USC Viterbi
School of Engineering

Sonny Astani Civil and Environmental Engineering

Winter 2013

NEWSLETTER

Dr. Ketan Savla, Assistant Professor
Photo credit: Lance Hill.

Dr. Felipe de Barros, Assistant Professor

Dr. George Ban-Weiss, Assistant Professor

Three Outstanding Scientists Join the Faculty

Three new faculty members will be bringing their expertise to campus in the areas of detection and control of dynamical flow phenomena to prevent damage to large-scale infrastructure systems, sustainable groundwater quality management, and how pollution and urban land use alter our local and global climate.

Dr. Ketan Savla teaches systems and transportation courses. He plans to develop new graduate courses which will teach concepts and tools from both the systems and control community and the operations research community, as relevant to the context of civil and environmental engineering. **Dr. Felipe de Barros**, who will join the faculty in January 2013, will teach fundamental courses on groundwater hydrology and environmental fluid mechanics at both undergraduate and graduate levels. He also hopes to develop a specific course in stochastic hydrogeology targeted toward delivering state-of-the-art methods to statistically characterize flow and transport in aquifers. **Dr. George Ban-Weiss**, who will join the faculty in August 2013, will teach about climate change and air pollution. He plans to develop experimental and modeling capabilities to research sources of pollution, changes to urban land cover, and regional and global climate change.

DR. KETAN SAVLA, ASSISTANT PROFESSOR

Dr. Ketan Savla's research focuses on systems, control, and optimization, with applications to complex dynamical networks, mobile robotic networks, and human-in-the-loop systems. One of his primary research goals is to model, analyze, and control dynamical processes on networks to determine resilience toward natural and manmade disruptions. He also works on designing computationally efficient dynamic task allocation algorithms for networks of mobile systems (such as unmanned aerial vehicles) in dynamic, unknown, and possibly adversarial environments. Such algorithms allow persistent monitoring of infrastructure systems using mobile autonomous platforms.

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FACULTY NEWS

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Dr. Savla is also interested in quantitatively understanding the role of human cognitive elements and decision making in the context of engineering systems. This informs design control policies such as optimal performance of human-in-the-loop systems. He also aims to develop models based on historical data to perform data-driven failure analysis and detection for complex dynamical systems ranging from individual structures to large cities. These models allow computationally efficient online prediction and detection of various failure modes in such systems.

Born in India, Dr. Savla earned a B. Tech. degree from the Department of Mechanical Engineering at the Indian Institute of Technology, Bombay. He earned his M.S. in mechanical engineering from the University of Illinois, Urbana-Champaign, and his M.A. in applied mathematics and Ph.D. in electrical engineering from the University of California, Santa Barbara. From 2007 to 2012, he was with the Laboratory for Information and Decision Systems at the Massachusetts Institute of Technology, first as a postdoctoral associate and then as a research scientist.

A Few Words From Our New Faculty

"My current research interest is in developing control and optimization tools for complex dynamical networks, multi-agent systems, and human-in-the-loop systems."
Dr. Ketan Savla

"My work connects knowledge from scale-dependent flow and transport processes in multiple natural environments with inter-related fields such as public health."
Dr. Felipe de Barros

"I am interested in how humans alter the environment, ranging from urban to global scales."
Dr. George Ban-Weiss

DR. FELIPE DE BARROS, ASSISTANT PROFESSOR

Dr. de Barros' main expertise is in groundwater hydrology and environmental fluid mechanics. His research interests include flow and transport in heterogeneous porous media, fate of contaminants in the environment, stochastic hydrogeology, and human health risk. His work connects knowledge from scale-dependent flow and transport processes in multiple natural environments (i.e. soil, groundwater, and rivers) with inter-related fields such as public health (i.e. toxicology and epidemiology).

One of his major research goals is to provide better sustainable groundwater quality management, which would minimize the impact of human and environmental contamination. This requires improved understanding and quantification of the interaction between hydrogeology, site characterization, and human health. The joint influence of these components in water quality management and the corresponding sources of uncertainty impact how decision makers allocate resources as they seek to acquire the data necessary to protect human health and keep water supplies clean in a cost-effective manner. Dr. de Barros is also interested in establishing a quantitative link between measures of flow topology in porous media and rate of dilution of contaminant plumes.

Prior to joining the USC Viterbi School of Engineering, Dr. de Barros worked with a team investigating statistical and self-averaging properties of effective dispersion coefficients in spatially heterogeneous flows and their corresponding role in the uncertainty quantification of environmental performance metrics. Such research is fundamental in quantifying and predicting both the self-purifying capacity of fresh water bodies, and the impact of contamination.

Dr. de Barros was born in Rio de Janeiro, Brazil. He earned his B.Sc. and M.Sc. in mechanical engineering from the Federal University of Rio de Janeiro, and his Ph.D. in civil and environmental engineering from the University of California, Berkeley. After completing his Ph.D., Dr. de Barros collaborated with several research groups in Germany, Italy, Brazil, and Spain.

DR. GEORGE BAN-WEISS, ASSISTANT PROFESSOR

Dr. Ban-Weiss' expertise is in air pollution, urban heat islands, and climate change. His research seeks to further understanding of how humans alter the environment on both an urban and a global scale, with particular focus on quantifying emissions from pollutant sources, characterizing changes in urban land cover, and using models to understand how changes in pollution and urban land use alter our local and global climate.

As a scientist at Lawrence Berkeley Laboratory, Dr. Ban-Weiss' research included characterizing the amount of sunlight reflected and absorbed by urban surfaces in California's largest cities. The greater number of dark surfaces that absorb sunlight (i.e. parking lots, roof-tops) is one of the main reasons that urban areas are hotter than surrounding rural areas. This is known as the "urban heat island effect." For this project he developed a high-resolution dataset of "solar absorptance" using a novel data source: multiband aerial imagery. To process the imagery, Dr. Ban Weiss developed algorithms similar to those used for satellites, resulting in the first dataset of its kind with sufficiently high spatial resolution to distinguish the sunlight absorbing properties of different urban land cover types. Results will be used by the California Air Resources Board for informing the California Global Warming Solutions Act (AB32).

Dr. Ban-Weiss is also assessing how well global climate models represent interactions of atmospheric particles and cloud cover. The changes in cloud cover caused by atmospheric particles can significantly alter the energy balance of local regions and the global climate as a whole. But the magnitude of this effect remains one of the largest uncertainties in modeling global climate. To fill this gap, Dr. Ban-Weiss compares signatures of particle-cloud interactions in multiple global climate models to satellite data.

Dr. Ban-Weiss received his B.S., M.S., and Ph.D. in engineering from the University of California, Berkeley and conducted post-doctoral research at the Carnegie Institution for Science in the Department of Global Ecology at Stanford University. ■

New Faculty Grants

Dr. Burcin Becerik-Gerber
Project Title: SEP: Creating an Energy Literate Society of Humans, Buildings, and Agents For Sustainable Energy Management
Agency: National Science Foundation

Dr. Patrick Lynett
Project Title: NEESR-SG: TSUNAMOS: A Validated, Multi-Scale Tsunami Model for Hybrid Numerical-Experimental Simulation
Agency: National Science Foundation

Project Title: RAPID: Observations Of Sediment Scour and Deposition in the Vicinity of Ports and Harbors from the 11 March 2011 Japan Tsunami
Agency: Virginia Tech

Project Title: Data Generation for Determination of Safe Depths near Ports, Harbors, and Marinas During Tsunamis
Agency: California Emergency Management Agency (CalEMA)

Dr. Constantinos Sioutas
Project Title: Health Effects of PM Particles Emitted from Heavy-Duty Vehicles-a Comparison Between Different Fuel Formulations
Agency: University of California, Riverside

Project Title: Genetic and Epigenetic Programming of Allergic Airway Inflammation
Agency: Childrens Hospital Boston

Dr. Lucio Soibelman
Project Title: Medium - A Framework for Enabling Energy-Aware Smart Facilities
Agency: NSF - Carnegie Mellon University

Dr. Costas Synolakis
Project Title: Data Generation for Determination of Safe Depths near Ports, Harbors, and Marinas During Tsunamis
Agency: California Emergency Management Agency (CalEMA)

Dr. Patrick Lynett and Dr. Costas Synolakis
Project Title: Simulation of Complex Tsunami Currents for Use in Hazard Mapping
Agency: California Emergency Management Agency (CalEMA)

ALUMNI NEWS

David M. Wilson Affiliates Support Students and Enhance Learning

The alumni and friends of the Sonny Astani Department of Civil and Environmental Engineering support CEE students through David M. Wilson Affiliates (DMWA). Continuing in the spirit of Professor Wilson, this departmental support group provides financial support through memberships, donations, and endowments. The group supports scholarships, student activities, and the educational programs of the Department.

Instrumentation for model building for CE 334L.
Photo credit: Lance Hill.

The DMWA replaced computers in the CEE Computer Lab.
Photo credit: Lance Hill.

DMWA assisted the department with awarding the following scholarships in recognition of students' academic achievement, as well as participation in, and leadership of, student organizations:

- **DMW Scholarship:** Laura Powchowski, Alex Nothnagel
- **DMW Fellowship:** Syed Hasan, Nancy Kathleen Martin
- **James Ruthroff Scholarship:** Rafi Halajian, Jack Stern
- **Angvire Endowment:** Kirsten Rice
- **Beavers Heavy Construction Scholarship:** Pedram Oskouie
- **DMWA Book Scholarships:** Usama Douglah, Samuel Levy, Jhumann Ung, Thomas Palmieri, Xiang Zhang, Adam Laufer, Karl Tingwald, Angela Noah, Wirikit Wichianchan, Jason Andrew, Winnie Siauw, Elise Takebayashi, Trevor Wiessler

This year, DMWA also improved the education experience for current and future students by:

- Replacing seven computers in the CEE Computer Lab, providing students access to current technology and software.
- Creating the David M. Wilson Affiliates CEE Student Meeting Room, allowing students to meet in a quiet environment.
- Providing state-of-the-art equipment including accelerometers, a dynamic shaker, and instrumentation in the undergraduate teaching laboratory, allowing students to monitor and study the effects of earthquakes on a model building shaken on the Department's shake table.

DMWA also supported Department activities including the commencement reception for graduating students and families, as well as student organization chapters including The American Society of Civil Engineers, Chi Epsilon, Earthquake Engineering Research Institute, Construction Management Association of America, Engineers Without Borders, and The Institute of Transportation Engineers. ■

GRADUATE STUDENT NEWS

Postdoctoral Work has Implications for Smart Cities

Smart cities, which integrate technology into a strategic approach to sustainability, citizen well-being, and economic development, require innovative science. Enter Dr. Hadi Meidani, postdoctoral scholar and research associate, who earned his Ph.D. in civil engineering in 2012 under the supervision of Dr. Roger Ghanem. His research focuses on developing predictive models for the optimal and sustainable management of future smart cities.

A true smart city requires coordinating social systems, transportation networks, and water and electricity distribution systems. This is complex because all of these systems are prone to uncertainties due to the inaccuracy of constitutive models, errors in mathematical approximations, and the insufficiency and noise in data. Dr. Meidani's research focuses on the quantitative representation of these uncertainties and serves to enhance decisions related to the optimal management of urban systems, risk reduction, and hazard mitigation.

Dr. Meidani is widely published and has developed a formalism to Markov models ubiquitous in the study of urban systems, which allows much needed robustness in the management of these systems.

Born in Iran, Dr. Meidani earned a bachelor's degree in civil engineering from K.N. Toosi University and a master's degree in structural engineering from Sharif University of Technology before earning a master's degree in electrical engineering here at USC. ■

Hadi Meidani
Photo credit: Lance Hill.

Honored Ph.D. students with Department Chair and Awards Committee are from left: Professor Soibelman, Professor Becerik-Gerber, Farrokh Jazizadeh-Karimi, Elham Hemmat-Abiri, Nancy Daher, and Professor Johnson

THREE PH.D. STUDENTS HONORED

Three outstanding CEE Ph.D. students were honored for excellence in teaching and research at the 2012 RA/TA Awards Luncheon.

Nancy Daher was awarded both a Teaching Assistant and Research Assistant Award.

Elham Hemmat-Abiri received a Teaching Assistant Award for her third consecutive year.

Farrokh Jazizadeh-Karimi received a Teaching Assistant Award.

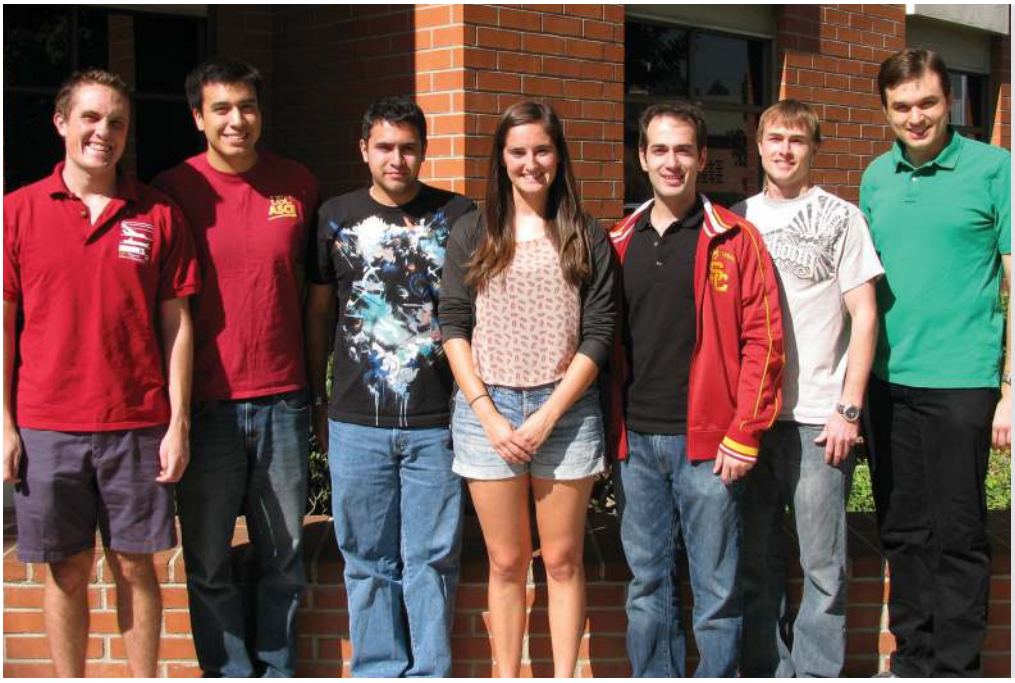
CEE PH.D. SEMINAR SERIES FEATURES DIVERSE SPEAKERS

Guest presenters for the fall 2012 semester CEE Ph.D. Seminar Series included: Falk Feddersen, Associate Research Oceanographer at the Scripps Institution of Oceanography; David A. Dzombak, Senior University Professor at Carnegie Mellon University; Ahsan Kareem, Professor of Engineering at Notre Dame University; and Dr. Robert Glass of Sandia National Laboratories.

CONGRATULATIONS PH.D. STUDENTS WHO PASSED THEIR DEFENSE IN 2012:

- **Surat Terapathana** (5-9-2012)
- **Sara Abedi Mashhadi** (5-11-2012)
- **Kalam Cheung** (8-7-2012)
- **Maud Comboul** (8-7-2012)
- **Fabian Rojas Barrales** (8-7-2012)
- **Sangyoung Son** (8-7-2012)
- **LiPing Teng** (8-7-2012)
- **Hadi Meidani** (9-4-2012)
- **Hyoung-Jin Kim** (10-24-2012)
- **Roshanak Varjavand** (10-25-2012)
- **Winnie Kam** (11-16-2012)

UNDERGRADUATE STUDENT NEWS



USC Sonny Astani student leaders include, from left: Samuel Levy, president of ITE; Oscar Rivera, president of ASCE; Omar Dana, president of EWB; Katherine Christian, president of CMAA; Rafi Halajian, president of EERI; Travis Airola, president of AGC, and Alex Nothnagel, president of Chi Epsilon.

CMAA STUDENT CHAPTER FOCUSES ON GROWTH

The student chapter of the Construction Management Association of America (CMAA) has embraced a mission of "A community of growth" this year, according to Chapter President Katherine Christian and Faculty Advisor Professor Hank Koffman. The chapter hosts events designed to give members valuable construction and leadership experience as well as an opportunity to develop a strong network of friends and colleagues. Chapter members will participate in the ASC Student Competition in Sparks, NV in February, and members are also preparing for the USC-hosted annual symposium in April.

ENGINEERS WITHOUT BORDERS MAKE A DIFFERENCE TO RURAL COMMUNITIES

The student chapter of Engineers Without Borders (EWB) strives to meet the fundamental human needs of clean water and housing for rural communities around the globe. Led by President Omar Dana and Faculty Mentor, Professor Dana Sherman, the chapter has partnered with two communities in Honduras to assist with designing and implementing environmentally sustainable, equitable, and economical engineering projects, including clean water supply. In November the chapter participated in a Tree People Community Service Event and during winter break they will travel to Honduras.

CHI EPSILON STRIVES TO BOOST MEMBER SUCCESS IN PROFESSIONAL EXAM

Chi Epsilon is USC's Civil Engineering Honor Society, which is open to both undergraduate and graduate students. Led by President Alex Nothnagel and Faculty Advisor Professor Hank Koffman, the chapter is focusing on increasing the number of civil engineering students who take and pass the Fundamentals of Engineering/ Engineer-in-Training examination. Chapter members attended the Pacific District Conference in November and took part in a career expo and forum for civil engineering students. New member initiation ceremonies are scheduled for December 10 and May 6.

CAMPUS WILL PLAY HOST TO 2013 ASCE PACIFIC SOUTHWEST CONFERENCE

The USC student chapter of the American Society of Civil Engineers (ASCE) will co-host the Pacific Southwest Conference from April 4-6. The annual three-day event will feature student engineering competitions for participants from universities across Southern California, Nevada, Arizona, and Hawaii. The chapter, led by President Oscar Rivera and Faculty Advisor Professor Gregg Brandow, is focusing on successful execution of the conference and competition design team projects. During the 2012 fall semester, six chapter members attended ASCE's 142nd National Annual Conference in Montreal, Canada. During the 2013 spring semester, chapter members will attend the Workshop for Student Chapter Leaders in Sacramento in January and the ASCE LA Section Centennial Celebration in Los Angeles in March.

EARTHQUAKE ENGINEERING RESEARCH INSTITUTE CHAPTER PREPARES FOR 2013 DESIGN COMPETITION

The student chapter of the Earthquake Engineering Research Institute (EERI) is led by President Rafi Halajian and Faculty Advisor Professor Navid Nastar. Chapter members participate in community outreach programs, networking events, and tours of local design firms. In February, the chapter will field a seismic design team for the 2013 Undergraduate Seismic Design Competition and will attend the EERI annual meeting.

NETWORKING THE GOAL FOR ASSOCIATED GENERAL CONTRACTORS OF AMERICA STUDENT CHAPTER

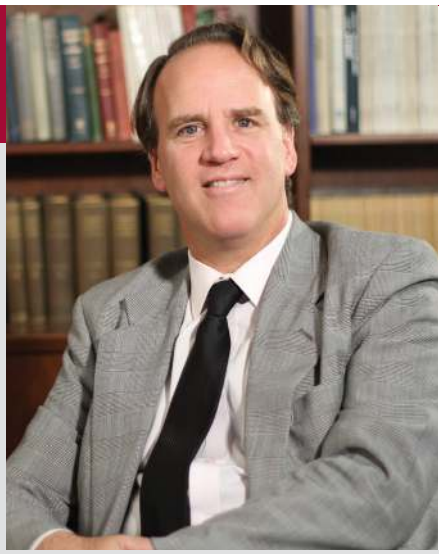
The Associated General Contractors of America (AGC) student chapter is led by President Travis Airola and Faculty Advisor Hank Koffman. It offers students interested in construction careers a chance to meet industry professionals and employers in order to enhance their knowledge and skills and provide opportunities for internships and employment. In October, chapter members attended the Fall AGC conference in Palm Desert, spoke with many professionals, and interacted with eight other AGC school chapters. This spring the chapter plans to attend the Spring AGC Conference.

INSTITUTE OF TRANSPORTATION ENGINEERS (ITE)

The Institute of Transportation Engineers (ITE) student chapter was founded in 2011 and is led by President Sam Levy and Faculty Advisor Professor Eric Shen. Events including tours of LAX, Los Angeles County Traffic Management Center, the Port of Long Beach, and a special pre-revenue operation tour of the Exposition Light Rail Line to Culver City help introduce members to the opportunities that exist within the transportation industry. This fall, guest speakers included Doug Failing of LA Metro, Jackie Patterson of JL Patterson and Associates, and Joaquin Siques of the City of Pasadena. This spring, members will participate in Traffic Bowl in March and ITE Student Presentation Night in May.

Chair's Message

As I enter my second year as department chair, I thank USC, the Viterbi School of Engineering, and the Sonny Astani Department administration, faculty, staff, students, and alumni for making my transition to USC such a wonderful experience. The past year has been marked with many successes and I anticipate even more achievement in the future. Key to this will be our faculty, to which we are making some exceptional additions. Dr. Ketan Savla and Dr. Felipe de Barros recently joined our department and Dr. George Ban-Weiss will join our department next semester. These appointments are only part of what we are enthusiastically undertaking to lead the department to new heights. To learn more about the many interesting things happening in the Sonny Astani Civil and Environmental Engineering Department, read our newsletter and visit our website at cee.usc.edu.



Dr. Lucio Soibelman

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USC Professor Named Among the World's Top Innovators

Assistant Professor Burcin Becerik-Gerber has been named to Technology Review's top 35 innovators under the age of 35.

Technology Review has recognized Burcin Becerik-Gerber of the USC Viterbi School of Engineering as one of the world's top 35 innovators under the age of 35, it was announced on August 21.

As an honoree on the magazine's 2012 list, Becerik-Gerber joins 34 other scholars in energy, biotechnology, nanotechnology, computer and electronics hardware and software, and other emerging fields.

An assistant professor in USC's Sonny Astani Department of Civil and Environmental Engineering, Becerik-Gerber is the sixth USC faculty member to receive the TR35 distinction in the last four years. The honor previously went to Jernej Barbič and Bhaskar Krishnamachari (2011), Michelle Povinelli (2010), and Andrea Armani and Ellis Meng (2009).

With a background in civil engineering and architecture, Becerik-Gerber seeks to reduce energy consumption in buildings and increase the comfort of occupants through solutions that assess the behavior of occupants and the systems of their buildings.

With degrees from Istanbul Technical University, the University of California, Berkeley, and Harvard University, Becerik-Gerber has worked as a construction manager, a technologist, an architect, and a professor.

"Being both an architect and an engineer, Burcin perfectly understands both the context and the physics of buildings and uses this powerful platform to innovate," said Yannis C. Yortsos, dean of USC Viterbi. "We are very proud of her distinction."

Lucio Soibelman, chair of the Sonny Astani Department of Civil and Environmental Engineering and Becerik-Gerber's mentor, added: "Burcin envisions an unprecedented 'new world' of fully integrated human-building systems where intelligence coordinates an occupant's behavior and energy usage. She has taken her ideas for an energy-aware society to the lab and began to implement her vision for a hyperdynamic and learned energy-aware society."

Becerik-Gerber discussed her achievements with fellow honorees in Cambridge, MA, on October 24-26. This year's TR35 winners were also featured in the September/October issue of *Technology Review*, which is published by the Massachusetts Institute of Technology, and online at technologyreview.com/tr35/.

"This year's TR35 recipients are applying technology to some of our generation's greatest challenges and innovating to improve the way we live and work," said Jason Pontin, editor-in-chief and publisher of *Technology Review*. "We look forward to watching these young technology leaders grow and advance over the coming years." ■