Chairs' & Center Directors' Meeting Minutes

Date: September 22, 2014 (12:00 to 2:00 pm)
Location: WCH – Room 443
Attendees: Abbaschian, Reza
Aguilar, Guillermo
Balandin, Alex
Barth, Matt
Boretz, Mitch
D'Anieri, Paul
Farrell, Jay
Haddon, Robert
Hartney, Pat
Matsumoto, Mark
Najjar, Walid
Ravi
Rodgers, Victor
Schultz, Jerry
Ula, Sadrul
Vafai, Kambiz
Wang, Albert

Absent: Bhanu, Bir
Chrobak, Marek
Garay, Javier
Myung, Nosang
Tan, Sheldon

The agenda for the meeting is shown in Appendix 1.

1. Welcome and call for agenda items - Reza
Mitch commented that there will be an ARPA-E workshop in February 2014. Mike Pazzani will pay for two attendees to this (three-day) workshop. Interested faculty should contact Reza.
Reza distributed copies of a message from Pramod Khargonekar, Assistant Director for the Engineering Directorate at NSF. This message announced NSF's new initiative entitled "Professional Formation of Engineers." The purpose of this initiative is to create and support an innovative and inclusive engineering profession for the 21st Century. Interested faculty can participate in an informational webinar on 9/23/14 at 2pm (EDT). Reza knows Pramod and encouraged faculty to meet with him during visits to Washington, D.C. Also, Reza met with the new dean of UCR's School of Education who is interested in developing collaborations with BCOE.

2. Approval of Minutes - Pat
The revised minutes of the September 8th Chairs/Directors meeting were unanimously approved.

3. Introduction of Paul D'Anieri, Provost and Executive Vice Chancellor

Reza introduced Provost D'Anieri and stated that he came from the University of Florida where he was dean of the College of Liberal Arts & Sciences, the largest academic unit at UF with over 600 faculty. He received his B.S. degree from Michigan State and his M.S. and PhD degrees in Political Science from Cornell.

Provost D'Anieri relayed that he came to UCR based on its mission, the leadership team and the potential of the campus to define a new model of public higher education. He is pleased that UCR recently developed a strategic plan. His immediate goals are to increase undergraduate graduation rates and increase research performance. One of his approaches will be to differentiate UCR from other top research universities. An example is the new University Innovation Alliance of 11 universities. UCR is the only university from California in this Alliance. Also, he intends to encourage joint appointments between academic units. He noted that the Chancellor wants to hire 300 new faculty so UCR needs to develop a strategic hiring plan as soon as possible. His first year goals are:

1. Increase seats in classes so that students can get the classes they need to graduate.
2. Develop a new campus budget process that is transparent and aligns dollars with mission.
3. Develop a faculty hiring strategy. Efforts will be directed to this strategy at the Leadership Retreat in October.
4. Develop an appropriate research infrastructure.
5. Evaluate academic organizational issues.
6. Get to know the campus. He wants to visit every department within his first year.

4. Introduction of each BCOE Representatives & Brief Overviews

The BCOE participants presented overviews of their units according to the order in the agenda. One to two page summaries of these overviews were attached to the agenda along with a Quick Facts page about BCOE.

Provost D'Anieri thanked the group for these presentations and noted BCOE's success in interdisciplinary research and its support of undergraduates. He concluded by stating that his job is to empower UCR's faculty but he can't print money so choices will need to be made.

No other matters were discussed.

UNIVERSITY OF CALIFORNIA
RIVERSIDE
BOURNS COLLEGE OF ENGINEERING

Chairs' & Center Directors' Meeting

September 22, 2014

Agenda

Winston Chung Hall – Room 443

1.	Welcome - Request for Agenda Items from the Floor	Reza
2.	Approval of Minutes from September 8, 2014 Meeting	Pat
3.	Introduction of Paul D'Anieri, Provost and Executive Vice Chancellor ➢ Vision for UCR ➢ Goals for the coming year	
4.	Introduction of each BCOE Representative & brief overviews	
	a. Undergraduate Education	Ravi
	b. Graduate Education & Research	Mark
	c. Administration & Facilities	Pat
	d. Conracts & Grants	Mitch
	e. Bioengineering	Victor
	f. Chemical & Environmental Engineering	Mark
	g. Computer Engineering	Walid
	h. Computer Science & Engineering	Marek
	i. Electrical & Computer Engineering	Jay
	j. Materials Science & Engineering	Javier
	k. Mechanical Engineering	Guillermo
	l. Masters of Science in Engineering On-line	Kambiz
	m. Center for Bioengineering Research	Jerry
	n. Center for Environental Research & Technology	Matt
	o. Center for Nanoscale Science & Engineering	Robert
	p. Center for Research in Intelligent Systems	Bir
	q. Center for Ubiquitous Communication by Light	Albert
	r. Winston Chung Global Energy Center	Sadrul
	s. Phonon Optimized Engineered Materials	Alex

BOURNS COLLEGE OF ENGINEERING

Chairs' & Center Directors' Meeting

Monday, September 22, 2014

Noon – 2 p.m.

UNIVERSITY OF CALIFORNIA
RIVERSIDE
BOURNS COLLEGE OF ENGINEERING

Chairs' & Center Directors' Meeting

September 22, 2014

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Quick Facts About the College

Founded: 1989

U.S. News Ranking: 69, top one-third (39th among public universities)

National Research Council: Top quartile

Faculty Count: 96 (seven joined Fall 2014)

Undergraduate Enrollment: 2,364

Graduate Enrollment: 594

Research Expenditures: $37 million

IDC generated: $4.1 million (returned ~ $1.5M)

Endowment Support: $36 million

Endowed Professorships: 9

Philanthropic Gifts ('12): $3.6 million received

NAE Member: 2

Fellows of Professional Societies: 81

NSF Career Awards: 46 (cumulative)

Diversity: 34 percent URM (2009 Claire Felbinger from ABET for outstanding service to URM)

Departments and Programs

- Bioengineering
- Chemical and Environmental Engineering
- Computer Science and Engineering
- Electrical and Computer Engineering
- Mechanical Engineering
- Computer Engineering (joint with CSE & EE)
- Materials Science and Engineering program (college-wide UG, Campus-wide graduate)

Degrees

- BS: BIEN, CHE, CEN, CS, EE, ENVE, Bus Info, ME, MSE (all accredited except for Bus Info)
- MS and PhD: BIEN, CEE, CEN, CS, EE, ME, MSE
- On-line MS: Bioengineering specialization in 2013, Water and Nanomaterials in 2014

  (Negotiating with Pearson for marketing and recruitment)

  Planned Programs: Energy, Civil Engineering, Systems Engineering

Research Centers

- Center for Bioengineering Research
- Center for Environmental Research Technology (CE-CERT)
- Center for Nanoscale Science and Engineering (CNSE)
- Center for Research in Intelligent Systems (CRIS)
- Center for Ubiquitous Communication by Light (UC-Light)
- Southern California Research Initiative for Solar Energy (SC-RISE)
- Winston Chung Global Energy Center (WCGEC)
- Phonon Optimized Engineered Materials (POEM)

Undergraduate Program

Chinya Ravishankar, Associate Dean, Undergraduate Education & Professor, Computer Science & Engineering

- **BCOE goal is to train professional leaders**
  - Academic training + professional development
  - Not just award degrees

BCOE F'14 Freshman Cohort:

- 85% are calculus-ready, or have finished calculus
- Historically, that number is ~50%

Compared to UCR freshmen:

- 50% are in the top 15% of campus freshmen
- 80% are in the top 33% of campus freshmen

BCOE Does its own recruitment and outreach

COLLEGE	Average Freshman AIS
BCOE	4535
CNAS	4308
CHASS	4110
UCR	4233

Student Success: The A+ System

- **Universities are trying predictive analytics, etc. (UIA, for example)**
  - BCOE has built predictive models for many years
  - Work poorly: Results are too noisy, especially at UCR
    - Big variance in student backgrounds, data is out of date, curricula change, etc.
  - These models really aren't very useful for advising
- **Advising must be individualized**
  - Analytic models can bias advisers!
  - Changes in student behavior can make big difference
- **Students also change schedules for various reasons**
  - Impact of schedule changes hard to understand

Our Solution: The A+ System

- **A+ is a scalpel, not a bulldozer**
  - Individualized per-student academic planning
  - A+ looks at courses required, courses completed, and projected pattern of course offerings
  - Produces an optimal course plan for each student
  - Students can change # units, move courses around, etc.
- **Initial reaction from students is very positive**
  - They know the obstacles in their individual case
    - Students never take advice based on statistics
    - Students feel more empowered with A+
- **A+ frees advisers from the tedium of course planning**
  - Can work with students at a higher level

Ensure: New Freshman Success Program

- Engineering Success and Retention
- High-intensity, in-your-face advising for freshmen
  - 225 freshmen, 30 peer mentors, supervised by 3 staff
- "Weight-Watchers" program for success
  - Mandated contact hours (via ENGR 10 enrollment)
- Academics, Professional Societies, Parent Awareness
- Fall theme: Connection to College
- Winter theme: Integration into College and Major
- Spring theme: Self-Direction

Undergraduate Research

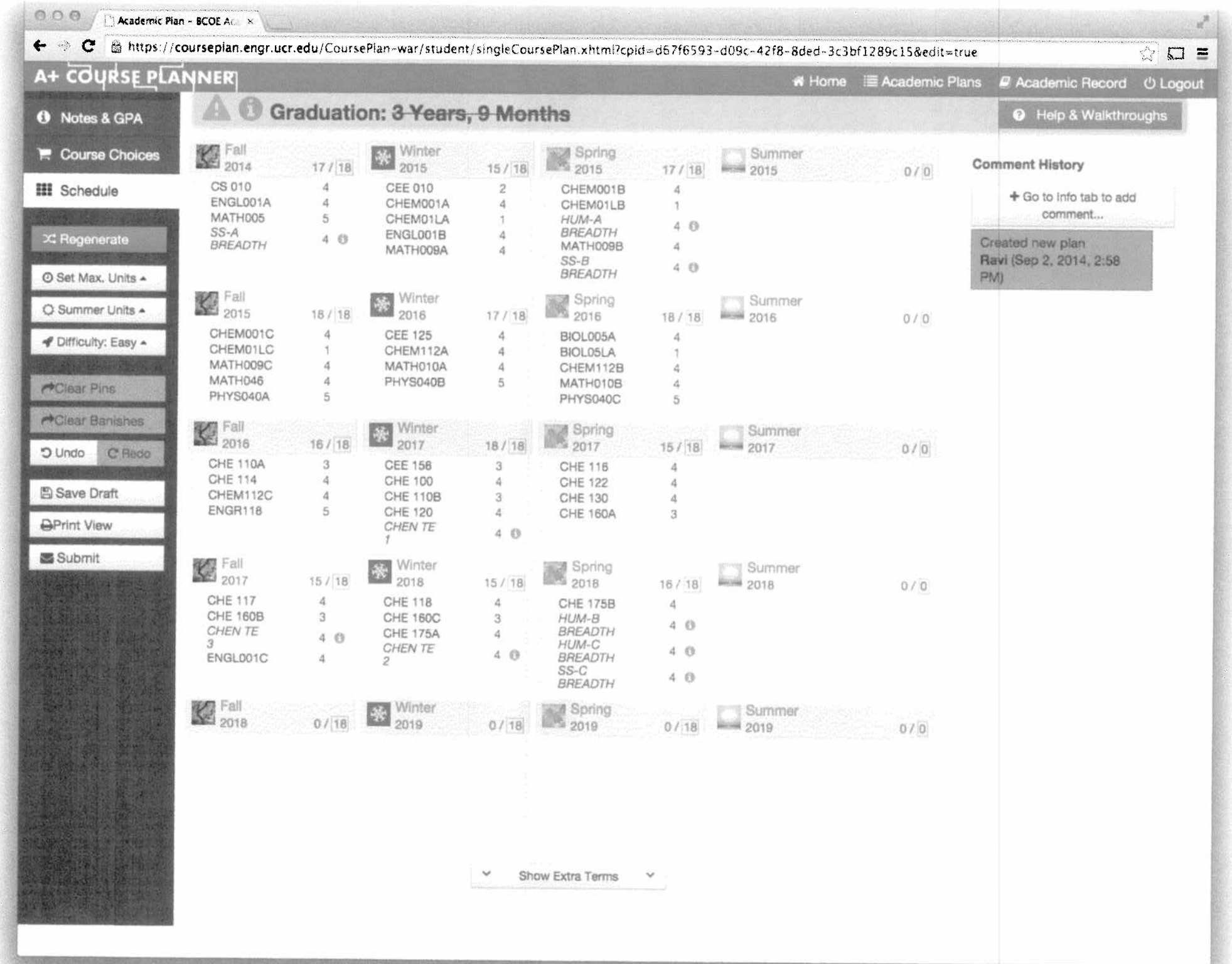
- 100% of BCOE UGs do creative work (Senior Design project)
- 50% of BCOE graduates do laboratory research
- 486 UG researchers
  - 23.94% of BCoE Spring'13 enrollment
  - 86 funded by college-level HSI grant
  - 46 funded under other research-oriented programs
  - 354 using other funds, course credit, or volunteering
- 72 Faculty research mentors (80% of BCOE)

Student Professional Development

- A total of 23 Student Professional Organizations
  - Very active, with 984 members
    - 48.5% of BCoE students
- 246 Student Professional Development events in '12-'13
  - Attendance was 7839 (3 × enrollment)
- 6436 Outreach hours
  - High School, Community College, etc.

	CNAS	BCOE	Ratio
F'13 Enrollment	4568	2364	1.93

	Current Campus-Funded FTE						
		CNAS	BCOE	Needed For Parity	BCOE Shortfall	Total shortfall	
Advising	Advising FTE	17	3.5	8.8	5.3	5.8	9.4
	Transition adviser	1	0	0.5	0.5		
Admin support	Admin. Support	3	0	1.6	1.6	1.6	
Enrollment management	Enrollment Management FTE	4	0	2.1	2.1	2.1	


Academic Plan - BCOE Ac
https://courseplan.engr.ucr.edu/CoursePlan-war/student/singleCoursePlan.xhtml?cpid=d67f6593-d09c-42f8-8ded-3c3bf1289c15&edit=true
A+ COURSE PLANNER
Home
Academic Plans
Academic Record
Logout
Notes & GPA
Course Choices
Schedule
Regenerate
Set Max. Units
Summer Units
Difficulty: Easy
Clear Pins
Clear Banishes
Undo
Redo
Save Draft
Print View
Submit
Graduation: 3 Years, 9 Months
Help & Walkthroughs
Fall 2014 17 / 18
CS 010 4
ENGL001A 4
MATH005 5
SS-A BREADTH 4
Winter 2015 15 / 18
CEE 010 2
CHEM001A 4
CHEM01LA 1
ENGL001B 4
MATH009A 4
Spring 2015 17 / 18
CHEM001B 4
CHEM01LB 1
HUM-A BREADTH 4
MATH009B 4
SS-B BREADTH 4
Summer 2015 0 / 0
Fall 2015 18 / 18
CHEM001C 4
CHEM01LC 1
MATH009C 4
MATH046 4
PHYS040A 5
Winter 2016 17 / 18
CEE 125 4
CHEM112A 4
MATH010A 4
PHYS040B 5
Spring 2016 18 / 18
BIOL005A 4
BIOL05LA 1
CHEM112B 4
MATH010B 4
PHYS040C 5
Summer 2016 0 / 0
Fall 2016 16 / 18
CHE 110A 3
CHE 114 4
CHEM112C 4
ENGR118 5
Winter 2017 18 / 18
CEE 158 3
CHE 100 4
CHE 110B 3
CHE 120 4
CHEN TE 1 4
Spring 2017 15 / 18
CHE 116 4
CHE 122 4
CHE 130 4
CHE 160A 3
Summer 2017 0 / 0
Fall 2017 15 / 18
CHE 117 4
CHE 160B 3
CHEN TE 3 4
ENGL001C 4
Winter 2018 15 / 18
CHE 118 4
CHE 160C 3
CHE 175A 4
CHEN TE 2 4
Spring 2018 16 / 18
CHE 175B 4
HUM-B BREADTH 4
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Ravi (Sep 2, 2014, 2:58 PM)

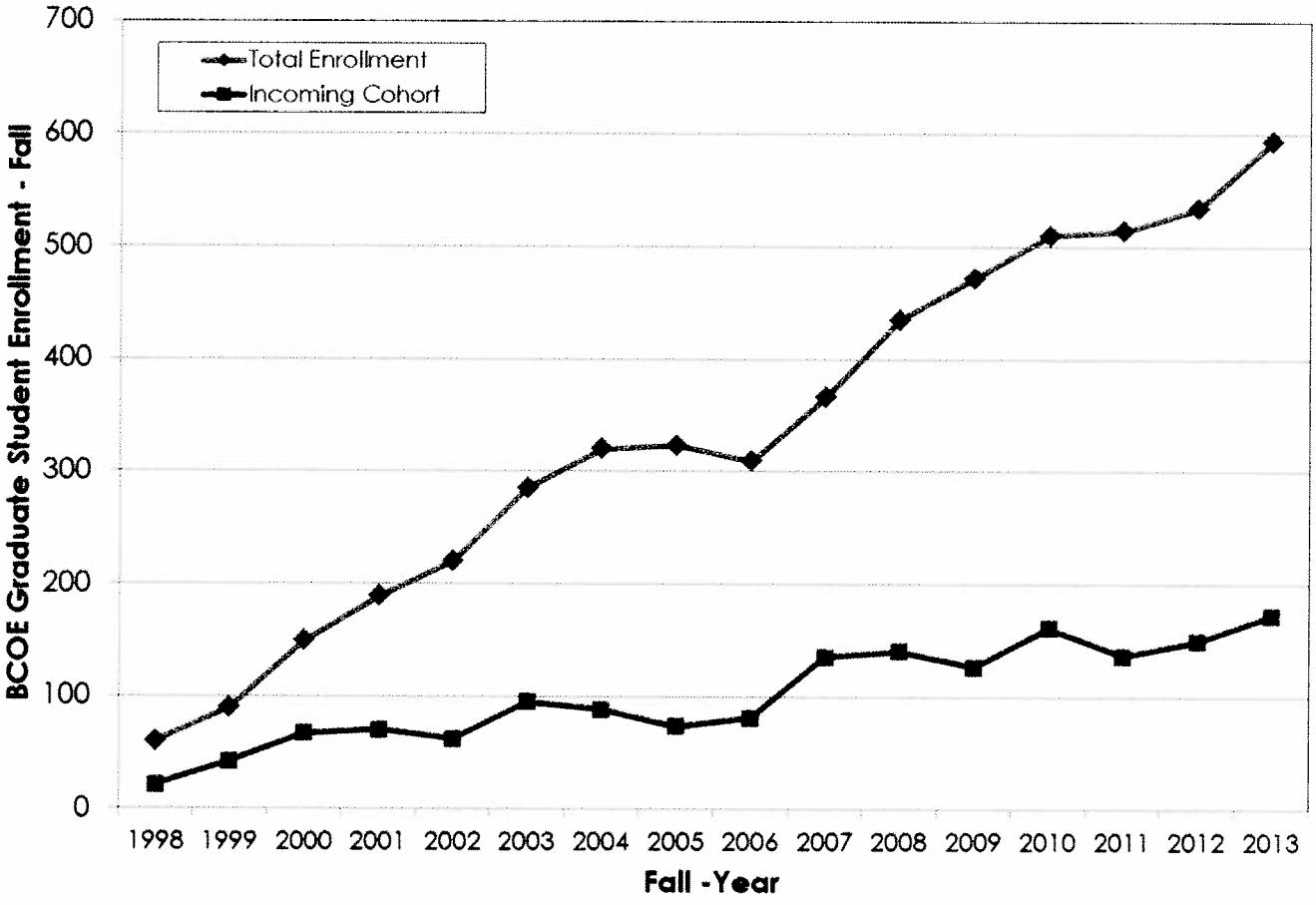
Graduate Education

Mark Matsumoto
Professor & Associate Dean, Research & Graduate Education

Graduate Program Overview/History

Program	Start Year	M.S.	Ph.D.
Bioengineering (BIEN)	2007-08	Yes*	Yes
Chemical & Environmental Engineering (CEE)	1999-00	Yes*	Yes
Computer Engineering (CEN)	2013-14	Yes*	No
Computer Science (CPSC)	1994-95	Yes*	Yes
Electrical Engineering (ELEN)	1998-99	Yes*	Yes
Material Science & Engineering (MSE)	2010-11	Yes	Yes
Mechanical Engineering (MCEN)	2001-02	Yes*	Yes
Online – Engineering (OENR)	2013-14	Yes	No

*Five-year BS/MS programs available since Fall 2009

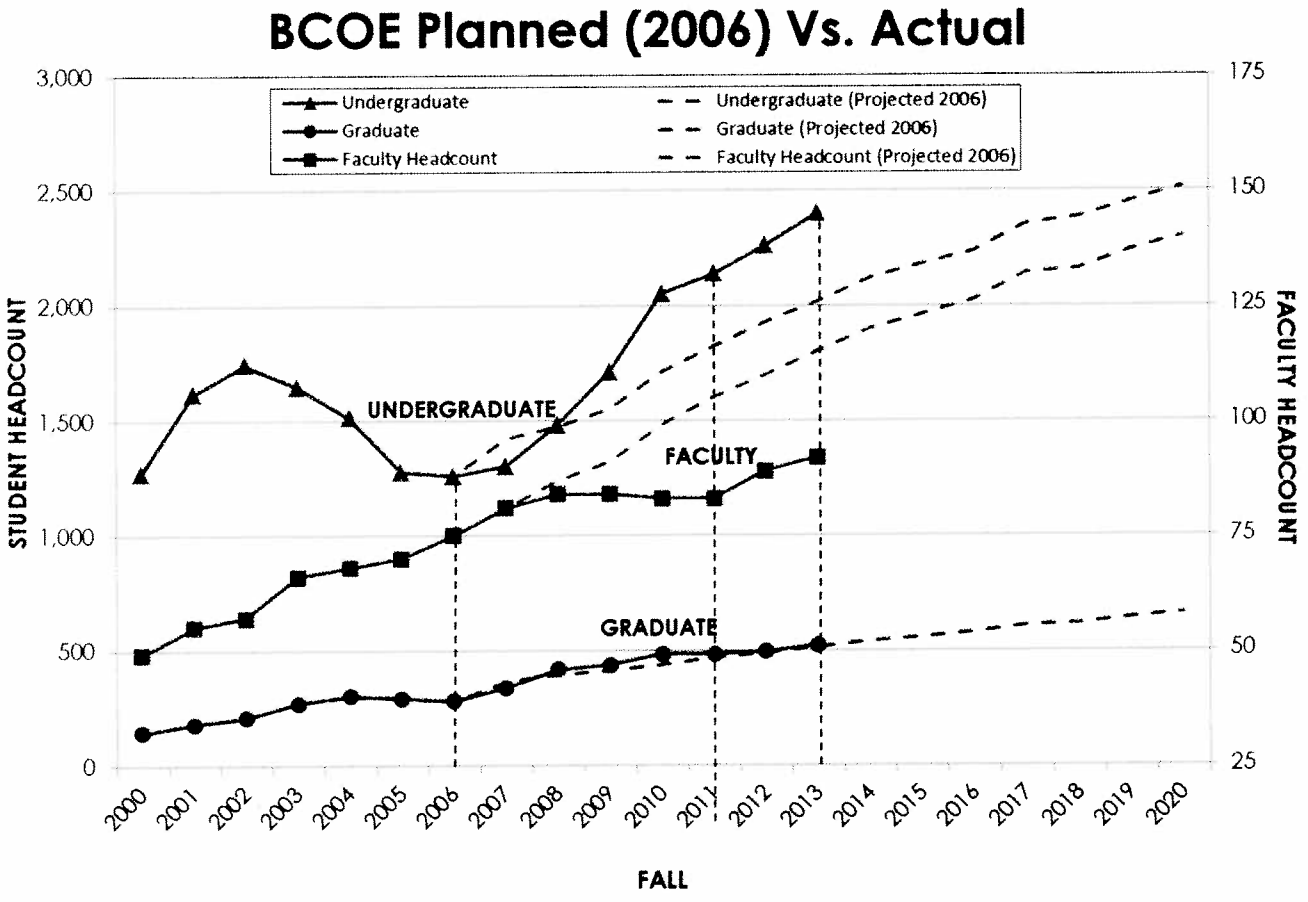


International Graduate Student Agreements

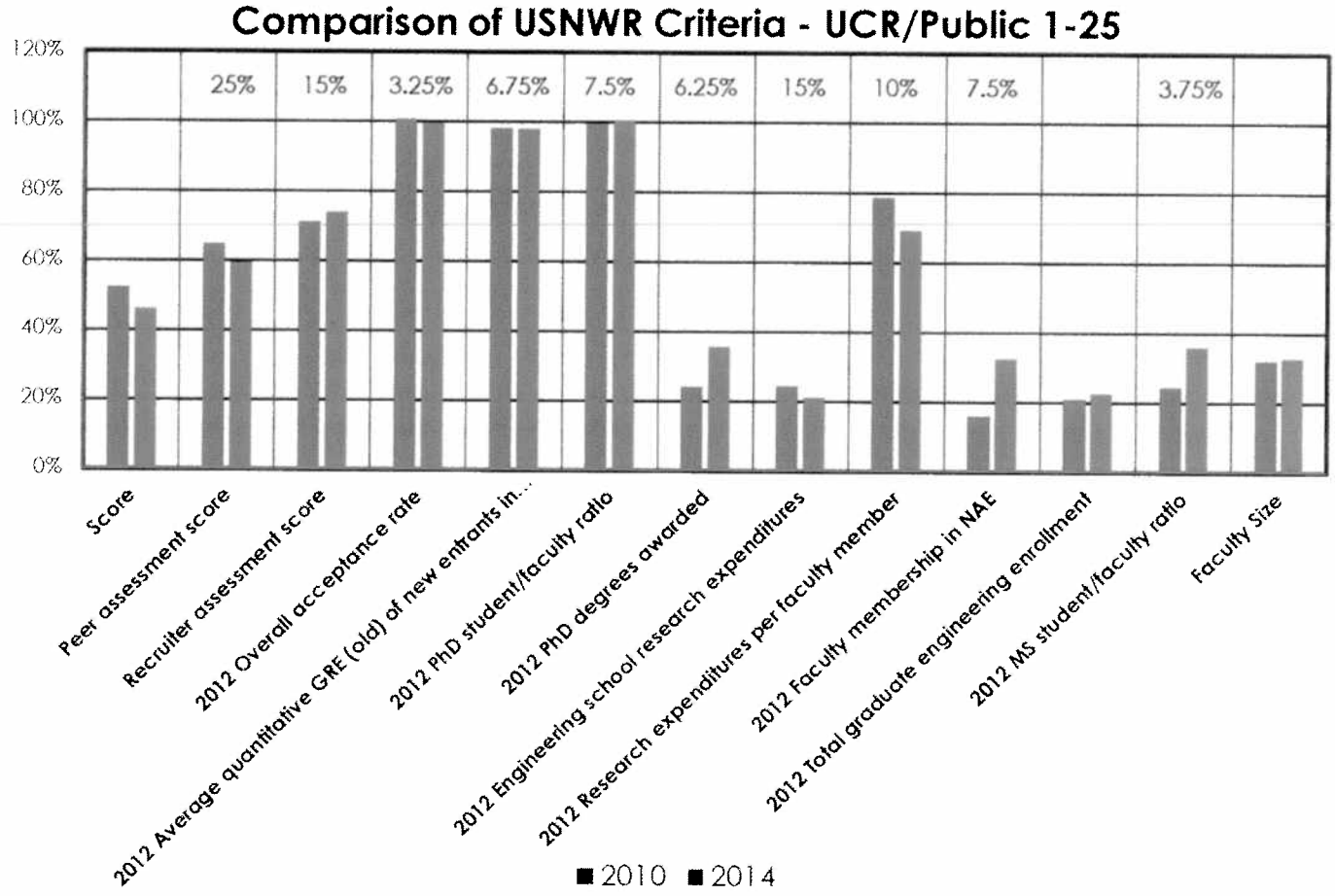
- Ambedkar Marathwada University (India)
- Chungnam National University (Korea)
- Gangnam-UCR International Education Center (Korea)
- Hanbat University (Korea)
- Hanyang University (Korea)
- Huazhong University of Science & Technology (China)
- Jiao Tong University (Japan)
- Josai University (Japan)
- Korea Institute of Materials Sciences
- Nanjing University (China)
- National Autonomous University of Mexico (UNAM)
- Overseas Koreans Foundation
- Rey Juan Carlos University (Spain)
- Shanghai Jiaotong University (China)
- Thailand Institute of Scientific & Technological Research
- Tohoku University (Japan)
- Tsinghua University (China)
- University of Bamberg (Germany)
- University of Wroclaw (Poland)

International Applications		
Cohort	M.S.	Ph.D.
2009	428	678
2010	413	613
2011	630	606
2012	884	691
2013	1,176	692

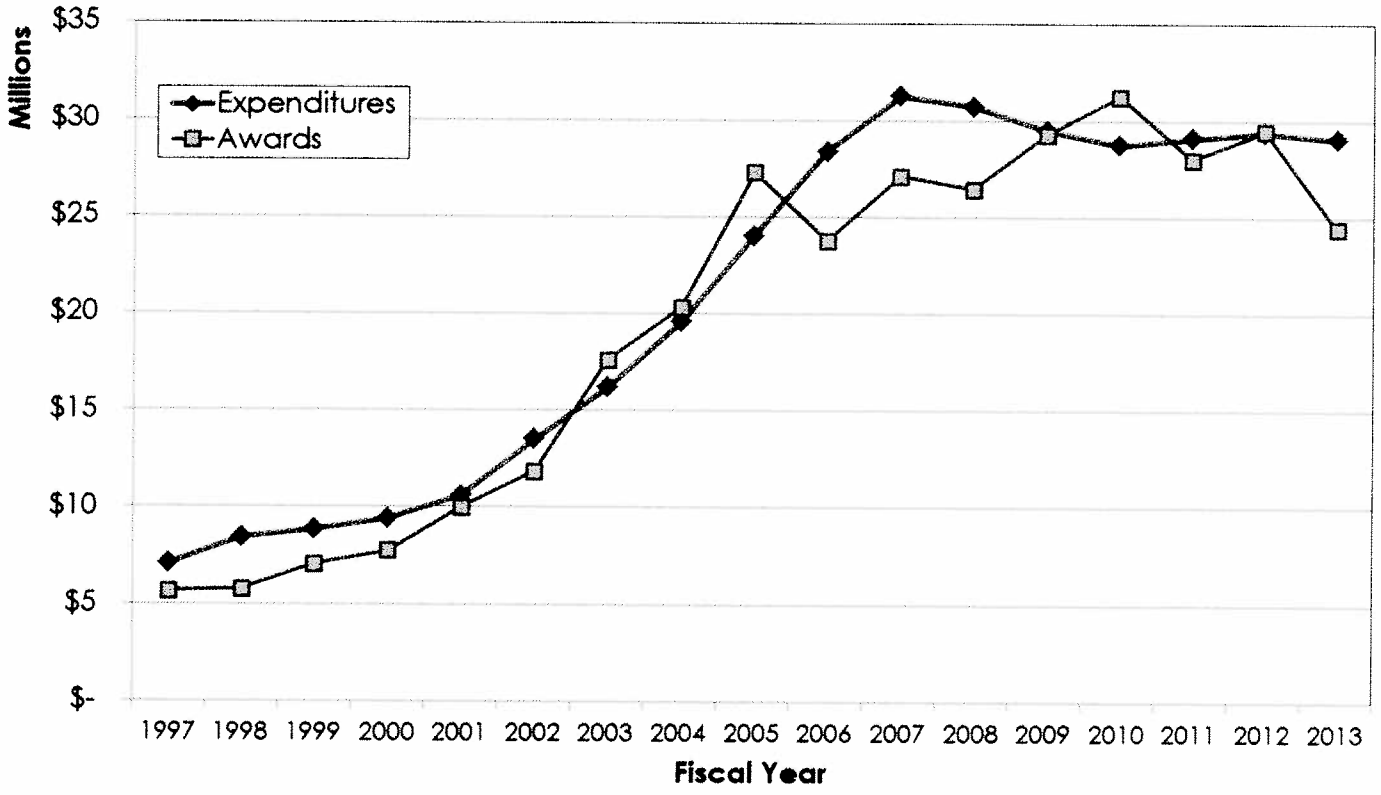
International New Enrollees		
Cohort	M.S.	Ph.D.
2009	13	60
2010	19	51
2011	25	37
2012	23	48
2013	26	58



Research



Research Activity, 3-Yr Running Average



Research Collaborations (partial)

- **City of Sendai (Japan)**
- **Haider Spine Institute (Riverside)**
- **Honda (Japan)**
- **Hyundai NGV (Korea)**
- **Infinite Universe Limited (China)**
- **Intel Corporation**
- **LG Innotek (Korea)**
- **Naval Surface Warfare Center (Corona)**
- **Oak Ridge National Laboratory**
- **Nissan Motor (Japan)**
- **Raytheon**
- **Riverside CEO Forum**
- **Samsung Electro-Mechanics Co., Ltd (Korea)**
- **Tata Sons Limited (India)**
- **Winston Chung (China)**

Research Space

- **Buildings**
  - Bourns Hall (1995), Winston Chung Hall (2005)
  - Material Science and Engineering (2011) – shared with CNAS; clean room area incomplete
- **Wet Labs**
  - 28,000 ft^2 (Bourns & MSE) + 7,000 ft^2 (damp, non-chemical)
  - Recent (2/25/13) analysis by CRM concluded additional 10,000-12,000 ft^3 needed for current BCOE faculty

Engineering Building Unit III

- **Detailed Project Plan (August 2006)**
  - 91,500 gsf, 54,000 asf, 30,000 asf wet lab
  - Target completion date – Fall 2011
  - Projected BCOE faculty size – 105 to 110
- ***EBU III is a priority for continued BCOE growth and excellence toward Top 25 objective.***

BCOE Administration and Facilities

D. Patrick Hartney, Assistant Dean
Finance & Administration

BCOE Personnel Levels and Transactions for Fiscal Year 2013/2014

College Personnel Information	FTE	Head Count
Filled Faculty (PERM)	88.6	90
Unfilled Facutly (PERM)	16.75	0
Other Academics (TEMP)	168	775
	273.35	**865**
Career Staff (PERM)	57.07	68
Career Staff (TEMP)	30.88	41
	87.95	109
Non-Career Staff	39.97	316
	127.92	**425**
Grand Total >	**401.27**	**1,290**

Transaction Information	
No. of Accounts Payable Transactions	11,086
No. of Payroll Transactions	18,461
No. of Travel Requests Transactions	4,350
No. of Campus Work Order Transactions	10,050
No. of Transfers	2,029
No. of BEAs	3,181
	49,157

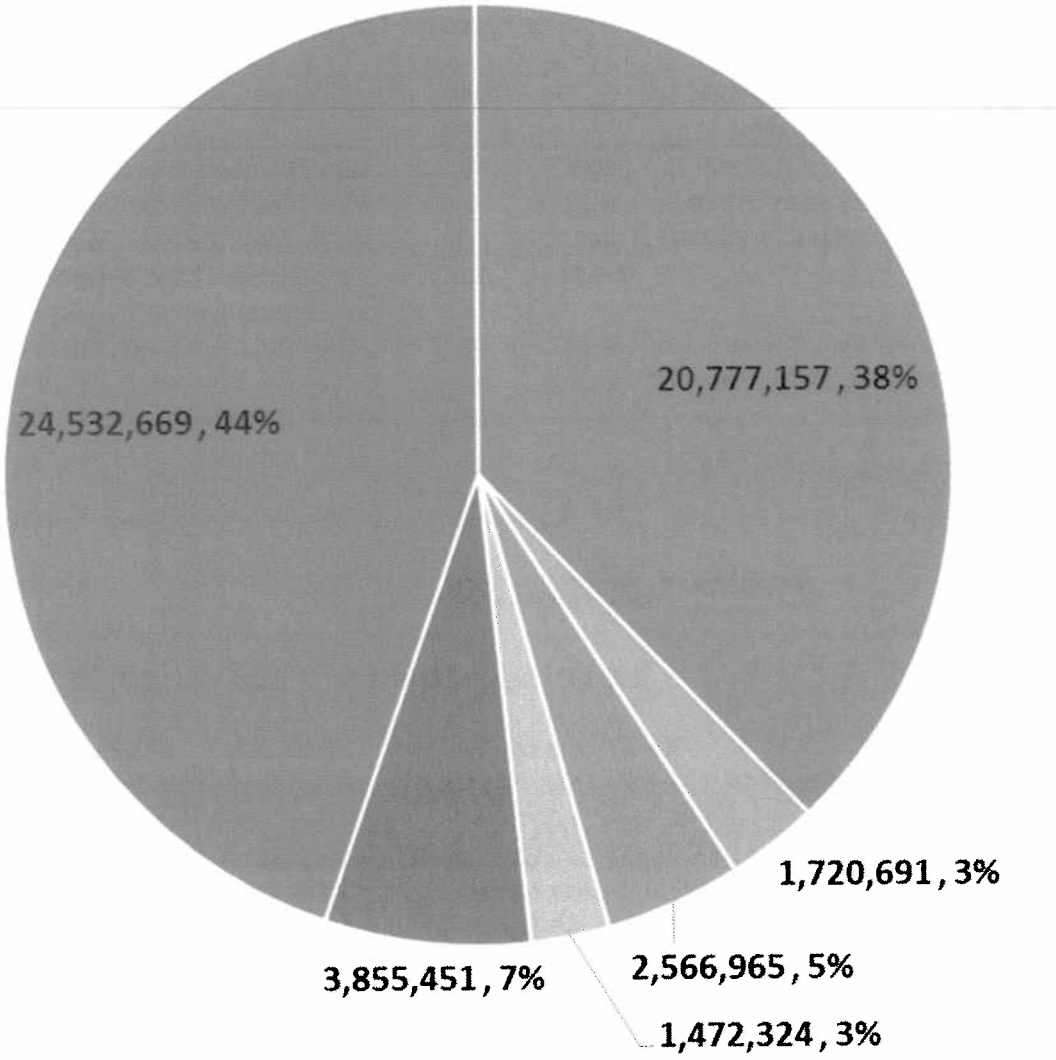
BCOE Expenditures for Fiscal Year 2013/2014

Annual C&G Expenses >	20,777,157	37.83%
Annual General/State Research Exps >	1,720,691	3.13%
Annual Initial Comp Expenses	2,566,965	4.67%
Annual Gift Fund Expenses >	1,472,324	2.68%
Annual S&S, Fees, & UNEX Expenses >	3,855,451	7.02%
Annual General/State I&R Expenses >	24,532,669	44.67%
	54,925,257	100.00%

BCOE Space Use Summary (as of Sept 19 2014)

USE	TOTAL ON CAMPUS	CECERT	Grand Total
Instr Svc	1,996		1,996
Instruction	6,187	529	6,716
Office Svc	19,844	1,360	21,204
Office	106,639	47,044	153,683
Other	1,107		1,107
Research LAB Svc	26,827	1,888	28,715
Research OFF Svc	0	130	130
Research	13,088	8,363	21,451
Research - DRY	12,866	6,127	18,992
Research - WET	11,939	2,938	14,877
Research Svc	2,103	399	2,502
Total	202,596	68,778	271,374

Expenditure Information



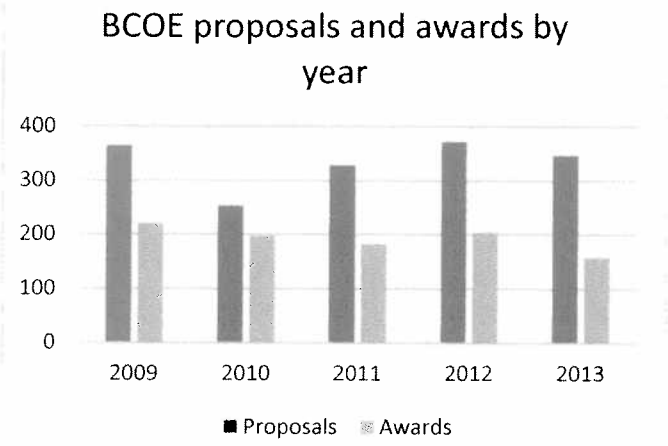
Contracts and Grants

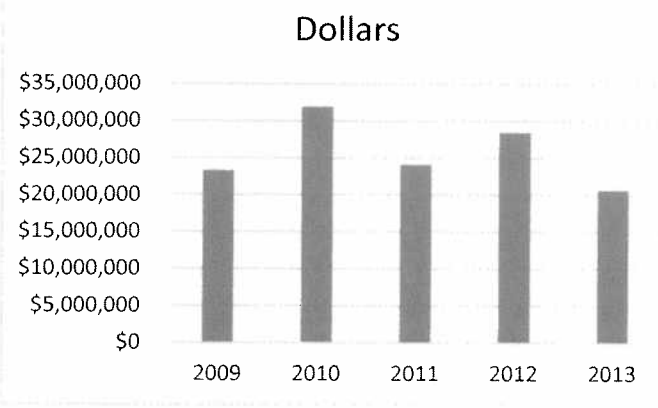
- **Central contracts and grants office for BCOE**
  - Tracks and disseminates funding opportunities, and helps PIs and students find opportunities.
  - Prepares budgets and all internal and external compliance documentation for all non-philanthropic proposals from BCOE (now more than 300 per year).
  - Works with the faculty and the research office on uploads/production and timely submission.
  - Helps to organize and manage large proposal teams.
  - Maintains a library of proposal text (diversity, management plans, data management) and past successful proposals.
  - Assists with writing, editing, graphics, and formatting.

Mitch Boretz
No, really, that's me.

- **In collaboration with RED, Graduate Division, and other schools/colleges:**
  - Leads an annual workshop (April) for assistant professors planning NSF CAREER proposals.
  - Conducts training for graduate students for the NSF Graduate Research Fellowship Program.
- **So, what's up?**
  - Faculty size has doubled since we went to this structure. Staffing has remained static.
  - Faculty mix is more senior than it was 12 years ago, so we are applying for larger and more sophisticated opportunities, which require more resources.
  - Campus investments in what is broadly termed "research development" are uneven and, so far, uncoordinated.

According to RED annual reports:





Bioengineering

Bir Bhanu
Distinguished Professor and Interim Chair

At a glance

- **Beginning**
  - Department Began: 5/2006
  - Graduate Program Began (BIG): 12/2006
- **Enrollment**
  - Undergraduate 2006: 14
  - Undergraduate 2014: 350
  - ABET Accredited 2012
  - Graduate 2006: 5
  - Graduate 2014: 96 (75 PhD, 21 MS); 10 NSF GRFP; 2/3 domestic and 1/4 minority
- **Faculty**
  - 2006: 5
  - Since 2012: 12
- **Extramural Support**
  - NIH
  - NSF
  - Beckman Initiative for Macular Disease
  - American Soc. of Laser Medicine & Surgery
  - Tobacco Related Disease Program
  - Whitaker Foundation
  - Haider Biologics
- **Core Faculty**
  - AAAS Fellows: **4**
  - ACS Fellow: **1**
  - AIChE Fellow: **1**
  - AIMBE Fellows: **4**
  - BMES Fellows: **1**
  - SPIE: 1
  - National Academy of Engineering: **1**
  - NSF Career: **1**
- **BIG Faculty**
  - 12 Departments
  - 44 Faculty Members

NATIONAL ACADEMY OF ENGINEERING

AAAS ADVANCING SCIENCE, SERVING SOC

AIChE

BMES BIOMEDICAL ENGINEERING SOCIETY

ACS Chemistry for Life®

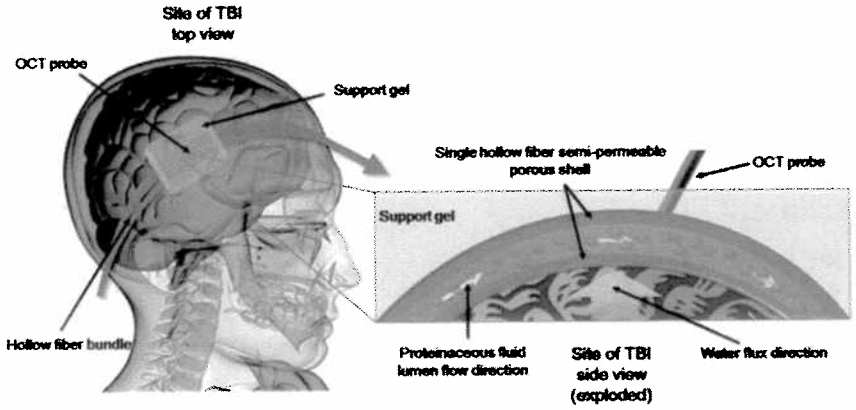
START • GROW • BE BIG

BIOENGINEERING INTERDEPARTMENTAL GRADUATE (BIG) PROGRAM

Research Focus Area

Research is conducted in the following major areas:

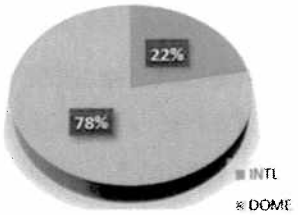
- Biomaterials and Regenerative Medicine
- Biomedical Imaging
- Molecular and Cellular Engineering
- Medical Devices
- Computational Bioengineering



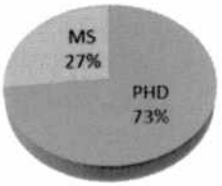
BIG Graduate Students

Ten BIG Students are NSF Graduate Research Fellows

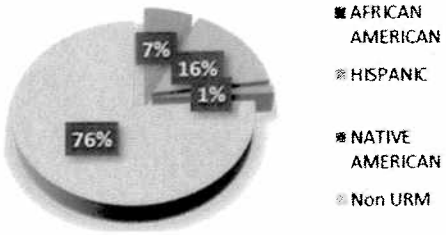
Domestic Vs. International



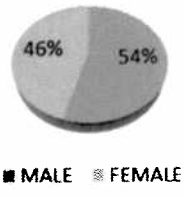
MS v. PhD



URM



Gender

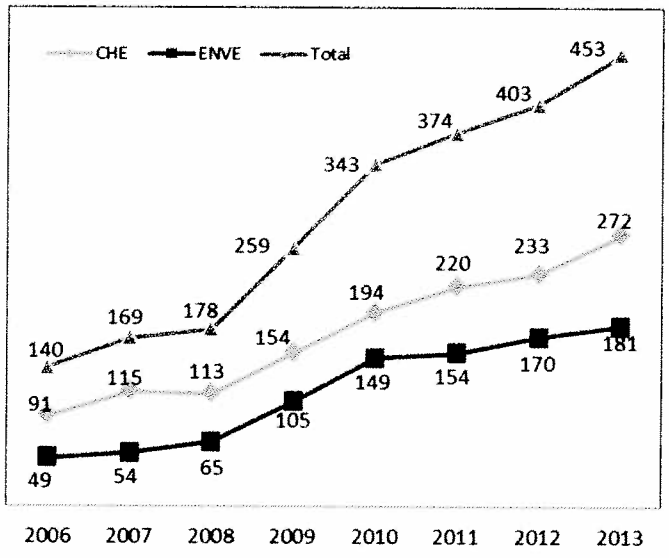


Chemical & Environmental Engineering

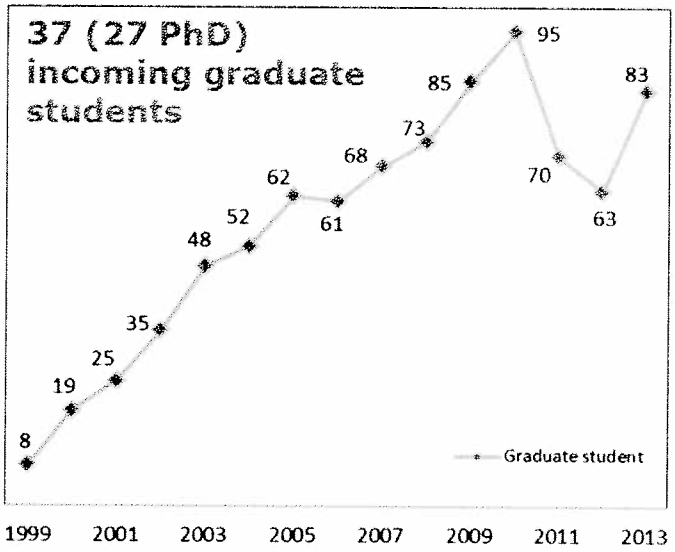
- **Department was formed in 1998**
- **Graduate program started in 1999**
- **Currently 17.5 ladder-rank faculty (one split appointment, one center director, and two associate deans)**
  - Lost five faculty (Marc Deshusses (former chair), Wilfred Chen, Yushan Yan (former chair) and David Cwiertny, Joseph Norbeck (founding director for CE-CERT) during FY 09 and 10
  - Hired eight new assistant professors during AY 12-15 (Ian Wheeldon (AY 12), Xin Ge (FY 12), Philip Christopher (FY 12), Juchen Guo (FY 13), Haizhou Liu (FY 13), David Jassby (FY 13), Ruoxue Yan (FY 14), Bryan Wong (FY15)
- **Two Undergraduate programs:**
  - Chemical Engineering: Chemical, Biochemical, Bioengineering options
  - Environmental Engineering: Water and Air Quality options
- **Enrollment (Fall 2013):**
  - Undergraduate students: CHE: 273 and ENVE: 173
  - Graduate student: 85 CEE (+8 students from other programs)

Nosang Myung
Professor & Chair

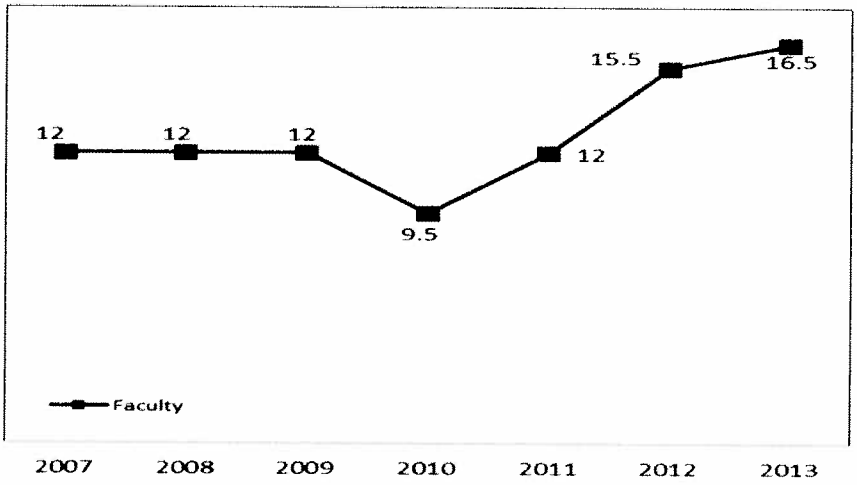
Undergraduate Enrollment



Graduate Enrollment



Faculty Size



Research is conducted in six major areas:

- Biotechnology and Bioremediation
- Advanced Materials and Nanotechnology
- Energy Conversion and Storage
- Computation and Molecular Modeling
- Air Quality Systems Engineering
- Water Quality Systems Engineering

Publication Statistics/CHE 2000-09

- # of citation/paper
  - 6th highest (24.15)
    - Caltech (38.36), MIT (28.52), U of W (25.82), Michigan (25.66), UIUC (24.31)
- # of papers/faculty/yr
  - 11th among top 25
  - 2nd among 16th - 25th
- h-index
  - 12th among top 25
  - 2nd among 16th - 25th

Computer Engineering

Walid Najjar
Director, Computer Engineering Program
Professor, Department of Computer Science & Engineering

Computer engineering is a discipline that embodies the science and technology of design, construction, implementation, and maintenance of software and hardware components of modern computing systems and computer-controlled equipment. Computer engineering has traditionally been viewed as a combination of both computer science (CS) and electrical engineering (EE).

- IEEE/ACM Curriculum Guidelines for Undergraduate Degree Programs in Computer Engineering, 2004

Jobs in Computer Engineering

- **Shift to software aspects of computer engineering**
  - **Where software and hardware interact**
- **6th highest paid major (median mid-career)**

Quick Facts	Hardware	Software
2010 Median Pay	$98,810	$90,530
Jobs in 2010	70,000	913,100
Growth Outlook 2010-20 (avg. 14%)	9%	30%
Change 2010-20	6,300	270,900

Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, 2012-13 Edition, Software Developers, on the Internet at http://www.bls.gov/ooh/computer-and-information-technology/software-developers.htm (visited May 22, 2013).

Time Line of CEN@ UCR

- **2000: a major jointly managed by EE and CSE**
  - An orphaned major:
    - CEN undergraduate advisor alternates yearly between CSE or EE
  - Curriculum changes require votes from both departments
- **2008: proposed as a program, joint CSE-EE**
  - Based on recommendation by CSE external undergraduate review committee
  - UCSB CEN program used as a model
  - Better preparation for ABET
- **MS degree in CEN**
  - 2009: proposal for MS degree in CEN
  - 2010: CEN Program committee @ BCOE formed
  - 2012: MS CEN approved by UC President
    - UC Santa Cruz, only other UC with MS in CEN
    - 2012: 5 years BS+MS in CEN approved

CEN Faculty

Nael AbuGhazaleh
Professor, CSE, ECE

Laxmi Bhuyan
Professor, CSE

Philip Brisk
Assistant Professor, CSE

Rajiv Gupta
Professor, CSE

Roger Lake
Professor, ECE

Walid Najjar
Professor, CSE

10 Faculty members:
9 Fellows (IEEE, ACM, AAAS)
~280 undergraduates
~29 graduate (MS)

Sheldon Tan
Professor, ECE

Frank Vahid
Professor, CSE

Albert Wang
Professor, ECE

Qi Zhu
Assistant Professor, ECE

UCSB CEN Program
19 Faculty
~180 undergraduates

Computer Science and Engineering

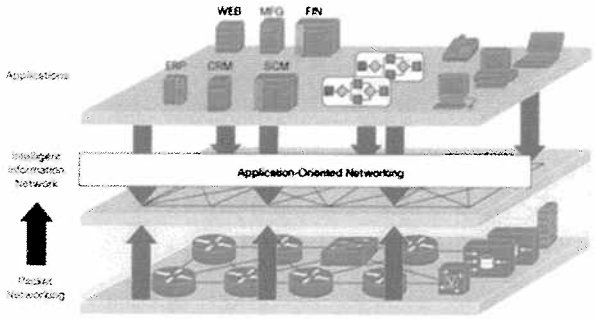
- Relatively new: established in 1989, first PhD graduated in 1999
- 24 faculty: 3 ACM Fellows, 4 IEEE Fellows, 5 AAAS Fellows, and 10 NSF CAREER awardees
- Funding: in 2012-14, 10M in external grants
- 3 undergraduate majors: Computer Science, Business Informatics, Computer Engineering (joint with ECE). Total ~650 undergrads.
- UCR's largest graduate program: 165 grad students: 115 Ph.Ds, 50 MS students. We graduate ~25 Ph.D.s per year, some now employed at UCI, Arizona, Florida, Umass, etc.
- Steady rise in rankings:
  - US News and World Report: 56 out of ~165 Ph.D. programs in 2014 (85 in 2001, 65 in 2006)
  - NRC rankings: 5-34 in S ranking, 5-31 in research, 24-59 in R ranking, out of 126 Ph.D. programs (in 2010)

Marek Chrobak
Professor and Chair

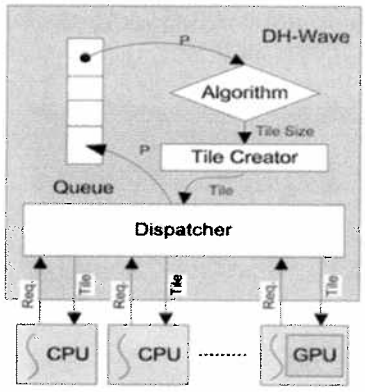
Research Strengths

- Networking and Mobile Computing
- Architecture and Embedded Systems
- Software Engineering and Programming Languages
- Data Mining and Databases
- Graphics
- Scientific and High Performance Computing
- Bioinformatics
- Algorithmics
- Artificial Intelligence

Research Highlights

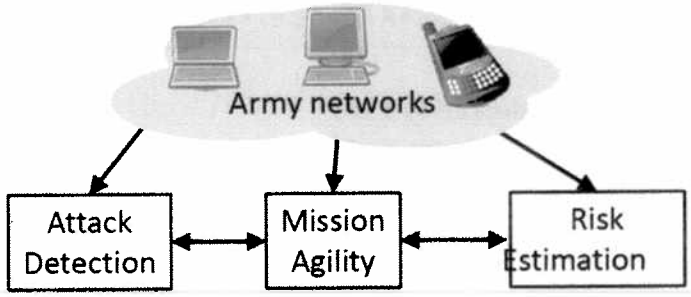


Application Oriented Networking



Heterogeneous Multiprocessor Programming

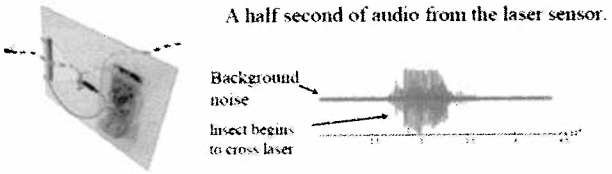
Computer Science & Engineering Research



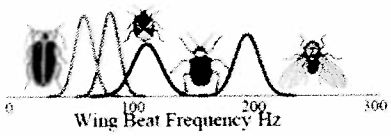
Networking ARL CRA Project
$5-7M over 10 years

MACRO: Models for Enabling Continuous Reconfigurability of Secure Missions
Cyber-Security Collaborative Research Alliance (CRA)

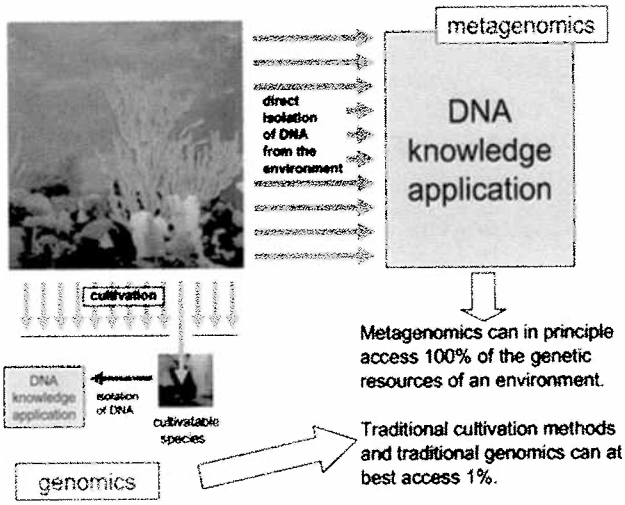
Detect the insects with wireless sensors in real time....



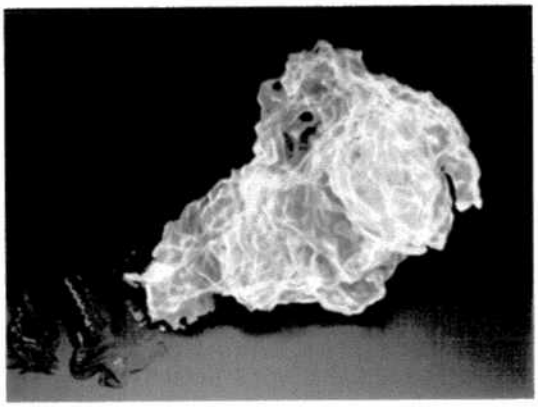
...then *classify* the insects using novel machine learning algorithms invented at UCR ...

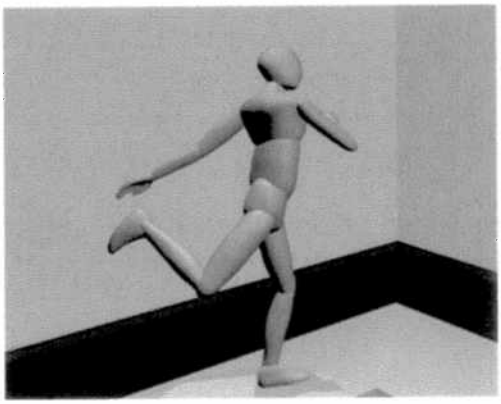


Gates Foundation: Precise Handling of Insects in Agriculture



Bioinformatics and Computational Biology





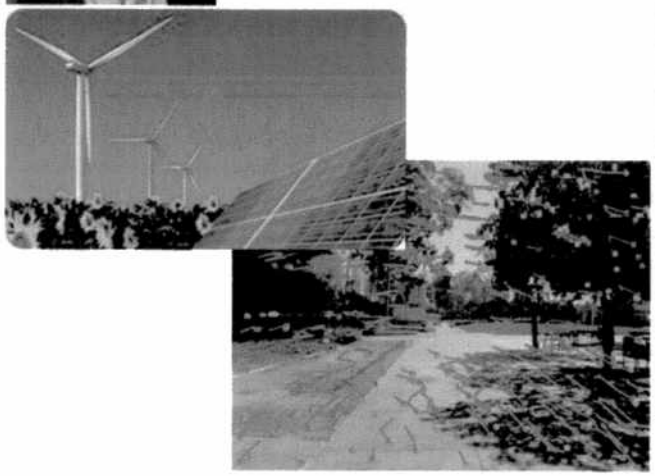
Computer Graphics: Human motion editing and analysis

Electrical and Computer Engineering (ECE)

Jay Farrell
Professor and Chair

ECE Degree Programs:

- BS, MS, Ph. D. Computer Engineering
- BS, MS, Ph. D. Electrical Engineering

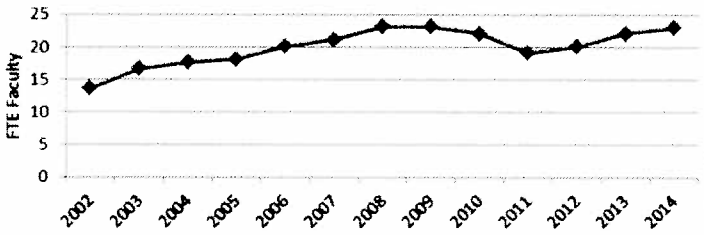


ECE History

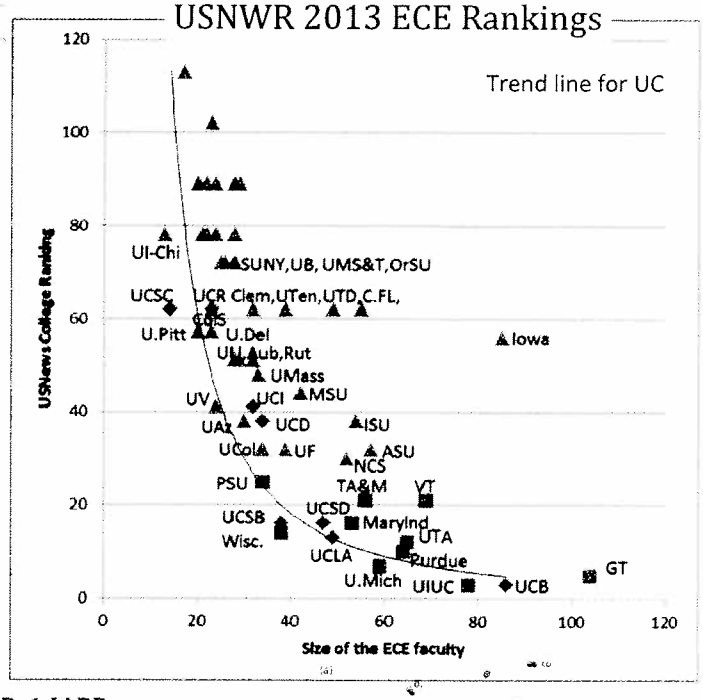
- 1989 First students enrolled
- 1992 Five EE Faculty
- 1993 First UG graduating class
- 1994 First ABET Accreditation
- 1997 Graduate Program starts
- 2000 Ten EE Faculty
- 2000 CEN B.S Starts
- 2001 First Ph.D. Granted
- 2006 Twenty EE Faculty
- 2012 CEN Grad. Prgm. Starts

UCR ECE USNWR Ranking (2014)

- #39 of 101 Public Universities
- Top Quartile NRC S-Ranking



The UCR ECE is well ranked relative to its size.



Faculty – 23.5 FTE

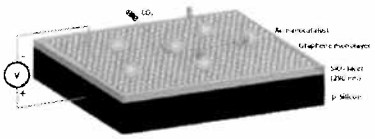
- Assistant Professors: 6
- Associate Professors: 2
- Full Professors: 15.5

Research Areas (24 People)

- Computer Engineering & VLSI (2.5): Low power, thermal management, reliability, embedded applications
- Systems (13.5): Controls, Communication, Energy & Power, Intelligent Systems, Robotics, Transportation, Signal & Image Proc.
- Nano Materials, Devices, and Circuits (8): graphene, electron & thermal transport, solar cells, L-ION batteries, optoelectronics, phonon engineering

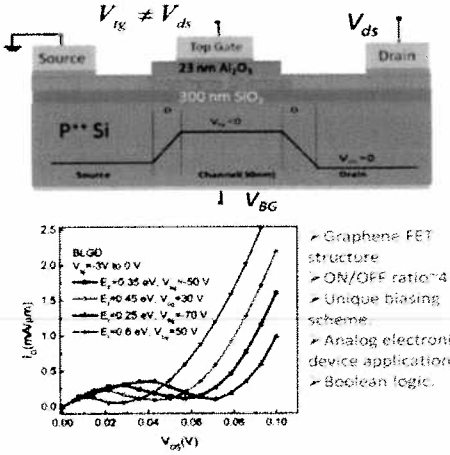
Honors, Awards, Professional Leadership:

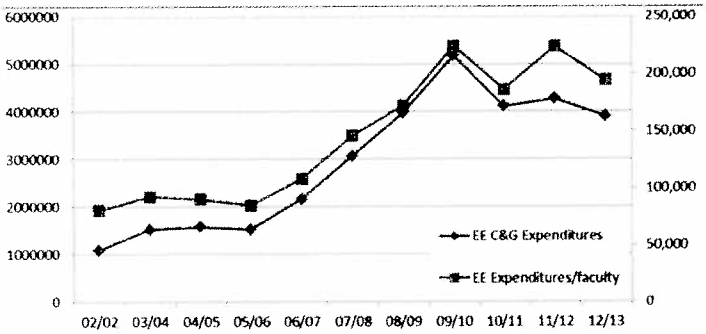
- Fellows: 9 IEEE, 7 AAAS, 2 APS, 2 SPIE, 1 IFAC, 1 IOP, 1 IAPR
- Research Initiation: 8 NSF Careers, 2 ARO YIA, 1 ONR YIP, 1 NSF BRIGE
- Society Presidents: IEEE EDS 2014-2015, IEEE CSS 2014, IEEE ITS 2014-2015
- IEEE Edtr.: ED Letters, J. SSC, SMC-B, SP Magazine, TSP, SP Letters, T. Nanotech



ECE Research Center Leadership:

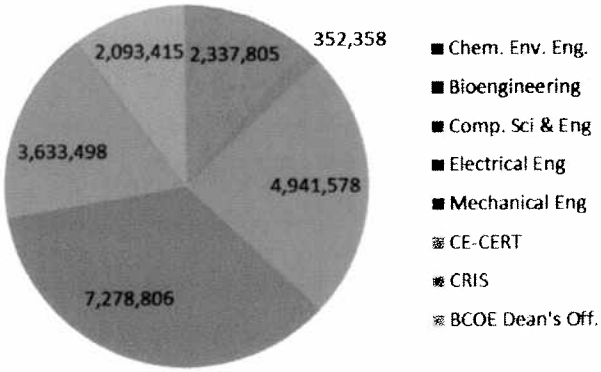
- CRIS – Center for Research in Intelligent Systems
  - Bhanu (Director), Roy-Chowdhury, et al.
- CE-CERT – Center for Environmental Res. & Tech.
  - Barth (Director), Farrell, Kassas, Yu.
- UC-Light – Ubiquitous Communication by Light
  - Wang (Director), Farrell, Liang, et al.
- POEM – Phonon Optimized Engineering Materials
  - Balandin (Director), Lake, et al.





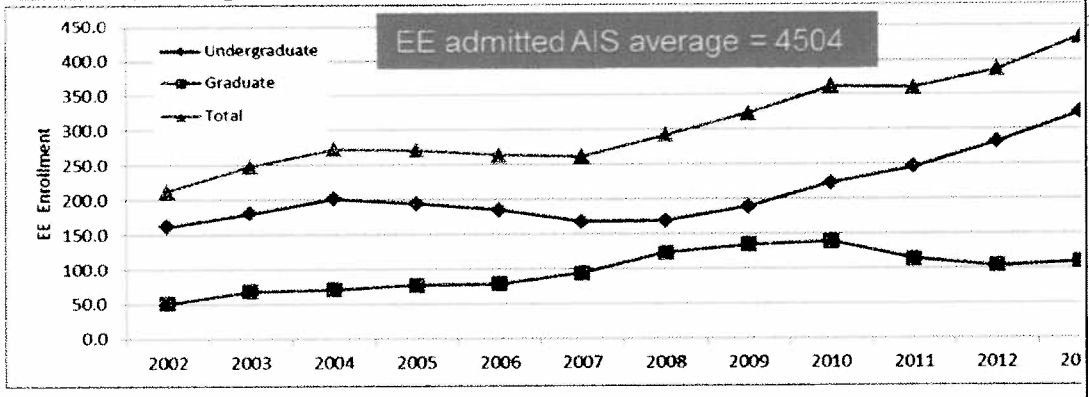
Red – EE Dept. Res. Expenditures per EE faculty (right scale)
Blue – Total EE Research Expenditures (left scale)

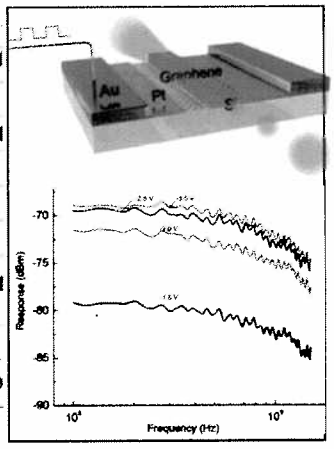
12/13 Awards = $362k/EE faculty



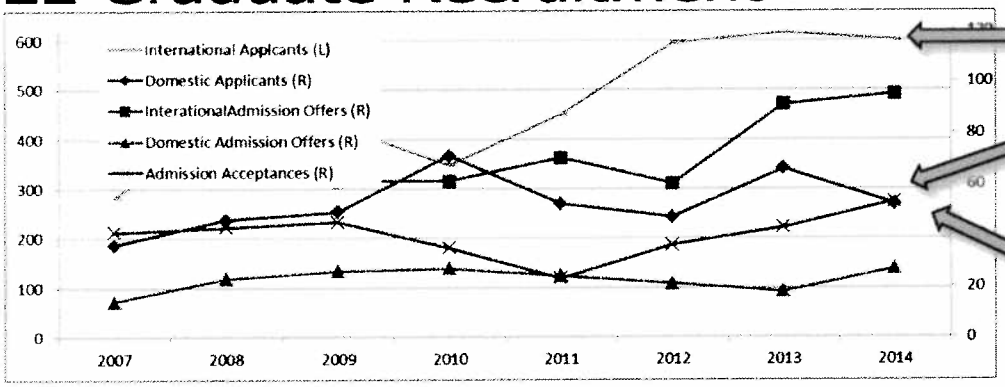
Awards Attributed to Departments, 12/13

EE Enrollment





EE Graduate Recruitment



International Grad apps
- Strong history of growth

Domestic Grad apps
- Goal: Continued growth

Target admits for Fall 2014
- 25 PhD
- 25 MS admits

Actual admits
- 25 PhD for F'14
- 28 MS for F'14

Materials Science and Engineering

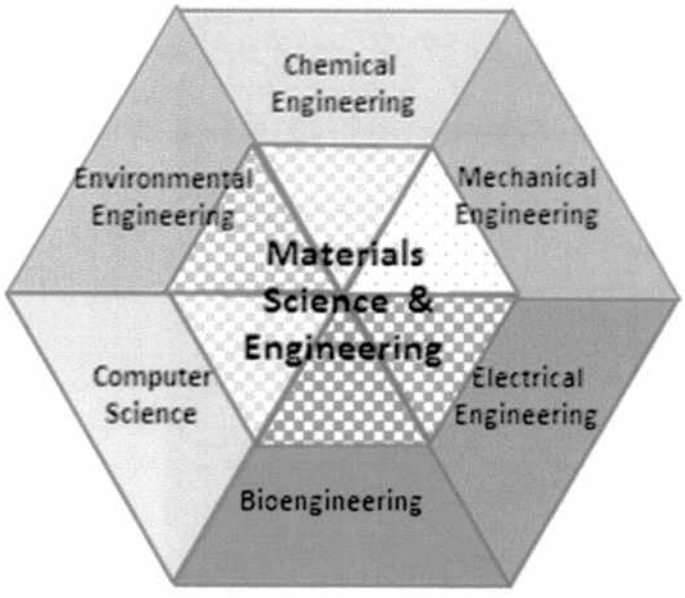
Javier Garay
Professor and Chair

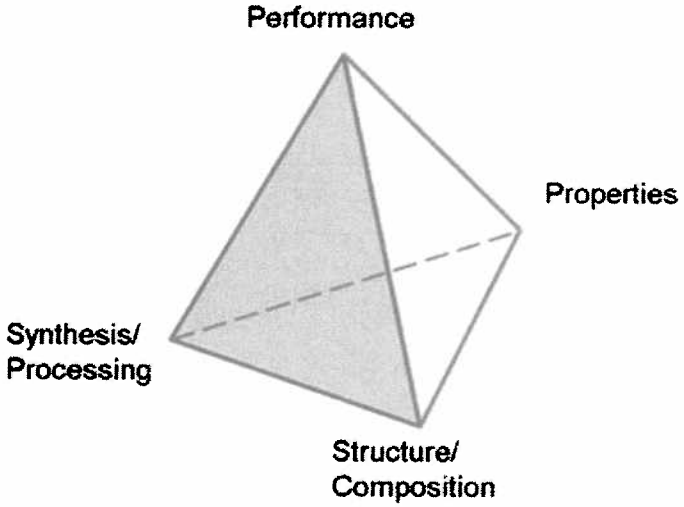
- Materials Science and Engineering (MSE) is concerned with the study of the structure, properties and applications of materials.
- The MSE Program at UCR aims to provide fundamental knowledge of materials with the objective of predicting, modifying and tailoring the properties of materials to achieve enhanced material/device performance.
- **Materials Research is one of the strength areas of research at UCR;**
- MSE provides the 'glue' for research in BCOE, CNAS and UCR

→ **MSE at UCR is an *interdisciplinary program with participating faculty* from Engineering (BCOE) and physical sciences (CNAS)**

Core Faculty: 15
Participating faculty members:
28 from BCOE
13 from CNAS

Award **B.S.** , **M.S.** and **PhD** degrees

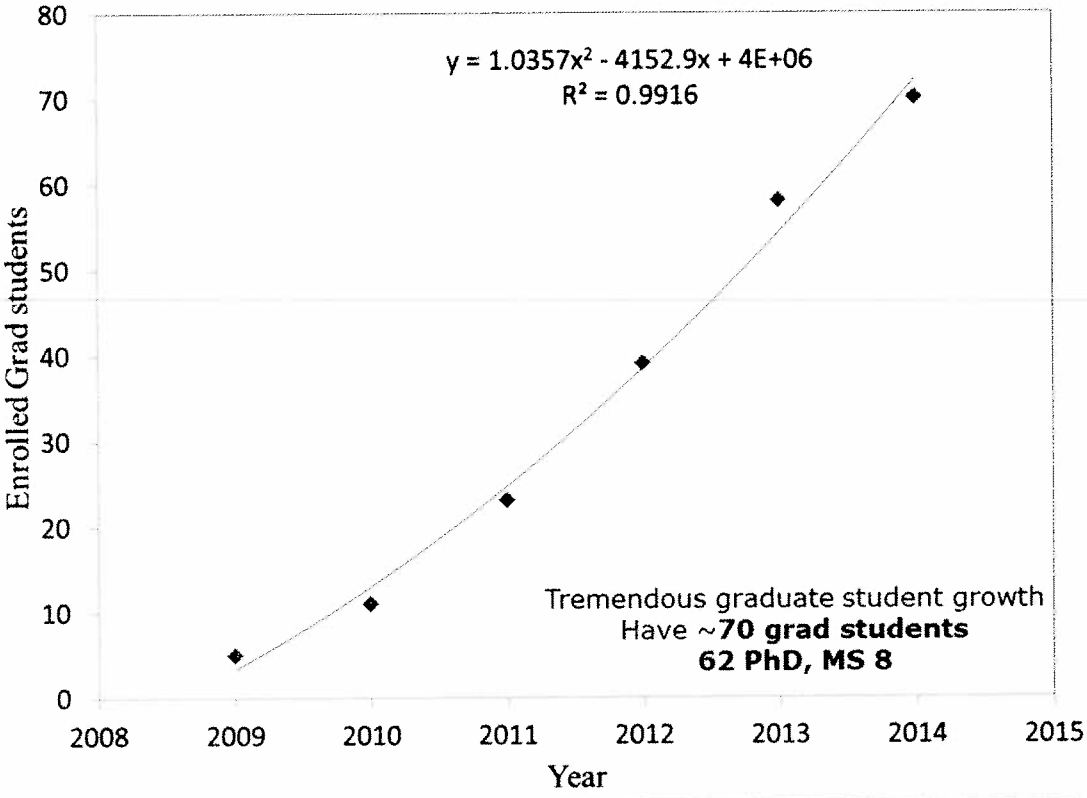


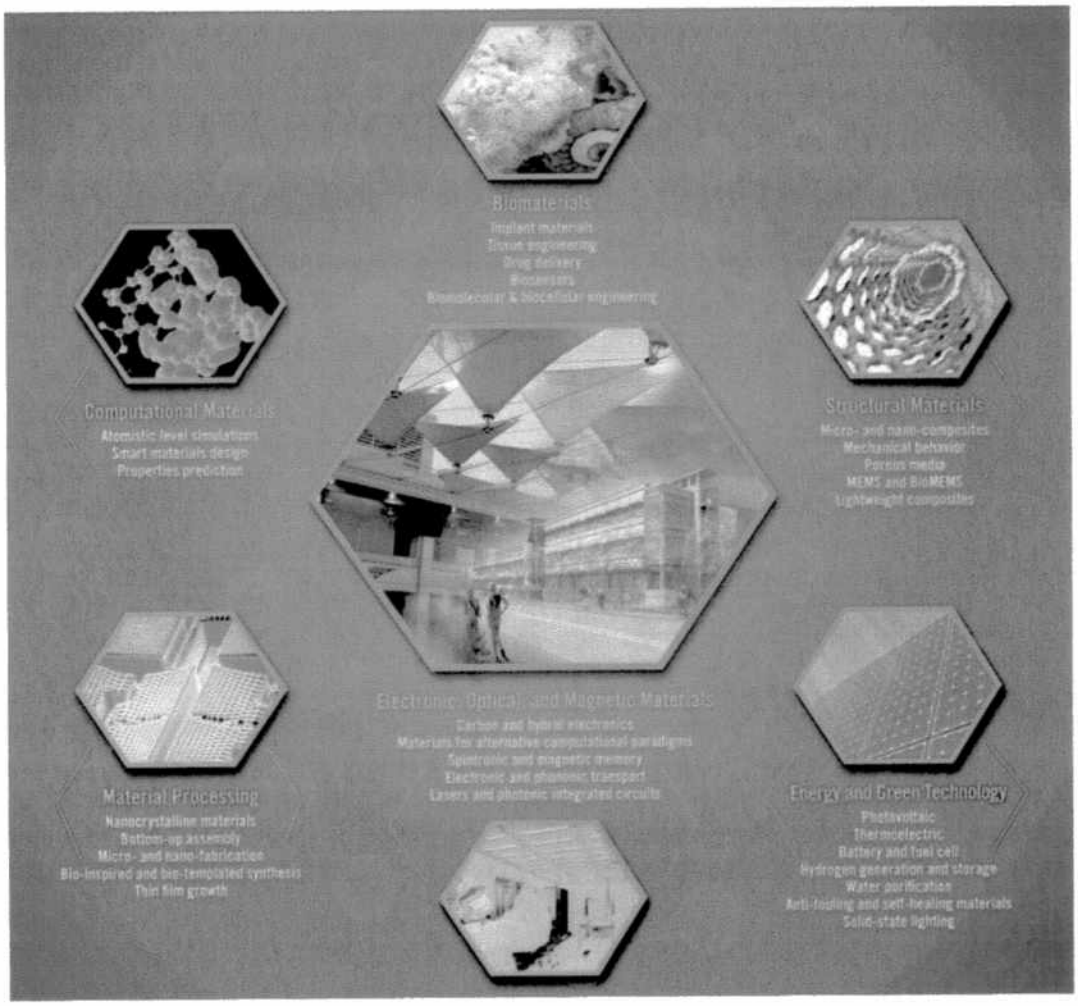


The four fundamental elements of MSE

The MSE undergraduate program is not a free-standing department. Rather, it relies on the participation of every department in the Bourns College of Engineering for providing curriculum, facilities, and assessment (Joint faculty hires).

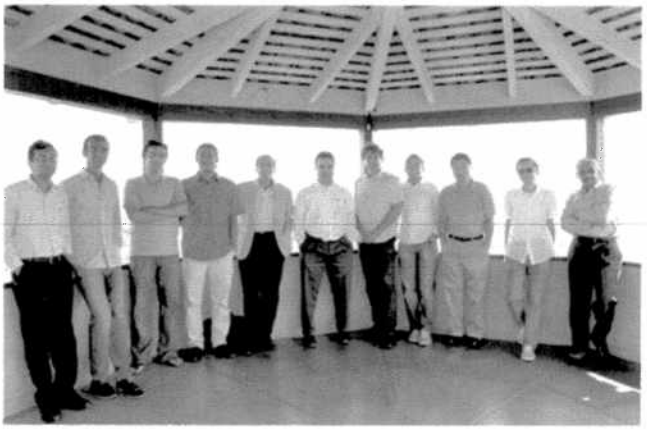
Growing Graduate Program



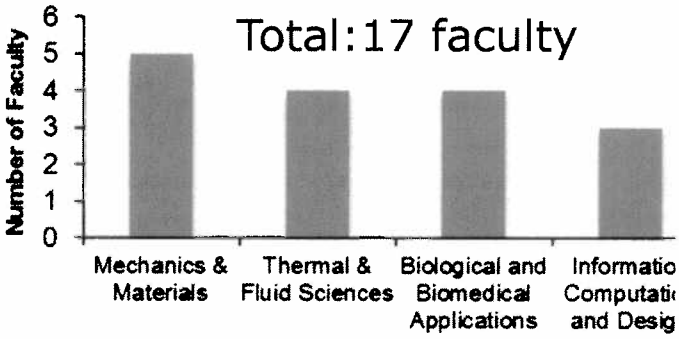


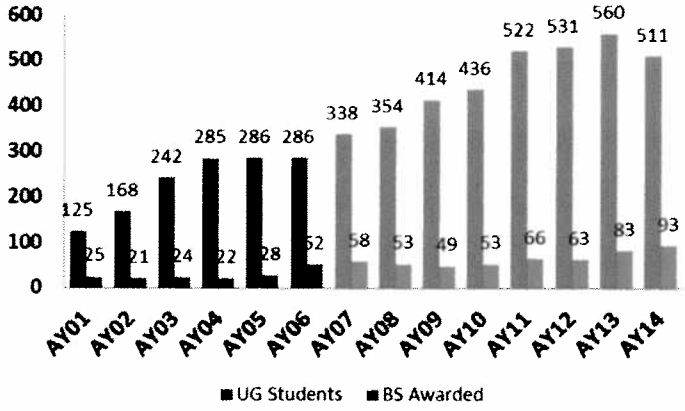
Mechanical Engineering

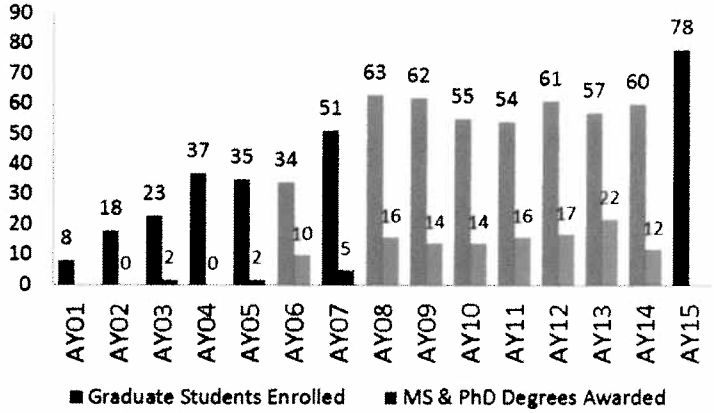
Guillermo Aguilar
Professor and Chair



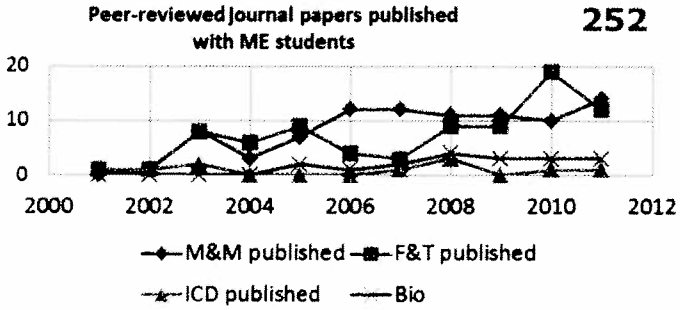
2013 ME Faculty @ Dana Point

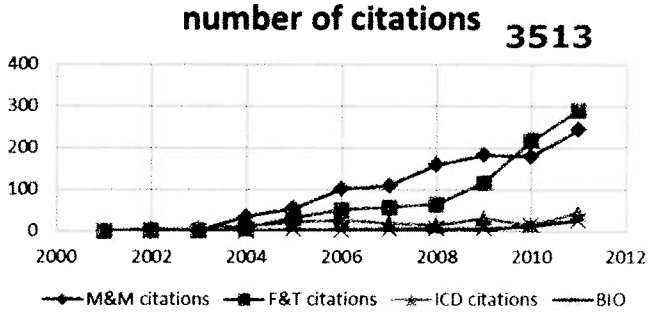






METRICS AND COMPARISONS

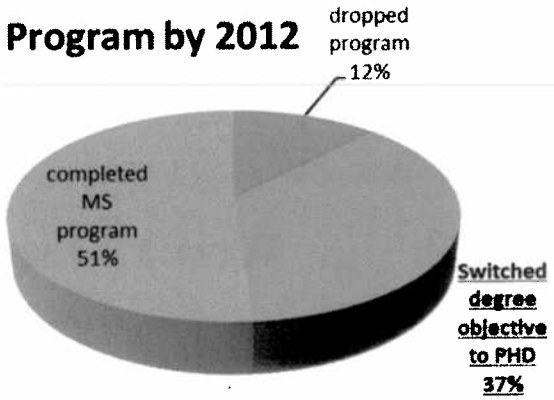


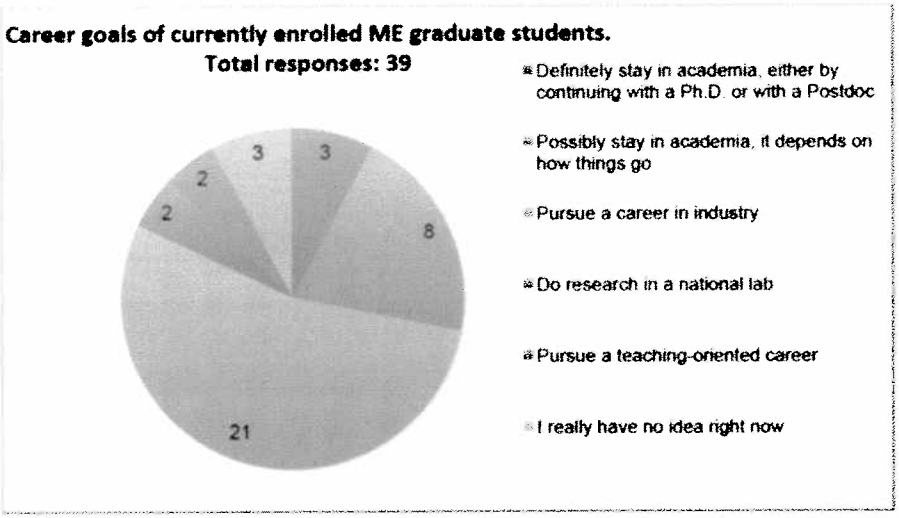


UCR USNWR Rankings

Ranking release date	2013 3/12 rank	total	perc	2014 3/13 rank	total	perc
Undergraduate						
National Univ	97			101	199	51
UG Engineering	82	156	53	85	162	52
Top Public Schools	44			46	115	40
Graduate						
BCOE	64	144	44	67	143	47
BIEN	51	66	77	67	75	89
ChE	61	91	67	60	88	68
CompE	52	91	57	46	85	54
EE	62	112	55	67	122	55
EnE	41	68	60	48	81	59
MSE	58	74	78	59	75	79
ME	72	109	66	61	132	46

MS Program by 2012



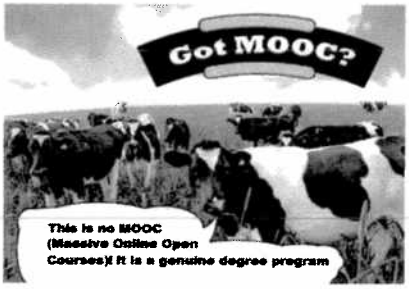


Vision/Growth Plans/Needs

- **Vision**
  The Vision of the Department is to be nationally recognized as an innovator in both research and education in mechanical engineering.
- **Growth Plans**
- Increase # faculty
- Grow graduate program by traditional and non-traditional means (e.g., bolster MS admissions with the goal of converting them to PhD students)
- Work closely with industry on joint projects. More than 50% of our students seek industry jobs
- NEED: <u>space, particularly wet labs</u>

Masters of Science in Engineering On-line

Kambiz Vafai, Distinguished Professor of Mech Eng and Director of MSOL



November 1998	• The Regents delegated authority to the UC President to set fees for self-supporting degree programs
2008	• MSOL Concept Started
September 9, 2009	• Proposal was communicated to the EVC
2011	• Reviews and Response to Reviewers conducted by CCGA
February 9, 2012	• Coordinating Committee on Graduate Affairs (CCGA) Approval
February 13, 2012	• Office of the Provost and Executive President, Academic Affairs, UCOP Approval
December 17, 2012	• Change to MSOL Program Graduate Council approval at • Partnership with Pearson on Fall of 2014.

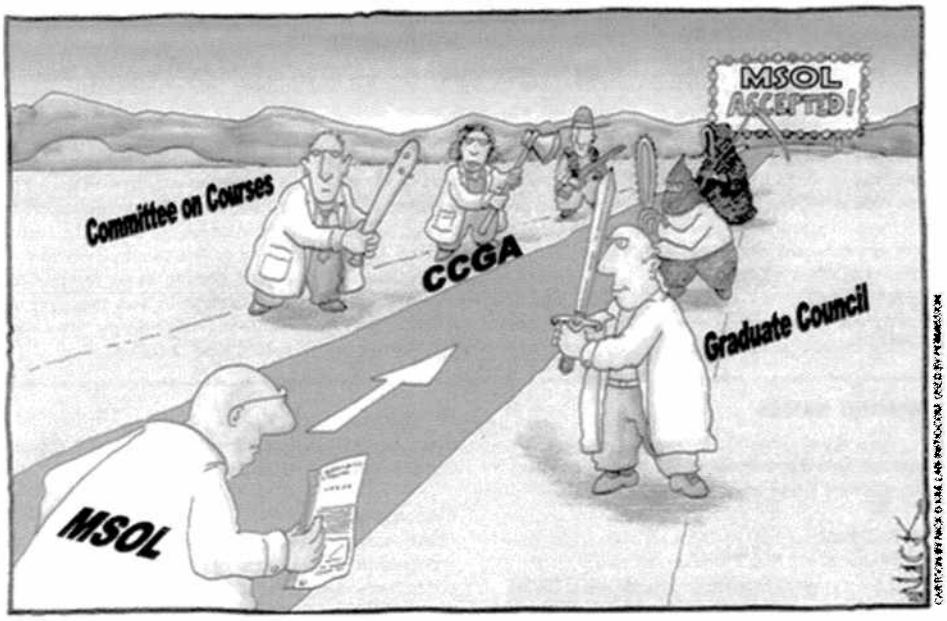
Course Conversion (V)

UNIQUENESS

- We have started the program with a specialization drawn from Bioengineering.
- Our MSOL program is unique amongst the competing online programs since it offers an effective and well-balanced blend of professional core engineering management and specialization courses.
- Program incorporates a significant design experience that draws from the knowledge gained from courses taken (ENGR 296). We believe this experience will attract students who complete the online M.S. program to our Ph.D. programs

PROGRAM PLANS

- At the beginning of the second year and every thereafter, we intend to offer two new areas of study. The topics for the 2014 academic year are: Environmental Engineering Systems (Water) and Materials at the Nanoscale. The topics for the 2015 academic year are: Mechanical Engineering and Electrical Engineering Specializations.
- In this program you can earn a Master of Science in Engineering degree with the same program of study as in our departmental programs, with the same courses, same instructors, and TA as on campus



Most faculty regarded the new streamlined review process for the Online Program as 'quite an improvement'

Center for Bioengineering Research

Jerome S. Schultz
Director

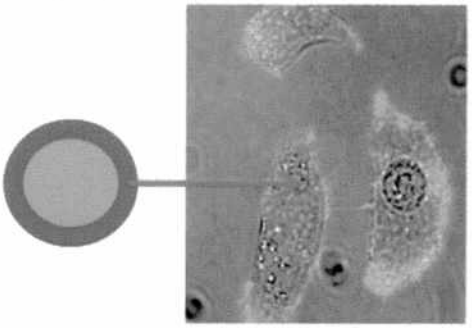
Goals:

> Provide Seed Funding for Multidisciplinary Projects
> Stimulate University/Industry Projects

Example Projects and Outcomes

Bahman Anvari, Professor, Bioengineering
Optical Imagine and Phototherapy
NSF-Grant: Intraoperative imaging of ovarian cancer
Collaboration: MD Anderson Cancer Center, Houston

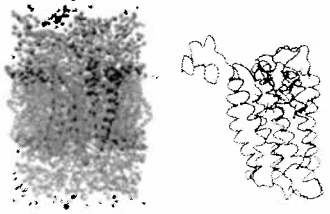
Unique Nano Particle Stealth Carrier



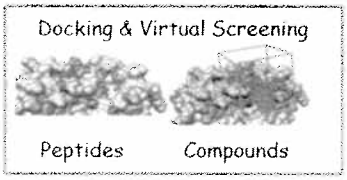
Cancer Cells

Dimitri Morikis, Professor, Bioengineering
Immune System Diseases-Macular Degeneration
Grants and 9 provisional patents
Collaborations: Princeton,UC-Santa Barbara, Stanford, U Queensland, U Sheffield, U Cypress

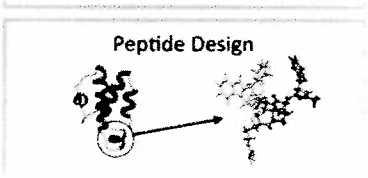
Target identification Computational Models



Analysis of structure and interactions



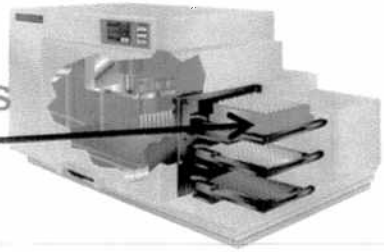
Experimental characterization

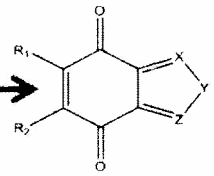


Jiayu Liao, Associate Professor, Bioengineering

High-throughput Screening for Drugs Based on Selective Molecular Pathways
7 Patent Applications, found potential virus inhibitor
Collaboration: Mount Sinai Medical Center, NY

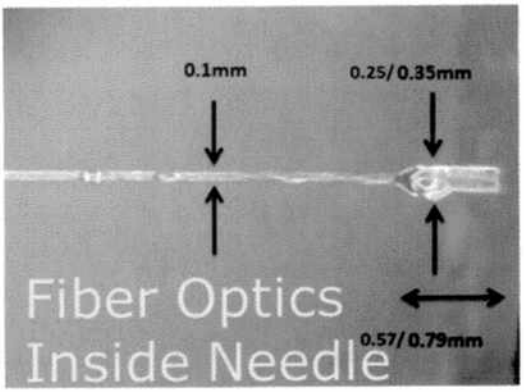
220,000 Compounds Tested

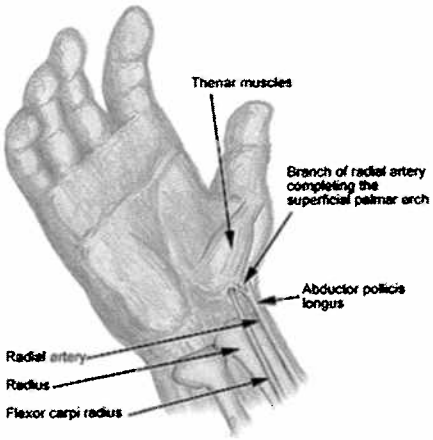


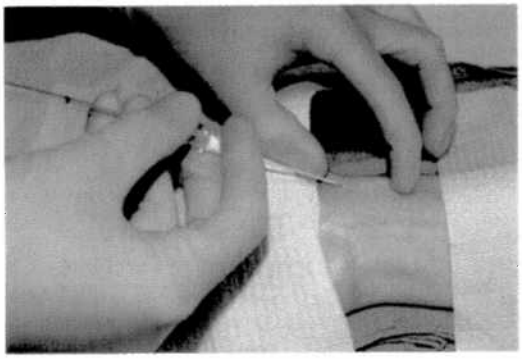


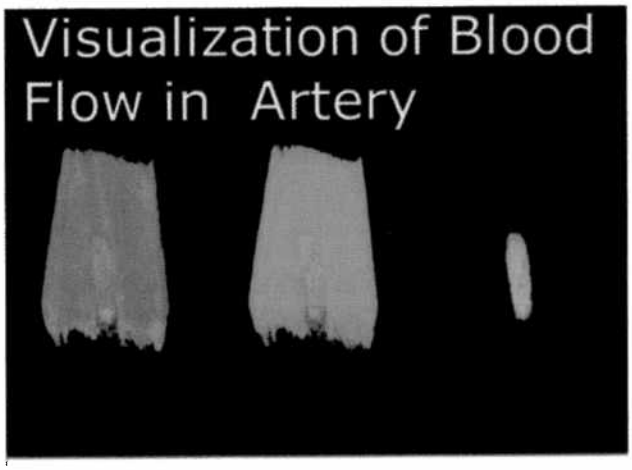
Virus Inhibitor

Hyle Park, Assistant Professor, Bioengineering
Optical Coherence Tomography Method Needle Guidance for Arterial Catheterization
Research sponsored by Dr. Thomas Haider









Center for Environmental Research Technology (CE-CERT)

Matthew Barth
Yeager Families Professor, Department of Electrical and Computer Engineering
Director, Center for Environmental Research and Technology

CE-CERT's mission is to contribute to improved environmental quality and energy efficiency by conducting a broad program of interdisciplinary basic and applied research and by providing educational opportunities for the next generation of engineers, scientists and policy-makers.

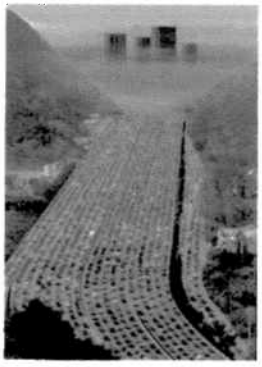
Established in 1992 as an off-campus research facility

CE-CERT Snapshot

- 25 Academic and Research Faculty, 22 staff, 55 graduate students and 60 undergraduates
- Multiple engineering disciplines: Chemical, Environmental, Mechanical, Electrical, Computer Science, Materials Science
- $12 million per year in active projects (industry, state, & federal agencies)
- ~100 industry partners
- ~40 academic partners

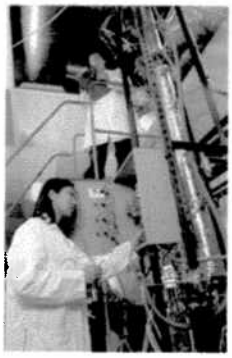
CE-CERT Research Areas

Emissions from Advanced Technologies and Fuels
Emissions measurement/analysis, fuel effects, new instrumentation/methods, after-treatment



Transportation Systems Research
Intelligent Transportation Systems, vehicle activity, energy/emissions modeling

Atmospheric Processes Research
secondary pollutant formation, mitigation methods, environmental modeling



Sustainable Energy Research
cellulosic ethanol, synthetic diesel fuel, energy distribution

Southern California Research Initiative for Solar Energy, Energy Storage and Grid Integration Research
solar devices, solar thermal, smartgrid, energy storage

www.cert.ucr.edu

UCR Bourns College of Engineering-
Center for Environmental Research and Technology

The College of Engineering-Center for Environmental Research and Technology (CE-CERT) is a collaborative research center involving government, industry, and academia to develop and assess environmental technologies to improve air quality, transportation, and energy efficiency. CE-CERT's mission is to be a recognized leader in education, an honest broker in research, a creative source of new technology, and a strong contributor to solving societal environmental issues. CE-CERT consists of faculty, research staff, and students to conduct projects organized along six research programs:

Emissions and Fuels Research— The EFR group encompasses capabilities in measurement of mobile source emissions *(such as heavy and light duty vehicles, locomotives, and ships)* in the laboratory and in the field, under controlled and "real world" operating conditions. Studies of the energy and environmental impacts of reformulated or alternative fuels and advanced emission control technologies are a major priority. Research also includes characterization of emissions from current and future sources to understand their environmental effects.

Atmospheric Processes Research—This research group studies the fate of pollutants in the atmosphere by conducting atmospheric measurements, chamber simulations, and computer modeling. The primary research focus is the photochemical reaction of primary emissions to secondary pollutants such as ozone and fine particulate matter. Measurements of trace species are also used in support of special air quality studies.

Sustainable Energy Systems Research—Researchers in this area carry out projects to develop and study technologies for producing electricity and fuel from various resources. Research priorities include development of processes for thermo-chemical conversion of coal, renewable material, or waste into synthetic fuels. Production of ethanol from cellulosic biomass using biological processes is also being developed.

Transportation Systems Research—The TSR group focuses on a variety of system-level issues related to multi-modal transportation. Our primary goals are to predict the air quality and energy impacts related to transportation, to develop new intelligent transportation system technology, and to pursue advanced vehicle engineering projects.

Southern California Research Initiative for Solar Energy (SC-RISE)—This research initiative focuses on advancing the current state of solar energy by carrying out cutting-edge research in solar-thermal technologies as well as materials synthesis, device integration, and theoretical modeling of novel photovoltaic devices. Research also includes the areas of energy storage, energy efficiency and wind energy.

Winston Chung Global Energy Center—This center takes a holistic approach to addressing energy storage needs and issues, broadly ranging from technical issues, economic development, and ecological wellness. The goal of this center is to advance solutions for today's energy storage demands, while developing far-sighted energy storage research and energy-use strategies for tomorrow's applications.

College of Engineering
Center for Environmental Research and Technology
University of California, Riverside
1084 Columbia Avenue
Riverside, CA 92507
(951) 781-5791
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Center for Nanoscale Science and Engineering (CNSE)

CNSE Cleanroom and Nanofabrication Facility
Construction: $3M
Equipment and Tools: $7M
Full Operation: 2007

Jeannie Lau
Physics

Robert Haddon
Chemistry
Chemical & Environmental Engineering

Alex Balandin
Electrical & Computer Engineering &
Materials Science Engineering

Research thrusts – next generation electronics spintronics, 3D-electronics, carbon nanotubes, graphene

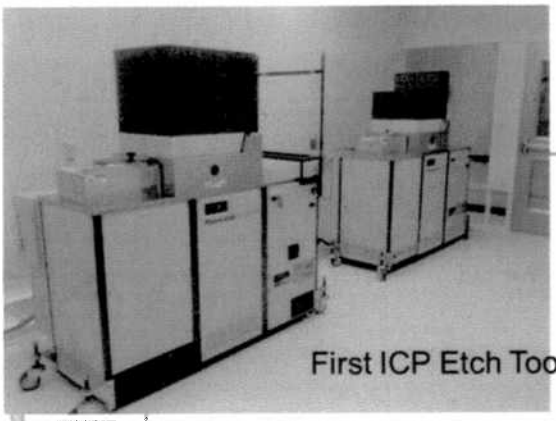
CNSE Hiring

Initially CNSE was given 10 academic positions (5 each in Engineering and Science), and we have hired in the areas that strengthen the ability of UCR to perform in **spintronics, 3-D electronics and advanced materials**

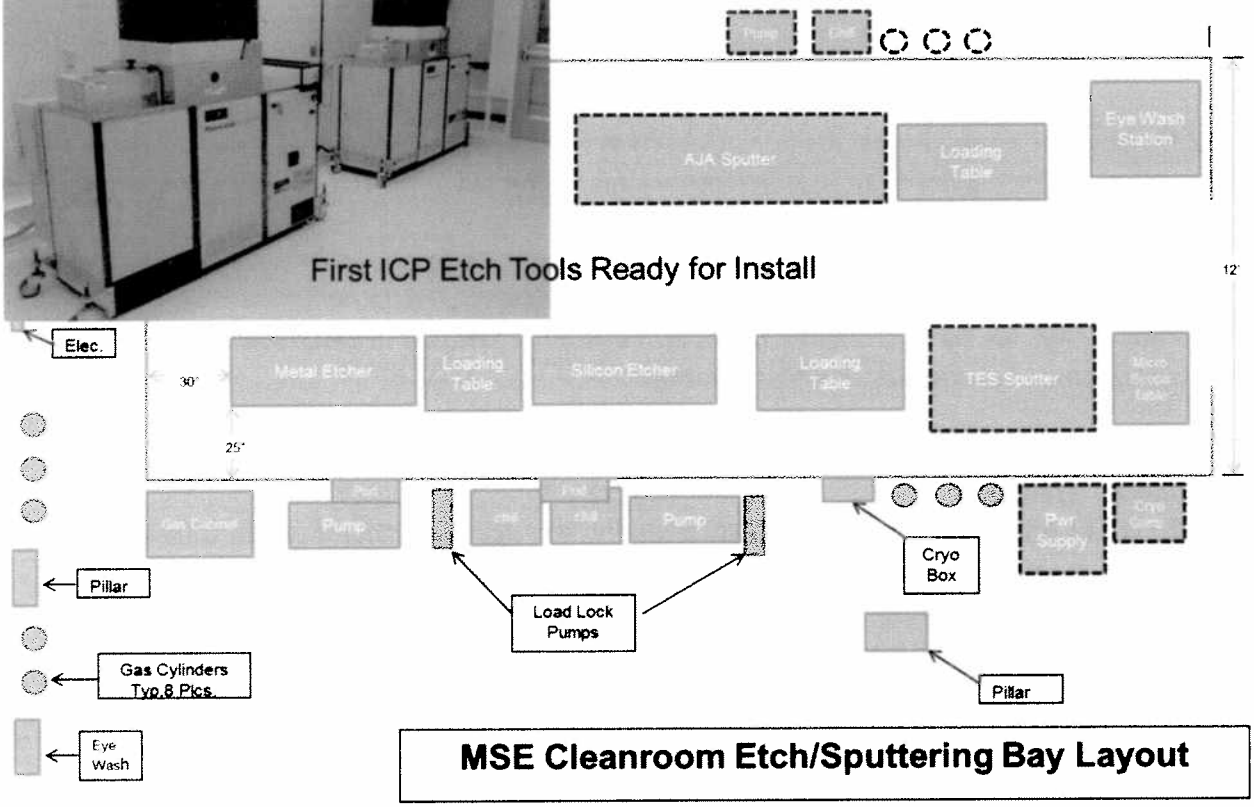
- July 2002, we hired Dr. Roland Kawakami as an Assistant Professor in Physics.
  Spintronics, Graphene
- December 2003, we hired Dr Jianlin Liu as an Assistant Professor in Electrical Engineering.
  Semiconductors, Spintronics, Memory storage

- July 2004, we hired Dr. Jeanie Lau as an Assistant Professor in Physics.
  Nanowires, Graphene
- July 2004, we recruited Professor Jing Shi from the Physics Department at the University of Utah.
  Nanomagnetism, Superconductivity, Spintronics, Oxides, Graphene
- July 2005, we recruited Professor Sakhrat Khizroev from the Electrical and Computer Engineering Department at Florida International University.
  Nanomagnetism, 3-D Information storage
- July 2009, we hired Assistant Professor Marc Bockrath from the Applied Physics Department of Caltech
  Nanoscale electronics and mechanics; Carbon Nanotubes, Graphene

CNSE Future Facilities – MS&E Cleanroom



First ICP Etch Tools Ready for Install



MSE Cleanroom Etch/Sputtering Bay Layout

Center for Research in Intelligent Systems (CRIS)

Bir Bhanu

Distinguished Professor of Electrical & Computer Engineering &
Director, Center for Research in Intelligent Systems

Goal: Research & Development of autonomous systems with sensing capabilities which are able to performs intelligent tasks and interact with other biological and artificial systems.

Applications

- Biological/Medical Imaging and Bioinformatics
- Security and Surveillance
- Image/Video Databases
- Object/Target Recognition
- Biometrics (gait, face, ear, body)
- Human-Computer Interaction
- Autonomous Navigation
- Robotics (Perception/Learning)
- Bio-inspired Computational Models
- TV Commercials, Human Emotions
- Vehicle Modeling/Recognition

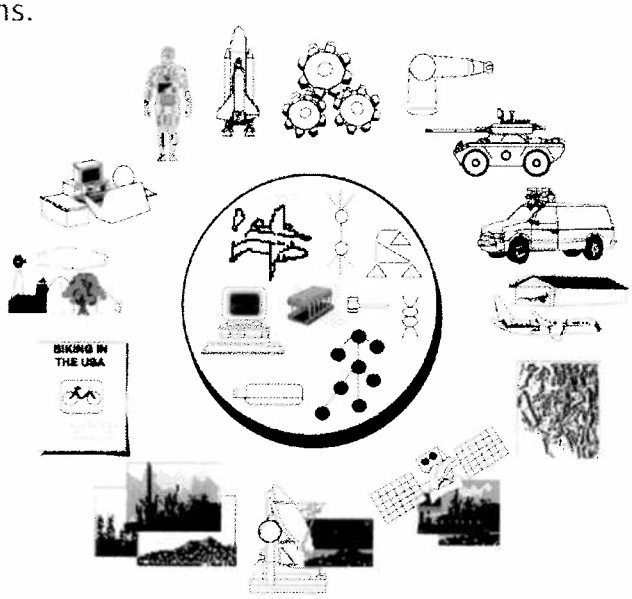


Figure from Bhanu/Das book, Springer 2014

Interdisciplinary Research Projects with CNAS (Life Sciences, Statistics), CHASS (Psych), SOM

- **Bio-imaging and Informatics (NSF IGERT Video Bioinformatics)**

Pavement Cells hESCs mTBI Lesion Detection Pollen Tube C. elegans

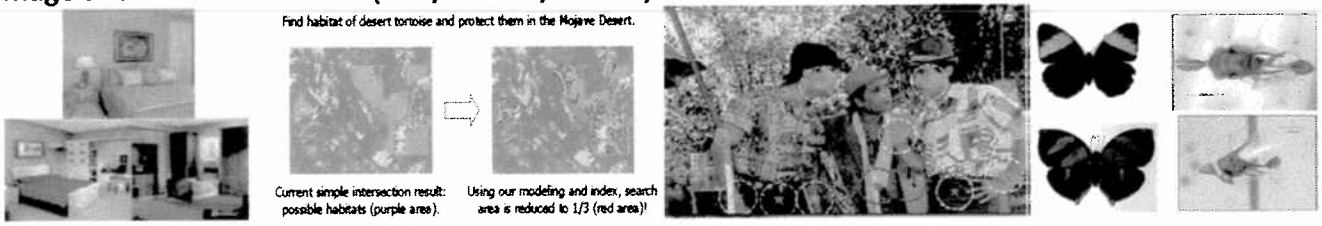
- **Security and Surveillance (NSF/ONR/ARO) – Tracking, Recognition, Learning, Monitoring and Security**

Video Networks Tracking-Social groups Reidentification

- **Object Recognition (NSF/ONR/DARPA/AFOSR/NASA) – People, Vehicles, Targets**

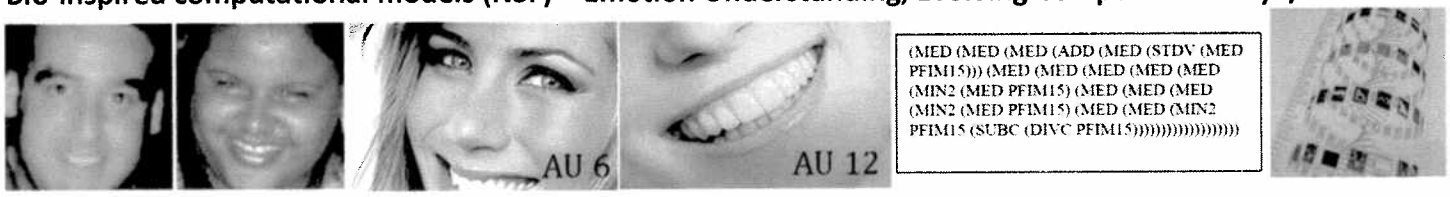
Gait Ear Faces Targets Vehicles

- **Image and Video Databases (NSF/DARPA/AFOSR)**



Semantic Concepts GIS Database Action/Activities Species – Butterfly and Wasp

- **Bio-inspired computational models (NSF) – Emotion Understanding, Evolving Computational eye/brain**



Facial Expression/Emotions Evolutionary Computation

- **Mobile vision/learning (NSF/DARPA/ONR) – Perception/Learning**

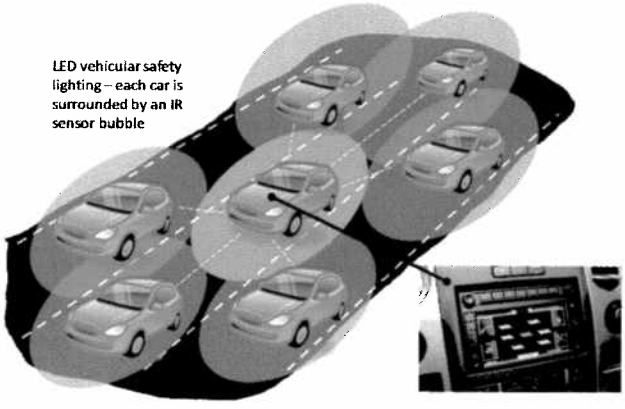
- **Fundamental Performance of recognition (NSF/AFOSR)**
  - **Qualifying limits of algorithms**

Center for Ubiquitous Communication by Light (UC-Light)

Albert Wang, Director, UC Light & Professor of Electrical & Computer Engineering

- **Mission**
  - Enable visible light wireless communication by embedding signals into the light emitted by LEDs
- **Vision**
  - Ubiquitous: Communicate as you see
- **UC-Light Center Milestones**
  - ✓ Funded by University of California Multi-Campus Research Programs and Initiatives (MRPI) Program
  - ✓ A 5-year Award 1/2010-12/2014
  - ✓ Kickoff on 1/26/2010 at UC Riverside
  - ✓ Industrial Advisory Board (IAB) formed in 2010
  - ✓ 1st IAB meeting on 4/1/2011
  - ✓ 1st industrial grant – INTEL/2010
  - ✓ 2nd IAB meeting on 5/11/2012
  - ✓ 3rd IAB meeting on 3/28/2013
  - ✓ 4th IAB meeting on 4/18/2014

- **Core technologies:**
  - ✓ VLC: Visible-light communications
  - ✓ VLP: Visible-light positioning
  - ✓
- **Killer Applications:**
  - ✓ Smart lighting
  - ✓ Wireless communications
  - ✓ Medical applications
  - ✓ Indoor/outdoor navigation
  - ✓ Smart Traffics



UC-Light Principal Investigators


Director
Albert Wang


Daniel Xu
Founding Director


Jay Farrell


Srikanth Krishnamurthy


Gang Chen


Ping Liang

UNIVERSITY OF CALIFORNIA
UC RIVERSIDE


Yehuda Kalay


Michael Siminovitch


Konstantinos Papamichael


Francis Rubinstein


Roland Winston


Patrick Yue

Berkeley
UNIVERSITY OF CALIFORNIA

UCDAVIS
UNIVERSITY OF CALIFORNIA

BERKELEY LAB
LAWRENCE BERKELEY NATIONAL LABORATORY

UCSB

UCMERCED

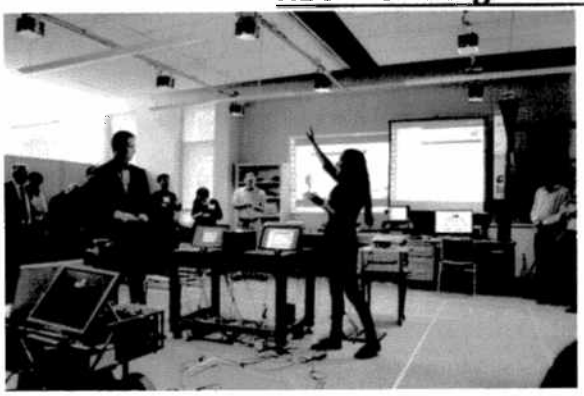
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

IAB - Industrial Advisory Board

Boeing, CISCO, Gallium Lighting, Intel, InteLED, Los Alamos National Lab, TASC, RHO, Lumewave, Microsemi, Northrop Grumman, Raytheon, Sutter Health, Xeralux, Celerity Technologies, Broadcom, Qualcomm, Huawei USA, TransRF, Hangsheng Electronics, Navy NAVSEA, etc.

Research Achievements

REU – Undergraduate Research Experiences



Winston Chung Global Energy Center (WCGEC)

Sadrul Ula
Co-Director

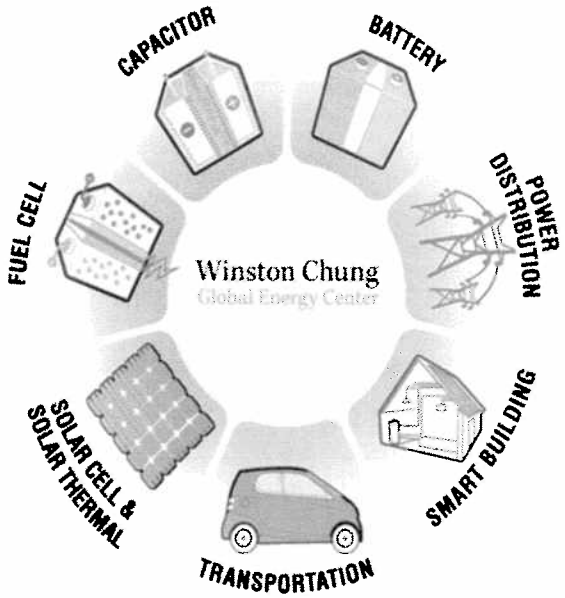
Nosang Myung
Co-Director

Winston Chung
Global Energy Center

BCOE Partners with Winston Chung to Develop Renewable Energy Future

- **$10 million gift established in 2011:**
  - Winston Chung Global Energy Center
  - Winston Chung Endowed Professorship in Energy Innovation
  - Winston Chung Endowed Professorship in Sustainability

WCGEC Energy Research Areas

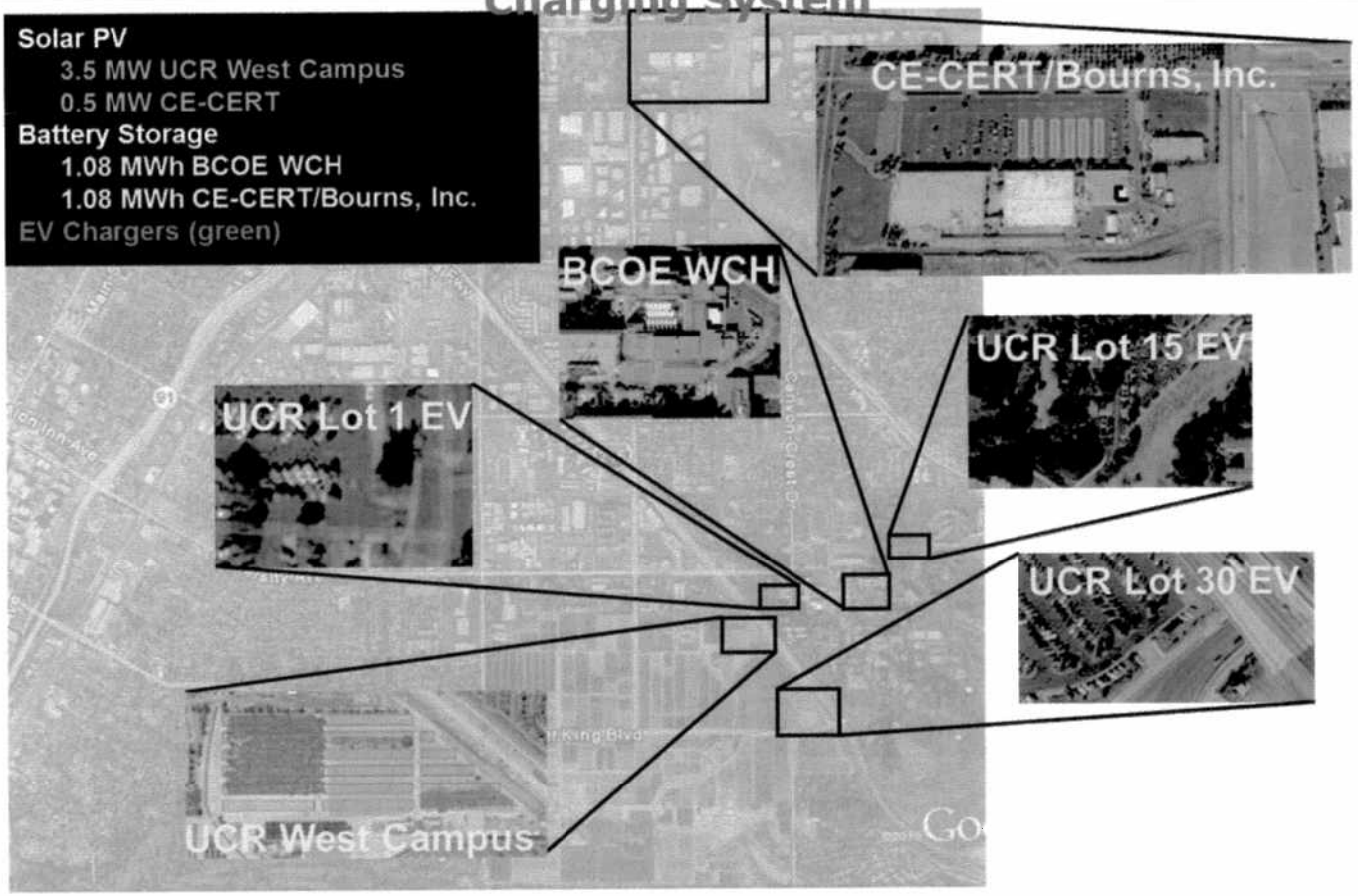


- **3.3 million gift funded:**
  - Six faculty research projects in energy storage
  - 1.1-megawatt battery storage project for Winston Chung Hall
    - 330 1,000-amp-hour rare-earth yttrium-iron-sulfate batteries
    - Can be charged during less costly off-peak hours
    - Delivers power to building during peak hours

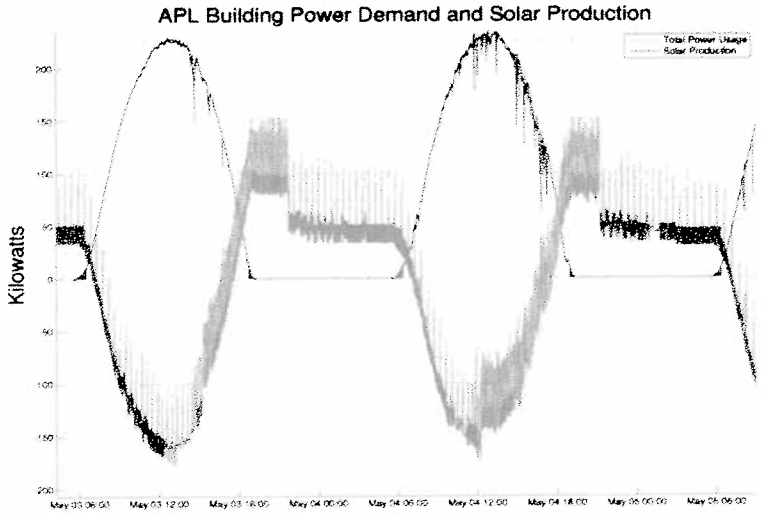
UCR Sustainable Integrated Grid Initiative (SIGI)

- Integration of Renewable Energy Generation, Energy Storage, Electric-Drive Transportation
- Smart Grid $10 million Testbed

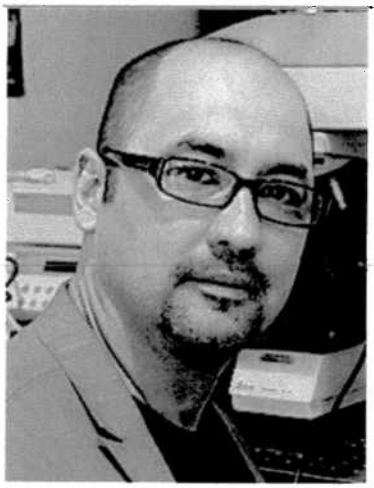
UC Riverside SIGI: Solar, Battery Energy Storage and EV Charging System



SIGI: Stationary Battery System 500 kWh



Phonon Optimized Engineered Materials (POEM)



Alexander Balandin
University of California Presidential Chair
Professor, Department of Electrical and Computer Engineering
Director, Phonon Optimized Engineered Materials (POEM)
Fellow of MRS, APS, IEEE, SPIE, OSA, IOP, AAAS

Established: July 1, 2013 on the basis of Nano-Device Laboratory with UCR space and equipment contribution

Participating Faculty:

Alexander A. Balandin (EE, MSE); Roger Lake (EE); Alexander Khitun (EE), Javier Garay (MSE, ME), Ashok Mulchandani (CEE), David Kisailus (CEE, MSE), Lorenzo Mangolini (MSE, ME), Elaine Haberer (MSE, EE), Prof. Shi (Physics), Prof. Abbaschian (ME) and Ming Liu (EE).

Participating PhD Graduate Student Researchers:

Jackie Renteria (EE), Richard Gulotty (MSE), Zhong Yan (EE), Chenglong Jiang (EE), Rameez Samnakay (MSE), Pradyumna Goli (MSE), Sylvester Ramirez (MSE), Mohammed Saadah (EE), Maxim Stolyarov (EE), Hoda Malekpour (EE)

Terminology and Rational:

- Phonons are quanta of crystal lattice vibrations that reveal themselves in all electrical, thermal and optical phenomena in materials.
- Phonons carry heat in semiconductors and scatter electrons.
- Nanotechnology creates opportunities for engineering phonons in much the same development of heterostructures three decades ago allowed for engineering electrons and enabled modern electronics and information and communication technologies
- Phonon optimized engineered materials will allow for more efficient renewable energy generation and storage, faster and lower power electronic and optoelectronic devices, better thermal management in a range of technologies, novel biomedical methods of diagnostic

  Goal: Make UCR the number one research establishment in the world in phononics research and applications

Currently Funded Research Projects in POEM's Director Laboratory

→ **NSF 2-DARE $1,750,000** (PI) Two-Dimensional Materials Beyond Graphene
→ **DOE EFRC SHINES Center $12,000,000** – Associate Director **$800,000** for POEM
→ **NSF – SRC NRI $1,681,577** (PI) Nanoelectronics 2020 and Beyond
  - **$200,000.00** industry cash gift contribution
  - Charge-density waves for ultra-low power electronics beyond Si CMOS
→ **NSF $360,000** (PI) Engineering Thermal Properties of Graphene
→ **NSF $379,637** (co-PI) Spin Transport in Topological Insulators
→ **NSF $350,000** (PI) Coop-grant on Graphene ICs
  - Develop graphene technology for wireless communications
→ **NSF $575,218** (co-PI) NSF GOALI Next Generation Memory for Electronics
→ **DARPA – SRC FAME $1,000,000** (PI) Van der Waals Materials for Energy Applications
  - Develop technology for increased thermoelectric energy conversion and ultra-low power dissipation electronics
→ **Winston Global Energy $200,000** (PI) Thermal Management of Batteries
  - Develop graphene-based technology for improved thermal management of batteries
→ **UC Proof of Concept $145,000** (PI) Commercialization of Graphene Thermal Materials

POEM Goal: Increase UCR Competitiveness in major center and multi-PI proposals

→ On average: $1.5M per year of competitive funding to UCR for the last 10 years

POEM Center

created on the basis of ***Nano-Device Laboratory*** **(NDL)**

Profile: experimental and theoretical research in advanced materials and nano-devices

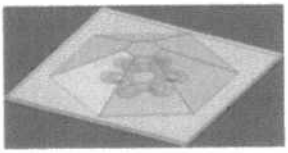
PI: Alexander A. Balandin

Nanoscale Characterization

Phononics Research & Applications

Thermal and Electrical Characterization

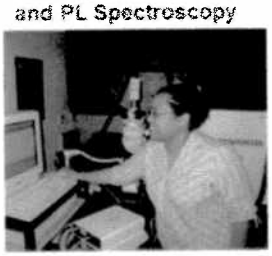
Electronic Devices and Circuits

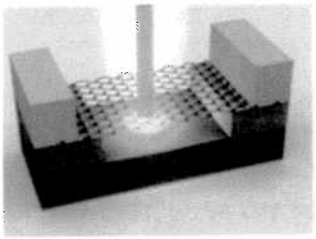


Theory and Modeling

Direct Energy Conversion

Raman, Fluorescence and PL Spectroscopy





Device Design and Characterization

Optoelectronics

Bio-Medical Nanotech

Campus-Wide and Inter-University Collaboration

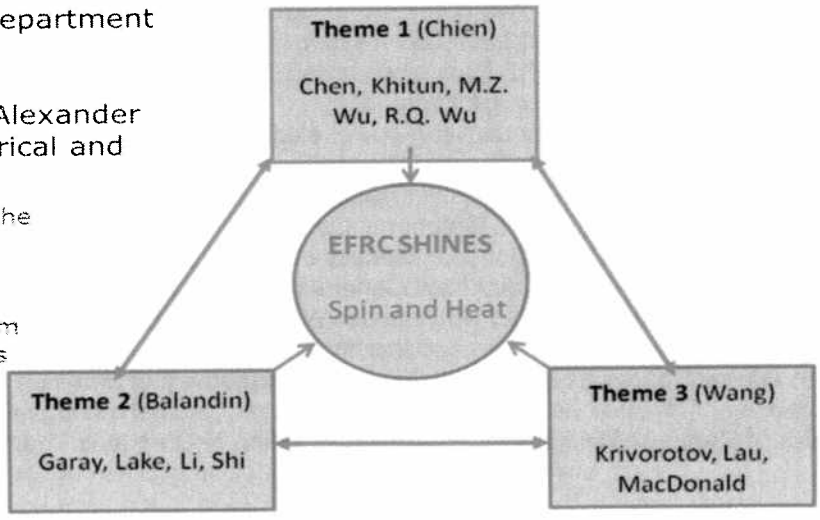
UCR DOE EFRC: Spins and Heat in Nanoscale Electronic Systems (SHINES) - $12M new center at UC Riverside

Director: Professor Jing Shi, Department of Physics and Astronomy

Associate Director: Professor Alexander Balandin, Department of Electrical and Computer Engineering

Program Committee is chaired by the Director.

The External Advisory Committee will comprise leading scientists from academic institutions, national labs and industry. The committee is chaired by the Associate Director.



Chairs

Dear Engineering Deans:

I would like to bring your attention a significant opportunity to help address major challenges in engineering education.

The NSF Engineering (ENG) Directorate has launched a multi-year initiative, the *Professional Formation of Engineers*, to create and support an innovative and inclusive engineering profession for the 21st Century. Professional Formation of Engineers (PFE) includes all processes and value systems that shape how people become engineers. In FY 2015 the first phase of the PFE initiative is launched through a pilot program, *Revolutionizing Engineering Departments (RED)*, in partnership with the Directorates for Computer and Information Science and Engineering (CISE) and Education and Human Resources (EHR). This funding opportunity enables engineering departments to lead the nation by successfully achieving significant sustainable changes in their undergraduate programs and to educate inclusive communities of engineering students prepared to solve 21st century challenges. As you will see in the program description, the principal focus is on departments. Thus, I would like to encourage you to make your department chairs/heads aware of this opportunity.

An informational webinar will be held September 23, 2014 at 2pm EDT ←
(http://www.nsf.gov/events/event_summ.jsp?cntn_id=132690&org=ENG).

We hope that you and your colleagues will submit creative ideas and ambitious proposals in response to this tremendous challenge and exciting opportunity.

Best wishes,

Pramod P. Khargonekar
Assistant Director for
Engineering Directorate
National Science Foundation
4201 Wilson Blvd., Suite 505N
Arlington, VA 22230
Tel: (703) 292-8300

New Dean of GSOE

UNIVERSITY OF CALIFORNIA
UCRIVERSIDE Graduate School of Education

Thomas M. Smith
Dean and Professor

900 University Avenue
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Tel 951.827.5802
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thomas.smith@ucr.edu
www.education.ucr.edu