

Greetings from Civil and Environmental Engineering at UC Berkeley



Gregory Fenves

It is a pleasure to greet CEE alumni and supporters with a revived newsletter from the department. We plan to publish the newsletter twice a year with updates about civil and environmental engineering research and education at Cal. The timing of this first newsletter is propitious because CEE is in the midst of an academic program review by the UC Berkeley campus, which included a visit by a distinguished panel of external reviewers. The review has been an opportunity to identify the accomplishments of our faculty, staff, and students. Some highlights are:

- CEE continues to be ranked the #1 graduate program in civil engineering for five years in a row, according to *U.S. News & World Report*. The environmental engineering program is currently ranked third. We are very proud that the undergraduate civil engineering program achieved the #1 ranking in the 2006 *USN&WR* survey.
- After a decline in student interest in civil and environmental engineering, our undergraduate enrollment has increased 30% since 2001. The department now has more than 300 undergraduate students and 350 graduate students. About 1 in 50 students at UC Berkeley is in CEE. The strong job market and increased interest drove freshman applications up another 19% for fall 2006 compared with the previous year.

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Raja Sengupta Explores New Frontiers in Automotive Safety and Inspection of Civil Systems

“We are living through a phenomenal expansion in the power and pervasiveness of networks of computation,” says Professor Raja Sengupta. “My research leverages this revolution to advance the safety of road travel and build low-cost unmanned air vehicles for the infrastructure inspection industry, local fire departments, and search and rescue in disaster areas.” Sengupta’s research at the nexus of information technology and civil engineering is one of the key aspects of the department’s new Civil Systems program (see article on page 2).



Raja Sengupta

The Federal Communications Commission has recently allocated radio spectrum for high-speed Dedicated Short-Range Communication Services to enhance the safety and productivity of the nation’s transportation system. Sengupta’s research has created synergies between wireless networks and advanced vehicle safety systems (AVSS). AVSS are vehicle borne information-centric applications that are intelligent enough to understand interactions with surrounding cars and the roadway.

In related research, Sengupta has been combining machine vision, control, and networking technologies to allow an operator to control a team of unmanned aerial vehicles (UAVs) executing search and inspection operations. Sengupta has demonstrated UAV use for infrastructure inspection by tracking five miles of the California aqueduct with real-time vision in the control loop for the aerial vehicles. This innovative research is opening new applications for information technology to address critical civil and environmental engineering needs. (See www.ce.berkeley.edu/fac/sengupta)

Breakthroughs on Water Re-use from Kara Nelson’s Research



Kara Nelson

Professor Kara Nelson’s research on the re-use of wastewater may lead to changes in California policies, enabling a dramatic increase in the amount of recycled water that can be produced with minimal new investment.

Nelson focuses on technologies to detect and inactivate pathogens in contaminated water. This is particularly important for water recycling, which can help to alleviate water scarcity, as well as provide low-cost treatment methods that can be used in regions of the world where many people still lack access to basic water and sanitation. Nelson is investigating how to improve the efficiency of tertiary filtration, a process that is currently used to treat wastewater so that it can be re-used to irrigate crops.

Another research team in her laboratory is elucidating the complex mechanisms by which sunlight inactivates pathogens in rivers, lakes, and natural treatment systems. Using a solar simulator to illuminate various types of water, highly reactive radical oxygen species are produced. Nelson has demonstrated that these short-lived radicals can kill viruses and bacteria, but more research is needed to determine the most important chemical species and wavelengths of light, as well as how different organisms respond. The results will be used to develop better methods for predicting the survival of pathogens in the environment, as well as how to improve low-cost treatment methods for both drinking water and wastewater. (See www.ce.berkeley.edu/fac/nelson)

Fotini Chow

As everyone knows, techniques used to forecast the weather are less than perfect. But **Professor Fotini (Tina) Katopodes Chow** is working to improve predictions of atmospheric flow and transport.



Fotini Chow

Chow joined the CEE faculty in July 2005 and teaches in the Environmental Engineering program. Her research in environmental fluid mechanics uses computer simulations to predict meteorological properties like atmospheric pressure, temperature, and wind speed. Chow's goal is to reach a deeper understanding of, and better prediction methods for, atmospheric flow over complex terrain. The research has the potential to help predict bad air pollution days in basins and valleys, and to improve the accuracy of forecasts in complex urban areas, especially for cities with microclimates. (See www.ce.berkeley.edu/fac/chow)

Alexandre Bayen

Embedded computing, wireless communication, and sensor networks have enabled the creation of information networks which allow civil engineers to gather the comprehensive and dynamic data needed for monitoring large scale infrastructure systems, such as highway systems, the air traffic control system, or water distribution systems. **Professor Alexandre Bayen** is working on algorithms for control and optimization of these systems using Lagrangian (i.e. mobile) sensor networks. This research will improve the efficiency of these systems.



Alexandre Bayen

Bayen joined the CEE faculty in April 2005 and teaches in the Civil Systems program. His research interests include combinatorial optimization, hybrid systems, and control of distributed systems. (See www.ce.berkeley.edu/fac/bayen)

The New Civil Systems Program at UC Berkeley

Many civil and environmental engineering problems involve large systems such as transportation systems, water and groundwater systems, ecological systems, and the built infrastructure. These systems are composed of many interrelated parts woven together into a complex network. Innovative solutions to systemic infrastructure problems require a combination of civil and environmental engineering knowledge, new technologies, economics, and policy that is rarely found in traditional disciplines alone. For these reasons, a new Civil Systems program has been created to prepare graduate students who can address the broad challenges of the future using relevant knowledge from multiple disciplines, new research approaches, and modern technology skills.

After two years of operation, the Civil Systems program has approximately 26 students working towards M.S. or Ph.D. degrees. In addition to civil engineers, we are attracting students from other disciplines, such as physics, electrical and mechanical engineering, computer science, and chemistry, who are fascinated by the breadth of the problems civil and environmental engineers grapple with. These students bring a fresh point of view and new skill sets to our work in systems for civil and environmental engineering.

In addition to a strong emphasis on the disciplines in CEE, the Civil Systems faculty's expertise spans aerospace, automated control, mathematics, and electrical engineering. Current teaching and research faculty include Alexandre Bayen, Robert Bea, Armen Der Kiureghian, Steven Glaser, Arpad Horvath, Adib Kanafani, Samer Madanat, Alexander Skabardonis, Raja Sengupta, and Bozidar Stojadinovic. We also have Alice Agogino (ME) and Shankar Sastry (EECS) as interdisciplinary thesis advisors.

The Civil Systems program is important to the department's strategic plan and our goal of leading the world in defining the future needs for civil and environmental engineering. (See www.ce.berkeley.edu/sys)

Davis Hall Renovation

The 1930's north wing of Davis Hall was demolished in 2003 to make way for a new building for the Center for Information Technology Research in the Interest of Society (CITRIS). As a result, the main Davis Hall building needed to be reconfigured to accommodate the laboratories and other facilities from the north wing. This gave us a rare opportunity to renovate and upgrade office space for students and faculty, and provide laboratory space for wet chemistry, optical and electron microscopes, environmental chambers for concrete and geotechnical materials, and an instructional earthquake shake table. A new computer laboratory and instructional facility was also added, and classrooms throughout the building were modernized with the latest audio/visual technology. A completely new gigabit computer network was installed and a wireless network is now available in all classrooms and public areas. A state-of-the-art conference room will be completed this summer.



New South Elevation of Davis Hall

The sixth floor of Davis underwent the most dramatic change with a bank of windows on the south side of the building. Seismic improvements were made in Davis Hall, although the building still has a seismic rating of poor. We expect planning for the full seismic retrofit of Davis Hall to begin in about two years.

Undergraduates Host 2006 Mid-Pacific Regional Conference

The UC Berkeley ASCE Student Chapter will host the 2006 Mid-Pacific Regional Conference Concrete Canoe Races and Steel Bridge Competition on April 28-30, 2006. Eight canoe teams and bridge teams will square off to qualify for their respective national competitions. The competitions will take place at two locations; the Canoe Races will occur at Lake Merritt in downtown Oakland, and the Steel Bridge teams will be constructing their bridges on the Doe Library Terrace and the Memorial Glade on the Berkeley campus. The complete schedule for Mid-Pac can be found at www.midpac.calasce.org.



Team Members Attaching Float Rings to Concrete Canoe

The Steel Bridge Team is busy designing and constructing a new entry for Mid-Pac. Last year was the second year in a row that Cal's Steel Bridge Team won third place in the country's most competitive region.

The National Concrete Canoe Competition has a long history, dating back to 1972 when concrete canoes were first constructed at UC Berkeley and the University of Illinois. Last year Berkeley won fourth place, continuing its reign as one of the premier teams in the nation.



Steel Bridge Team with 2005 Entry



Foundation Failure due to Soil Liquefaction during the 1999 Kocaeli Earthquake, Turkey

Jennifer Donahue Researches Soil Liquefaction during Earthquakes

Jennifer Donahue, a Ph.D. candidate studying under Professor Jonathan Bray in the Geo-Engineering program, uses advanced cyclic testing to determine the liquefaction susceptibility of silty soils taken from the city of Adapazari, Turkey, as a result of the 1999 Kocaeli Earthquake. Previous state-of-the-art methods for screening of soils had not identified these fine-grained deposits as liquefiable. The results of Donahue's research are expected to have a large impact on understanding the seismic hazard throughout the Bay Area and many other areas of the world.

Greetings from CEE continued from page 1

- Our student societies are very strong. The ASCE Student Chapter has more than 200 members and a very full calendar of activities led by an enthusiastic student leadership. These outstanding students will certainly be future leaders for the profession.
- Sponsored research in CEE reached an all time high with \$25 million of new grants and contracts in 2004-05.

This has all been accomplished with the disruption of the department's move from our home in Davis Hall in 2003 and 2004 (see related article on page 2). We are now back in smaller space, but it has been refurbished in many ways. One of my goals is to continue investing in our laboratory, instructional, and research facilities.

On this topic, your support of the department's mission is essential. With declining funding from the State of California for UC, the department will be relying increasingly on its network of alumni and supporters. This newsletter is one of the first steps to strengthening these connections, and I look forward to talking with you as our alumni programs gear up.

Go Bears!

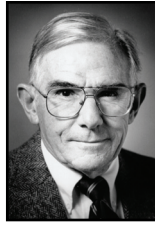
Gregory L. Fenves (fenves@berkeley.edu)
Chair, Civil and Environmental Engineering

Carl Monismith, Guest Speaker, at Chi Epsilon's Spring Banquet on May 5

Chi Epsilon, the Civil Engineering honor society, will hold its spring banquet and initiation of new members on the evening of May 5, 2006, at Spenger's Fish Grotto in Berkeley. The guest speaker will be Professor Emeritus Carl Monismith, who will look back at the people, projects, and events that brought CEE at UC Berkeley to international prominence. Professor Monismith's talk is titled, "The Department of Civil Engineering, University of California, Berkeley: The First One Hundred Years (or so)."

Professor Monismith has been a vital contributor to Cal civil engineering for over fifty years, having joined the faculty in 1951. He is a Chi Epsilon member, initiated as a Berkeley student in 1950.

Department faculty and alumni are invited to attend, but reservations are required as space is limited. Contact Brandon Kluzniak (brandonk@berkeley.edu) for a reservation or additional information.



Carl Monismith

Karl Pister Named 2006 Cal Alumnus of the Year

Professor Emeritus Karl Pister (B.S. Civil Engineering '45; M.S. Civil Engineering '48; Dean of the College of Engineering, 1980-90; and Chancellor of UC Santa Cruz, 1991-96) has been named Cal's Alumnus of the Year for 2006 by the California Alumni Association.



Karl Pister

This award is the highest honor given by the association to an alumnus of the University of California, Berkeley, and is bestowed on the alumnus who has achieved distinction through exceptional contributions to international, national, state, or community welfare. "It is hard to find an individual whose life's work better mirrors the very mission of our university," said Chancellor Robert Birgeneau. A full article can be found on the *California* magazine Web site at www.alumni.berkeley.edu/calmag/200601/alumnus.asp.

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