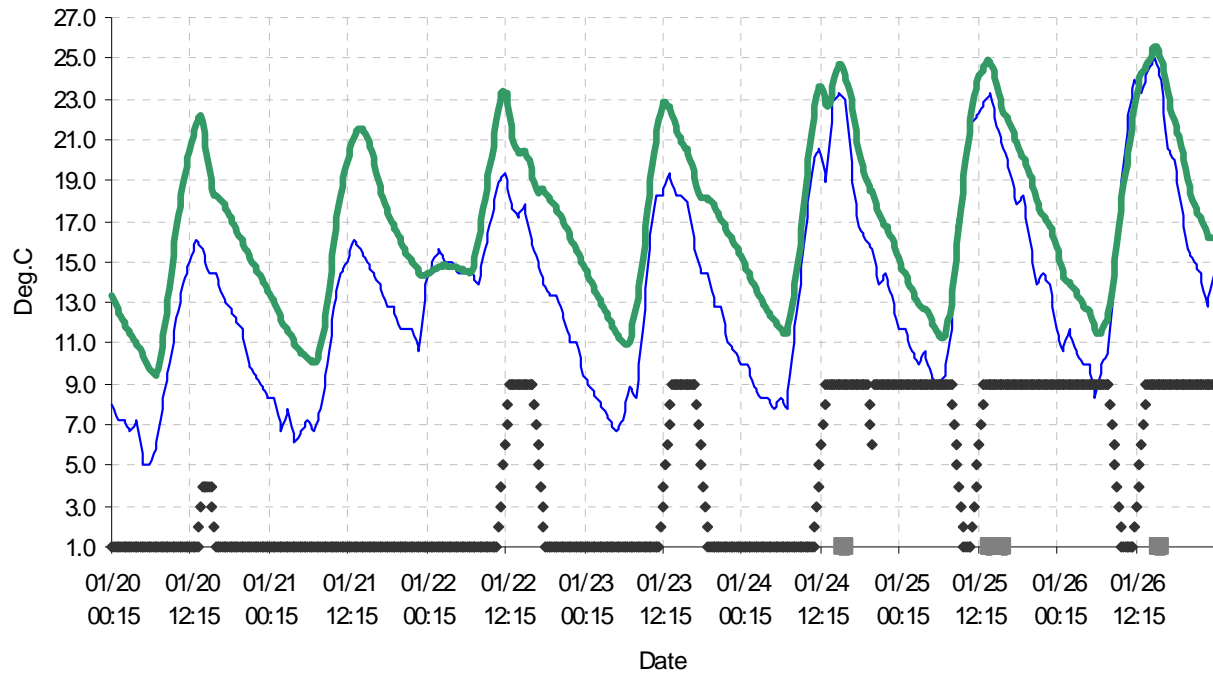


Hourly correlation during museum opening hours, between temperature (in red), and wind during warm days for two typical years of San Diego weather.



# EnergyPlus Geometry



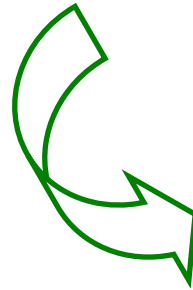


<b>Percentage of hours</b> where $T_{IN}$ is:	$T_{IN} < 66$ (F) <b>Cold</b>	$66 < T_{IN} < 75$ (F) <b>Comfortable</b>	$75 < T_{IN} < 81$ (F) <b>Warm</b>	$81 < T_{IN} < 86$ (F) <b>Hot</b>	$T_{IN} > 86$ (F) <b>Very hot</b>
BMS controlled Stack driven flow	<b>5.8 %</b>	<b>56.5 %</b>	<b>23.7 %</b>	<b>12.1 %</b>	<b>1.9 %</b>
BMS and USER controlled Stack and wind driven flow	<b>6.6 %</b>	<b>66.0 %</b>	<b>20.4 %</b>	<b>5.2 %</b>	<b>1.8 %</b>



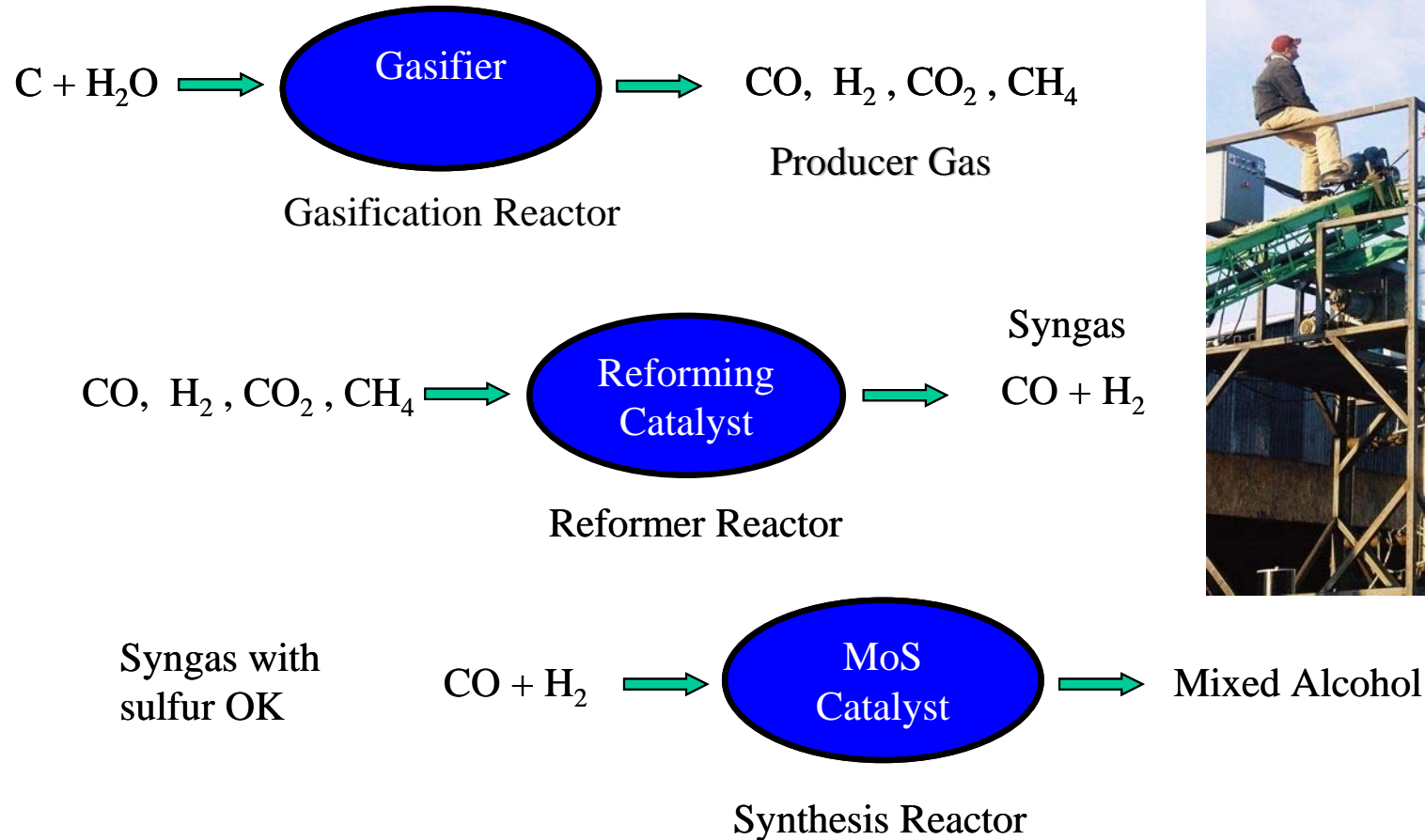
# Resource Center for Alcohol Fuels: \$3M from U.C. Discovery and West Biofuels

- 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





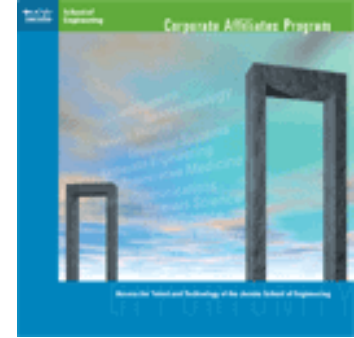
# Faculty Research



**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

**BAE SYSTEMS**



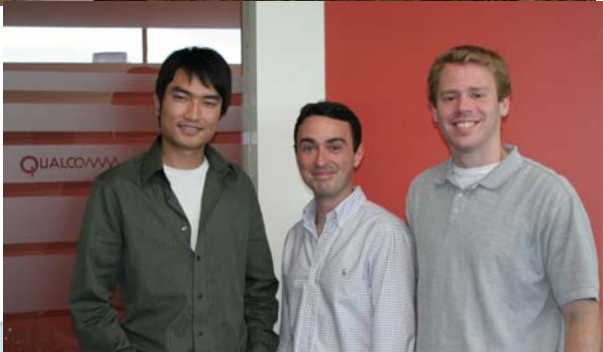
***NORTHROP GRUMMAN***



Contact: Tatis Cervantes

# NOW ACCEPTING PROJECTS

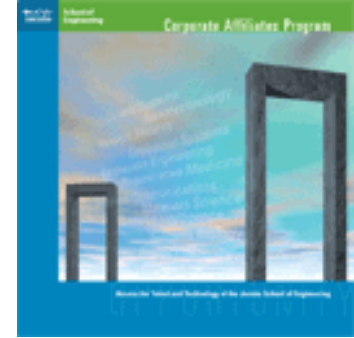
Ruth Kiefer, *TIP Manager*  
[rkiefer@ucsd.edu](mailto:rkiefer@ucsd.edu)





# 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:**

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