CEE@Berkeley Connections
Fall 2008
CIVIL AND ENVIRONMENTAL ENGINEERING | UNIVERSITY OF CALIFORNIA, BERKELEY

CHAIR'S MEMO:

Dear CEE Alumni and Friends,

Lisa Alvarez-Cohen

CEE at Berkeley continues to thrive as a result of the excellence of our faculty, the originality of our students, the generosity of our emeriti, and the professionalism of our staff. Everyone in our CEE community demonstrates a tireless dedication to making sure we provide both a solid foundation in what future CEE engineers need to know, and the tools to come up with solutions to unforeseen problems.

We warmly welcome three new faculty members: Marios Panagiotou, in High Performance Structural Engineering; Evan Variano, in Ecosystems and Water Resources; and Joan Walker, who joins the department through a joint initiative with Berkeley's Global Metropolitan Studies program. Read about their exciting new research directions and their teaching interests that will deepen our curriculum.

It's been a banner year for our undergraduate competition teams! CEE's Steel Bridge Team took first place at its national competition in Gainesville, Florida. When the bridge results were announced at the ASCE Department Heads meeting in Charlotte, North Carolina, I voiced

CONTINUED TO PAGE 2

Inside

"Mobile Millennium" Poised to Expand Bay Area's Reputation as High-tech Leader

"Mobile Millennium" – the ultramodern phrase conjures up a new era of smooth, efficient movement through the contemporary world. Started just one year ago, the *Mobile Millennium* project is a partnership between UC Berkeley, the federal and California Departments of Transportation, Nokia, Navteq and Traffic.com, led by CEE Professor Alexandre Bayen. Under the umbrella of the *California Center for Innovative Transportation,* more than twenty Ph.D., master's, and undergraduate students are working together with staff engineers from UC Berkeley and researchers from Nokia to construct the next-generation traffic monitoring system.

The system consists of a privacy-preserving data-gathering infrastructure, which includes Nokia software running on GPS-equipped smartphones, and computer servers at Berkeley capable of handling massive amounts of data. Berkeley's research is focused on the development of novel mathematical algorithms capable of reconstructing traffic using the data collected from the mobile phones. This challenging task has the potential of revealing traffic conditions where no traffic sensors are currently available.

Mobile Century experiment ribbon cutting, February 8, 2008. Left to right: Dr. Bob Iannucci, CTO and Senior Vice President of Nokia, Randell Iwasaki, Chief Deputy Director, California DOT, Assistant Professor Alexandre Bayen, JD Margulici, Associate Director, CCIT

On February 8, 2008, a prototype was successfully tested in an experiment called *Mobile Century*. Mobile Century deployed 165 Berkeley students driving 100 cars in 10 miles loops for 10 hours, a configuration that amounted to 2 to 5 percent of traffic on the targeted portion of I-880. This number is representative of the percentage of the driving public that will carry GPS-equipped phones in about 18 months, when newer phones – on which GPS will be a standard feature – begin to permeate the marketplace. Transportation officials invited to the command center were able to see a real-time reconstruction of highway traffic on large screens, which captured, within minutes, the congestion resulting from an accident on I-880 northbound.

Since the success of Mobile Century, the team has brought the technology to the next step, named *Mobile Millennium.* The project has focused on the development of algorithms to crack the "Holy Grail" of traffic information – arterials – and the creation software that, gathers all the data and turns it into a user-friendly end-product that can instantly be delivered to a cell phone.

On November 10, 2008, Nokia and UC Berkeley announced the launch of *Mobile Millennium* in a press event celebrating the release of free software that the public may download to their smartphones. It marked a new phase of the project in which the public will use the system. The team seeks to enlist up to 10,000 users, who will be given incentives to participate.

The software running on the phones shows real-time traffic information to the users (speeds, congestion, travel time estimates).

As the number of participants grows, traffic information will become available in progressively broader areas – making Mobile Millennium likely to expand the Bay Area's reputation as a high-tech leader of an informed, economical, and ultramodern ride home.

Visit http://traffic.berkeley.edu to download the software for your cell phones.

CHAIR'S MEMO

CONTINUED FROM PAGE 1

my pride so loudly that no one could doubt my affiliation!

A few weeks later our Concrete Canoe team came in second at its national competition in Montreal, Canada. And in April, our Environmental Team placed first in its regional competition. We are extremely proud of our students and the incredibly long hours they put into these projects. When I talk to these students, I see their growth as leaders, skilled engineers and designers, and their deep appreciation for what it means to work as a team.

Our graduate students are not to be outdone. Read about the many students whose research and papers reap tributes from the national organizations in their respective fields. Yet hard as they work, these students support the community at CEE by hosting a spring dance. This year's theme? DISCO!

This issue of *Connections* also highlights Professor Alexandre Bayen's research into the next generation of traffic monitoring systems and expresses appreciation to Professor Emeritus P.K. Mehta, and his wife, Shanti Mehta, for their generous gift of graduate fellowships to the department.

CEE is launching a multi-faceted outreach effort to all of our alumni and friends. You will be reading about the various components of this effort in future issues. Right now, however, we are asking you all for externship and internship opportunities for our undergraduate students as part of our new Professional Development Certificate program. See page six for details.

In September, our campus launched *The Campaign for Berkeley*, a landmark fundraising effort over the next five years to secure the university's academic excellence and global leadership for future generations.

Please consider making a gift to CEE so that future civil and environmental engineers can continue to accomplish great things just as *you* did upon graduation! See Cal's e-giving site at *www.givetocal.berkeley.edu/makeagift*.

Go Bears!

Lisa Alvarez-Cohen
Fred and Claire Sauer Professor of Engineering and Chair
Civil and Environmental Engineering

Fellowship Furthers Structural Materials Research

Emeritus Professor Povindar Kumar Mehta received help from so many at Berkeley during his thirty years on campus, first as a graduate student in Materials Science and Engineering, and then as a professor in the Department of Civil and Environmental Engineering. When he and his wife, Shanti, talked about giving back to all those who had helped them, the University was number one in their minds.

Povindar Kumar Mehta

"When I heard about how each year Cal loses qualified applicants to private universities with greater endowments, that got my attention," says Mehta.

The Mehtas set up the P. Kumar and Shanti Mehta Fellowship in Structural Materials to support and maintain one or more graduate fellowships in CEE. The scholarship goes to students in good standing with a research interest in structural materials for sustainable development in the Structural Engineering, Mechanics and Materials graduate program.

Mehta was a member of the CEE faculty at Berkeley for 30 years. At his retirement in 1993, the University awarded him the "Berkeley Citation," given to individuals who have exceeded in their fields and whose contributions to Berkeley are above the call of duty.

Mehta is known for his breakthrough research for decades on the use of fly ash in structural concrete. He holds nine patents in the area of concrete technology and is the author or co-author of four books. His work in using fly ash in concrete mix instead of Portland cement, the binder of modern concrete mixtures, has the potential to cut drastically the global CO^2 emission rate, as carbon emissions occur predominantly in cement production.

"For thirty years, I had been exposed to the best minds in structural engineering. I had the brightest students," says Mehta. "I get great psychological satisfaction out of watching the beneficiaries of our fellowship continue to explore with my research. How often do we get to see our ideas, backed by action, take root?"

Engineers Crunch Numbers and Disco Dance

Two of the department's most active student organizations, the CEE Graduate Student Society and the Women of SEMM, organized the wildly successful second annual CEE Spring Social in April. This year's theme was *Disco Prom*.

Over 200 graduate students from all disciplines, staff, faculty, and guests came dressed in their shiniest 70's clothes and danced until midnight. DJ Stuart Ake, husband of Shelley Okimoto, CEE's graduate student affairs officer, chose songs until he had everyone "doing the hustle" on the dance floor.

Top to bottom: Faculty and students pose for a photo-op by group: Structural Engineering, Mechanics and Materials, and Geoengineering

The Graduate Student Society and the Women of SEMM host a variety of events throughout the year that aim to encourage interaction between the various CEE groups, between master's and Ph.D. students, and between students, faculty and staff. Gathering in a social setting allows people to get to know one another outside of the classroom. Since the Graduate Student Society is made up of students from all disciplines, the planning of these social events also brings students together in whole new ways.

"Engineering isn't just about crunching numbers and reading manuals. There is also a huge social aspect to being an engineer. Events like this nurture that," says Kelly Cronin, Planning Committee Co-chair.

Co-chair Tracy Becker adds, "It is nice to be able to tell prospective students about these social events to show them that there is a community within the program and that they can have a fun social experience during their time here."

CEE's Competition Teams Rule in 2008

Civil and environmental engineering departments across the country have one thing in common: a fierce pride in their Concrete Canoe and Steel Bridge teams. CEE at Berkeley is no different, except it is also fiercely proud of its Environmental Team.

Over Memorial Day weekend in Gainesville, Florida, CEE's Steel Bridge team made history when it took first place among 42 participating schools in the 17th annual National Student Steel Bridge Competition, sponsored by the ASCE and the American Institute of Steel Construction Inc.

Steel bridge design is judged by construction speed, lightness, stiffness, economy, efficiency, and aesthetics. All categories are fed into a formula that resembles real-life conditions for bridge construction. The objective is to build a durable bridge as economically as possible. In the end, the winning bridge costs the least and does not break when loaded.

Top to bottom: CALatrava Steel Bridge; VoCal Canoe; Environmental Team's treatment system.

CEE's bridge, "CALatrava," earned highest honors in lightness and efficiency, and was ranked highest overall.

Berkeley's steel bridge success began with its designer, Nathan Langdon, CEE Structural Engineering, Mechanics and Materials graduate student. Intrigued by the design challenges of the bridge competition, he traveled to last year's national competition to see what the competition was all about. When Langdon came back to Berkeley, he became the bridge project manager, and infected others with his enthusiasm. A core of bridge enthusiasts was born.

"I plan on doing bridge until I can't anymore," says Ashley Kita, student builder.

In June, CEE's Concrete Canoe team took second place at "America's Cup of Civil Engineering," also known as ASCE's 21st Annual National Concrete Canoe Competition, which was held in Montreal, Canada.

CEE's canoe, "VoCal," was named after Berkeley's Free Speech Movement.

"Our canoe's name represented Cal and its history as no previous name had done," said Dan Gee, project manager.

"VoCal" gave the team an opportunity to tell students from other campuses about the Free Speech Movement and how it has influenced their own schools.

The student-built boats are judged on a technical design paper that highlights planning, development, testing, and construction of the team's canoe, a formal oral presentation and defense of the design choices, and the end product: the final racing canoe and project display. Then the competition switches gears as the teams' designated paddlers race the canoes in both endurance and sprint races.

CEE came in first place for the oral presentation, second for best design paper, and third place for best final product. The team was especially proud of the final canoe because they had tried a new technique of constructing the graphics out of a thin layer of dyed concrete.

In April, CEE's Environmental Team made department history by placing first in the "Water Treatment and Beyond" competition in Sacramento, CA. Teams from participating universities were asked to design a synthetic stormwater treatment system that was cost effective and would require minimal maintenance.

Each team was required to treat 10 gallons of contaminated "stormwater overflow." Environmental industry experts judged the systems on water quality, cost, sustainability of design, and presentations.

"We learned a lot about water treatment and how to build treatment systems from recycled, common materials," says Katrina Harrison, project manager. "Major components of our system were a filing cabinet, duct tape, and T-shirts."

CEE took first in the volume of clean air recovered, second in water quality, and second in cost, to garner a first overall – the team's inaugural first place win in the 10-year history of the competition.

See videos of CEE's Bridge and Canoe teams at their national competitions!

Bridge: www.ce.berkeley.edu/news/view.php?item=175
Canoe: www.ce.berkeley.edu/news/view.php?item=180

Joan Chamberlain, CEE's Undergraduate Advisor

"In all my jobs, working with students was the best part," says Joan Chamberlain, CEE's undergraduate advisor. Joan followed "the best part", by joining CEE, where in 2004, she became the first departmental student advisor dedicated solely to the undergraduates.

Most Satisfying Part of Her Job

"It happens when students come in completely overwhelmed and I can help to eliminate an obstacle that is standing in their way. This might mean helping them with their schedule. It might mean helping them connect with other students or resources on campus."

Why CEE Students Lead

"CEE students take charge of their own education. They do not expect anything to be handed to them. They go after what they need. If what they need is not available in a course, they create their own course – and they network and they bring in speakers, and then they mentor one another. This trait is particular to civil and environmental engineering students – they see a problem and they set about solving it."

Curriculum News

"CEE is developing a four-year professional development and leadership certificate program which will entail students taking certain prescribed classes, participating in an internship and externship, demonstrating leadership in some capacity, and attending career fairs and infosessions. In the end, the students will receive a certificate which tells employers these students have had additional education in what it means to lead and manage."

Undergrads Need Their Alumni

"Offer to mentor our undergraduates. Sponsor externships in your companies. Come back to Cal. Talk to our students about your experience as an engineer. There are many ways to get involved with CEE undergraduates!"

Recent CEE Faculty and Student Achievements

Faculty

Professor **Carlos Daganzo** received one of Graduate Assembly's Distinguished Faculty Mentorship Awards for 2008. He was selected from among 36 nominations of current students in departments all over campus and from former students around the country.

Professor **Arpad Horvath** was awarded the 2008 ASCE Walter L. Huber Civil Engineering Research Prize for outstanding contributions to life-cycle environmental modeling and assessment of infrastructure systems.

Professor **Armen Der Kiureghian** was honored by an afternoon of appreciation for his 16 years of leadership in establishing the American University of Armenia. He was a founding member of the Board of Trustees and a founding Dean of the College of Engineering.

Professor Emeritus **James Kelly** received the George W. Housner Medal from the Earthquake Engineering Research Institute. The Housner Medal recognizes those who have made extraordinary and lasting contributions to public earthquake safety through the development and application of earthquake hazard reduction practices and policies.

Professor **Shaofan Li** was one of 10 researchers selected to receive Microsoft's A. Richard Newton Breakthrough Research Award. The award provides $1 million in funding to encourage breakthrough academic research to solve some of today's most challenging societal problems.

Professor **Jack Moehle** was awarded the American Concrete Institute's Arthur J. Boase Award for his research to improve understanding of the seismic behavior of reinforced concrete structures.

Professor **Paulo Monteiro** was a winner in the King Abdullah University of Science and Technology Global Research Partnership Investigator competition. Twelve international scientists were selected as KAUST Investigators for the 2007 round of nominations.

Dr. **Mike Riemer** was honored with Chi Epsilon's Arthur N. L. Chiu Outstanding Faculty Advisor Award for his outstanding commitment to advising and encouraging chapter members.

Graduate Students

Seema Bhangar, Ph.D. student in Environmental Engineering, received the 2007 Annual Scholarship Award from the Golden West Section of the Air and Waste Management Association.

Michelle Bensi, Structural Engineering, Mechanics and Materials (SEMM) graduate student, won honorable mention in the Center for Information Technology Research in the Interest of Society's White Paper Student Competition, in which students submitted proposals on innovative ways to use IT in the service of society.

SEMM Ph.D. student, **Joshua Blunt**, won the Earthquake Engineering Research Institute Student Paper Competition for his paper titled, "The Use of Novel Material Properties in the Performance-based Design of Tunnel Formed Structures."

Beverly Coleman, Ph.D. student in Environmental Engineering, was awarded first prize for student achievement by the International Society of Indoor Air Quality and Climate.

Christina Keenan, Environmental Engineering Ph.D. student, received the American Chemical Society Division of Environmental Chemistry Graduate Student Paper Award for her paper titled, "Factors Affecting the Yield of Oxidants from the Reaction of Nanoparticulate Zero-Valent Iron and Oxygen."

SEMM Ph.D. student, **Cagla Meral**, has been invited to represent the US in the Young Persons' World Lecture Competition 2008. Her research is entitled, "Supercritical Carbon Dioxide Treatment of Portland Cement."

Gretchen Miller, Environmental Engineering Ph.D. student, was selected to receive an Outstanding Student Paper Award by the Hydrology section of the American Geophysical Union. The title of Miller's paper was, "A New Technique for Upscaling Sap Flow Transpiration Measurements to Stand or Landscape Scale Fluxes."

Ran Holtzman, Ph.D. student in Geoengineering, received an Outstanding Student Paper Award from the American Geophysical Union for his presentation titled, "Deformations of Sediments via Grain-scale Simulations: A Quasi Static Approach."

Rune Storesund, Ph.D. student in Civil Systems, received the 2008 ASCE Western Regional Younger Member Council Award for Outstanding Young Civil Engineer in the Private Sector.

Andrew Tinka, Civil Systems Ph.D. student, presented the Drifting Water Sensor project to a panel of venture capitalists on behalf of the Lagrangian Sensor Systems Laboratory. Tinka competed in the 2008 Venture Lab Clean Technology Innovation Competition and was awarded second place.

Daniel Work, Civil Systems Ph.D. student, received a Dwight David Eisenhower Transportation Fellowship for 2008.

Nathaniel Butler and **Audra Nemir**, Ph.D. students in Environmental Engineering, and Iris Tien, CEE senior who entered the Civil Systems program, received National Science Foundation Scholarships.

Kristen Parrish and **John-Michael Wong** received FIATECH's Celebration of Engineering and Technology Innovation Award in the student researcher category. Parrish and Wong were selected for their creative work in set-based design.

Parrish is a Ph.D. student in Civil Systems and Wong is a Ph.D. student in SEMM.

Undergraduate Students

Joanna Chang and **Elyse Wong** won Structural Engineers Association of Northern California Scholarships. The $5,000 scholarships are awarded to senior engineering students who plan to go on to graduate study in structural engineering.

Two CEE seniors, **Iris Tien** and **Jenna Wong**, were awarded Chancellor's Fellowships, which are given to exceptional students who are entering a Berkeley doctoral program. Tien enrolled in Civil Systems and Wong in Structural Engineering, Mechanics and Materials.

John McLaughlin was CEE's graduating senior with the highest GPA (3.959). He has been active in field research measuring air pollutant emissions from gasoline and diesel engines driving through the Caldecott tunnel.

Nalat Yulong received the Clement T. Wiskocil Award, which recognizes the graduating civil engineering student who exhibits exceptional leadership in engineering.

For more information on these achievements, and the achievements of others, visit News & Events on the CEE Web site, **www.ce.berkeley.edu**.

CEE Welcomes Three New Faculty

Joan Walker

CEE's own alumna, Joan Walker (CE B.S. '91), has returned to Berkeley as an assistant professor teaching classes in transportation engineering and civil systems. She is also affiliated with UC Berkeley's new interdisciplinary Center for Global Metropolitan Studies.

Walker's research focus is behavioral modeling for policy analysis and planning with an expertise in discrete choice analysis and travel behavior. She works to improve understanding of, and prediction models for, human behavior and its effect on societal issues such as the environment, economy, equity, and quality of life. She aims to map how technology, infrastructure, incentives and marketing can promote more sustainable behaviors.

Walker received her Ph.D. from Massachusetts Institute of Technology in 2001.

"Most importantly," says Walker, "I was a two-time national champion concrete canoer for Cal."

Evan Variano

Environmental engineers track pollutants that threaten health, nutrients that control the balance of organisms, or the sediment that controls the migration of beaches and riverbeds.

The engineer must consider the motion of the water and air that carries the substances. And that's where things get interesting for Evan Variano, assistant professor in Ecosystems and Water Resources Engineering.

"At the heart of a very practical set of questions is one of the greatest unsolved questions in classical physics," says Variano. "That is, fluid motion is nonlinear – it defies our mathematical methods, our supercomputers, and even our intuition." Variano aims to devise new ways of measuring transport dynamics in fluid flow.

Variano earned his Ph.D. at Cornell University in 2007.

Marios Panagiotou

An important new direction in seismic design involves integrating specific performance objectives under different levels of seismic intensity. This requires understanding soil-foundation-structure systems in correlation with the seismic ground motion characteristics. Marios Panagiotou, assistant professor in High-Performance Structural Engineering, says, "I aim to create more performance-effective and cost-efficient designs able to minimize structural and non-structural damage under different levels of ground shaking intensity."

Panagiotou earned his Ph.D. in Structural Engineering from the University of California, San Diego in 2008. His interests lay in performance-based seismic design of structures including rocking, seismic isolation, supplemental damping, soil structure interaction as well as characterization of the seismic ground motion destructiveness.

Highlights of his research include sound and innovative conceptual development coupled with the largest shaking-table experiments performed in the United States.

David Friedman on *The Campaign for Berkeley*

Mr. David Friedman (CE B.S. '75), President and CEO of Forell/Elsesser Engineers, is a member of CEE's Advisory Council, a committee of professional engineers, business leaders, academic leaders, and government and policy officials who are committed to enhancing the strengths of the department so that it continues to be one of the best research and educational programs in the world.

Friedman also serves as the Chair of the Council's Development Committee. He shares why he is inspired to support CEE in *The Campaign for Berkeley*.

"It is somewhat ironic to me that the stature of Berkeley's CEE department seems like a "best kept secret." So few seem to realize that CEE is continuously THE top civil and environmental program in the country (dare I say the world?)."

Competition is Fierce for Faculty & Students

"The caliber of the education and research stands out among its peer institutions. Yet even distinguished alumni do not seem to translate the stellar stature of the program into the need for monetary support. The competition is fierce for faculty and graduate students, and support for CEE is imperative to keeping the United States at the forefront of the field of civil and environmental research and education."

CEE Researches Solutions to Pressing Problems

"CEE's faculty, its graduate students, and its high quality research programs are all focused on the pressing issues of the day. It is amazing how many of our societal challenges need civil and environmental engineering solutions."

CEE's Invaluable Contributions to Industry

"It is as an industry professional that I really see the incredible contributions of the CEE department. I see it in its collaborations with the practitioners in addressing practical issues that face the profession (in my case, structural and earthquake engineering) and the caliber of students CEE educates and molds into creative thinkers and problem solvers (and I try to hire as many of them as possible!). This is what reminds me and inspires me to support CEE at Cal."

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How to Get Involved with Cal's CEE Students

CEE Career Fair!

CEE's ASCE student chapter will sponsor a 100-company career fair on **March 18, 2009**. The Career Fair provides our friends in the industry an opportunity to meet and recruit over 200 CEE undergraduate and graduate students. Company sign-ups include registration for two company representatives and hors d'oeuvres. Space is limited, so sign up early! Contact Katie Doering, ASCE Officer, at katiejodoering@gmail.com.

Internships! Externships!

CEE has launched a new Professional Development Certificate Program for its undergraduates and it needs internship and externship opportunities for students in the program. Alumni and friends in civil and environmental engineering industries are asked to provide internship, externship, and job shadowing opportunities for CEE freshmen and sophomore students. To post internships and externships, go to the password-protected site at http://career.berkeley.edu/Employers/EmpCEE.stm.

CEE @ Berkeley Connections is produced by the Civil and Environmental Engineering Department at the University of California, Berkeley. Editor: Holly Halligan (halligan@ce.berkeley.edu). Design: Cuttriss & Hambleton, Berkeley. Printing: University of California Printing Services. Images: Coralie Claudel, Fazia Ali of Faiza Photograph + Design, Paul Kirchner Studios, Aly Sato, Peg Skorpinski

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