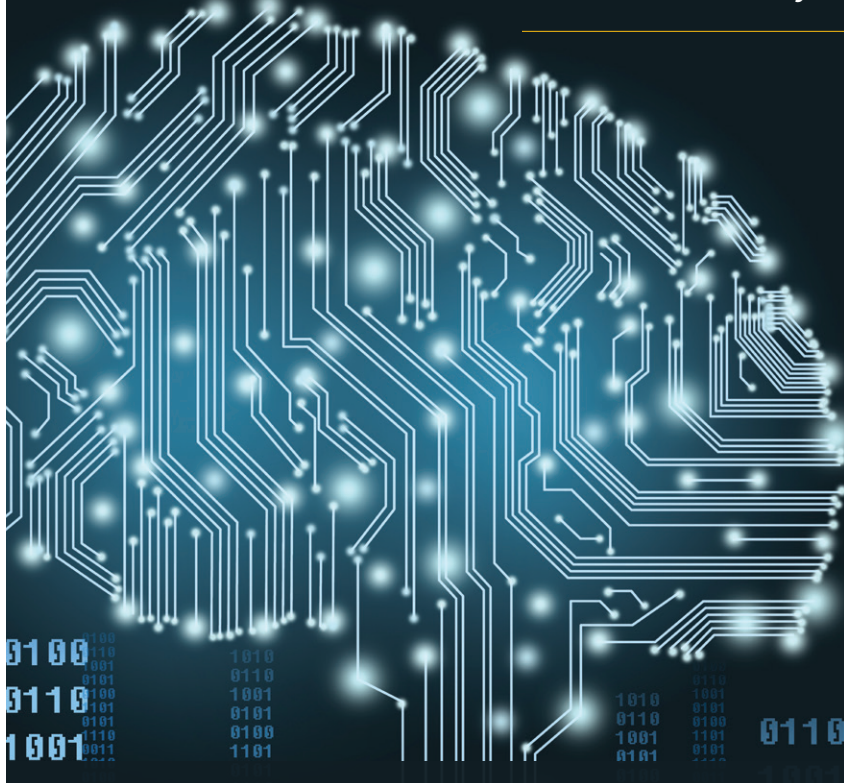


*Rapid advancements in data science and artificial intelligence have made such interaction and customization a reality.*



## Redefining the Environment-User Relationship

Imagine construction sites where human workers build side by side with robots; homes that can automatically set ideal temperature and lighting levels and self-detect maintenance issues; and even office buildings and schools designed to respond and protect inhabitants in the case of extreme violence or natural disasters.

In the not-so-distant future, built environments like homes, classrooms, office buildings and transportation hubs will become interactive entities that provide user-centered spaces and services for their inhabitants.

*Continued on next page...*

## Big Impacts

### Revolutionizing Wave Hydrodynamics Research

Studying wave hydrodynamics allows coastal researchers to assess and predict coastal currents, tides and tidal currents, internal and surface waves, storm surges, tsunamis and more – all essential for coastal sustainability and human safety.

*Continued on page 3...*

## Spotlight On...

- Master of Construction Management Program
- 2018 Pacific Southwest Conference
- Mechanical Contractors Association of America Chapter

*Continued on page 4...*

## Remarkable Research



### Studying the Effects of Technology, Physics and Social Behavior

**Ketan Savla's** research addresses fundamental scientific, technological and social challenges in the systematic planning and operation of societal-scale systems.

*Continued on page 5...*



*One USC Sonny Astani Department of Civil and Environmental Engineering researcher is studying how to build these intelligent environments to ensure users' safety, well-being and satisfaction as well as environmental sustainability.*

Continued from page 1...

## Redefining the Environment-User Relationship

Generating policies related to both humans and buildings, in a dynamically changing environment, is an exciting research challenge. Knowledge acquired through each line of research could be extended to different types of built environments. For example, in studying worker behavior within built environments, researchers could simulate the impact of worker behavior on safety as well as create proxies that communicate with workers to promote safe behavior.

Rapid advancements in data science and artificial intelligence (AI) have made such interaction and customization a reality. One USC Sonny Astani Department of Civil and Environmental Engineering researcher is studying how to build these intelligent environments to ensure users' safety, well-being and satisfaction as well as environmental sustainability.

**Burcin Becerik-Gerber**, Stephen Schrank Early Career Chair in Civil and Environmental Engineering and associate professor of civil and environmental engineering, is working on three National Science Foundation (NSF)-funded projects focused on intelligent built environments' user-centered factors of interest, like security in public buildings, productivity and safety on construction sites, and health and well-being in offices.

### Advancing Human Comfort and Safety Through AI

With Arup, a global engineering and design firm, and collaborators from USC's occupational science and psychology departments, Becerik-Gerber has been exploring the possibility of personalized control systems through the creation of a smart office desk and development of 'intelligence' to provide personalized local services. An IoT (Internet of Things) desk would be equipped with wearable and workstation-mounted sensors measuring conditions such as light intensity, temperature, humidity and carbon dioxide levels to monitor the user's environment and infer that person's intent, physiological condition and current task.

Becerik-Gerber, with Arup and her USC collaborators, received an NSF grant to develop a symbiotic relationship between the desk and its user that would maximize the user's postural, thermal and visual comfort. The project will advance fundamental research addressing how best to combine sensor data, machine learning approaches and structured communication

between the user and the workstation to bring thermal, visual and postural conditions closer to ideal over time while improving user satisfaction and willingness to use the system.

In another NSF project, with **Lucio Soibelman**, department chair and Dean's Professor of Civil and Environmental Engineering and colleagues from USC's education and psychology departments, Becerik-Gerber will study human-robot teamwork on construction sites with a particular focus on building trust in automation with the goal of improving productivity and safety.

With the advancements in construction robotics – like increased use of demolition robots and bricklaying robots – some construction tasks will be co-shared by human and robot workers. The team is interested in the collaboration's potential impact on construction work processes, such as the coordination of worker-robot interactions to innovate the safest and the most productive methods; potential improvements on work processes for an individual crew or multiple crews expected to share space; and the advantages and disadvantages of co-locating efforts.

Through a recently awarded NSF grant, collaborating with colleagues from USC's psychology, computer science and public policy departments, Becerik-Gerber will focus on building attributes designed to prevent or deter acts of extreme violence or detect emergency behaviors during active-shooter incidents in schools and offices. These research insights could improve preparedness and response to active shooter events, saving lives.

In addition to the NSF grants, Becerik-Gerber has also received the prestigious Rutherford Visiting Fellowship from the Alan Turing Institute, the United Kingdom's national institute for AI, to study the impact of building design on occupants' evacuation behavior during building emergencies. With her team and collaborators, she is collecting data in Beijing, London and Los Angeles, using simulated fire scenarios in immersive virtual environments. This data will help in understanding how building design features affect people's decision-making and the influence of cultural factors on these decisions.

# Big Impacts

Continued from page 1...

MORE THAN

1,000

researchers and engineers are currently using this software to speed up their simulations and enhance their understanding of coastal phenomena.

Employing traditional numerical models requires expensive computational facilities and excessively complex operation and results-interpretation. But, thanks to several years of hard work by the Coastal Engineering Group at USC, there is now open-source software that makes modeling far less pricey and cumbersome.

**Sasan Tavakkol**, a PhD candidate working with **Patrick Lynett**, professor of civil and environmental engineering, developed and maintains Celeris, the first interactive nearshore modeling software. It allows researchers to adjust the model while it is running, and runs faster than real-time, concurrently visualizing results. Celeris can be used on any laptop with a decent graphics-processing unit. In fact, USC researchers were able to simulate a United States coast with more than 7 million grid points in real time on a gaming laptop.

Celeris adds vivid numerical simulations to every engineer's toolbox as it eliminates the need for expensive computational facilities and introduces a user-friendly interactive graphical user interface. The first version of the software, Celeris Advent, was released in January 2017. More than 1,000 researchers and engineers are currently using this software to speed up their simulations and enhance their understanding of coastal phenomena with use cases ranging from understanding rip currents to predicting wave breaking conditions for surfers.

Tavakkol and Lynett are now working on a second version of the software, called Celeris Base. Tavakkol expects the new version to be the foundation for endless opportunities and add-ons to the software. He believes Celeris will either replace similar commercial software soon or push developing companies to adapt the new technology and upgrade their software. Tavakkol is also set to revolutionize the coastal modeling field even further by introducing immersive coastal simulations upon his graduation this fall, before he joins Google as a software engineer.

# SPOTLIGHT ON...

## Viterbi Saudi Aramco Construction Management Master's Program



**Q:** What is the purpose of this master's program?

**A:** This program is designed to educate and train multidisciplinary professionals to understand and execute the broad array of technical and nontechnical activities associated with construction management.

**Q:** What are some highlights from the first year of the program?

**A:** Sixteen of Saudi Aramco's Project Management rising stars completed their degrees in 2018. The second cohort will begin the program in 2019.

**Q:** Why did Saudi Aramco choose to invest in its employees' development through this partnership?

**A:** Sending employees to the world's top universities allows them to compete and lead in a dynamic, technology-driven energy industry. USC's top-tier global status in research and engineering, distance learning capabilities and Saudi Aramco's historic ties to California helped cement the partnership.

## 2018 Pacific Southwest Conference

Every April, the American Society of Civil Engineers (ASCE) Student Chapter at USC competes in the Pacific Southwest Conference against 17 other schools from Southern California, Arizona, Nevada and Hawaii. The 2018 conference was co-hosted by Northern Arizona University and Arizona State University in Tempe, Arizona.

 **43** USC PARTICIPANTS



**CONCRETE FRISBEE**



**VOLLEYBALL**



**OBSTACLE COURSE**



**CONCRETE CANOE**



## Introducing USC's MCAA Chapter

USC's Mechanical Contractors Association of America (MCAA) chapter launched this spring, providing field-learning and industry mentorship opportunities for students interested in mechanical and plumbing subcontracting. In March, the club attended the national MCAA conference and participated in California Plumbing and Mechanical Contracting Association events. This fall, our chapter will participate in the MCAA Greater Futures Forum – touring local mechanical contractors' offices, interacting with other chapters and attending job fairs as well as a student design competition.

## David M. Wilson Affiliates Program Commemorates 60 Years

**David M. Wilson**, chair of the USC Department of Civil Engineering until his death in 1961, left a lasting impact on his students. Those students came together to honor his legacy and continue his good works in 1958. Through the David M. Wilson Affiliates program, alumni and friends have, for 60 years, offered continuing financial support for CEE student scholarships and programs – including \$20,000 in 2017-18.

# REMARKABLE RESEARCH



## Studying the Effects of Technology, Physics and Social Behavior

*Continued from page 1...*

**Ketan Savla** has developed rigorous extensions of traditional tools, such as network flow, queuing systems, combinatorial optimization and game theory, to incorporate canonical constraints associated with civil infrastructure and autonomous systems.

In one project, his group is developing stochastic scaling methods to construct macroscopic constitutive laws for traffic flow from microscopic interaction protocols, such as car following, lane changing and routing, facilitated by emerging vehicle-to-vehicle/infrastructure communication and autonomous mobility paradigms. They're also developing novel frameworks and scalable algorithms to optimize performance of lifeline networks, such as transportation, power, gas and water.

Savla, the John and Dorothy Shea Early Career Chair in Civil Engineering, was recently promoted to associate professor of civil and environmental engineering, industrial and systems engineering, and electrical engineering-systems.

## PhD Graduate Receives Prestigious Award for Black Carbon Research

For his research into climate and health issues caused by air pollutants known as black carbon particles produced by diesel engines, coal power plants and biomass burning, **Trevor Krasowsky** received the William F. Ballhaus, Jr. Prize for Excellence in Graduate Engineering Research at the 2018 USC Viterbi PhD Hooding and Awards Ceremony.

His research aids scientists and policymakers with the California Air Resources Board, where he now works, to create science-backed policies that reduce human health risks. He studied under the direction of **George Ban-Weiss**, Pasquale and Adelina Arpea Early Career Chair and assistant professor of civil and environmental engineering and spatial sciences.



## Making Strides in Membrane-Based Water Distillation

Fourth-year environmental engineering doctoral student **Allyson McGaughey** seeks to improve our understanding of the interactions between material properties and performance for novel membrane-based water treatment systems used for wastewater reclamation and desalination.

She and her advisor, **Amy Childress**, professor of civil and environmental engineering and director of USC's environmental engineering program, use novel characterization approaches and modelling to study the effect of material properties and scaling on wetting of membranes used in membrane distillation. Childress was recently awarded a National Science Foundation grant for \$460,000, to which McGaughey was a key contributor.



# Congratulations, Class of 2018!

## 750+

people gathered on **May 11** for the Astani Department of CEE commencement ceremonies.

The graduating class was composed of:

## 11

doctorate graduates

## 133

master's degree graduates

## 39

bachelor's degree graduates

Keynote speakers included:



**Armas Clifford "Mike" Markkula, Jr.** – Co-founder of Apple; founder and chairman of Echelon Corporation



**Wanda Austin** – USC Trustee and retired President and Chief Executive Officer of The Aerospace Corporation



**Harel Kodesh**  
Partner  
Silver Lake Partners



# HIGHLY ACCOMPLISHED

## PhD Students Receive Hoods and Recognitions

The 2018 USC Viterbi School of Engineering PhD Hooding and Awards Ceremony took place Thursday, May 10, 2018, in Bovard Auditorium. During the ceremony:

- > **Ashrant Aryal** was recognized for receiving the Viterbi Undergraduate Research Mentoring Award.
- > **Lauren Crawford** was acknowledged for receiving the Jenny Wang Excellence in Teaching Award.
- > **Trevor Krasowsky** received the William F. Ballhaus, Jr. Prize for Excellence in Graduate Engineering Research.

## Master's Students Take Home Special Awards

- > The Excellence in Service Award was awarded to **Sierra Allegra**.
- > The Excellence in Research Award was presented to **Shiyang (Gary) Huang**.

## Honoring Undergraduate Excellence

Honorees at the 2018 Viterbi Undergraduate Award Ceremony included:

- > **Sam Kinsey**, David M. Wilson Affiliates Outstanding Achievement in Civil Engineering
- > **Cole Kurth**, Albert Dorman Future Leader Award
- > **Justine Lee**, David M. Wilson Affiliates Outstanding Achievement in Environmental Engineering
- > **Samantha McVety**, Viterbi Award for Outstanding Research
- > **Milly Rodriguez**, Center for Engineering Diversity Award

## Professor Chosen for Prestigious Fellowship

Selected as a Fellow at the prestigious Harvard Kennedy School of Government's Belfer Center for Science and International Affairs in the Science, Technology, and Public Policy Program Project on Managing the Atom, **Najm Meshkati**, professor of civil and environmental engineering, industrial systems engineering and international relations, will be on sabbatical from USC during the 2018-19 academic year. At Harvard, Meshkati will work in areas related to nuclear safety and engineering diplomacy.



## STAY CONNECTED



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your updates to  
[salinapa@usc.edu](mailto:salinapa@usc.edu).

## CHAIR'S MESSAGE

# Greetings!

As I begin another three-year term as department chair, I am amazed at the wonderful, talented group of faculty, staff and students with whom I work, and I am thrilled about the successes I have witnessed.



We've seen remarkable interest in the fields of environmental and civil engineering. Currently, our program includes 152 undergraduate, 255 master's and 71 PhD students. On May 10, 183 students received degrees from CEE. And a few weeks before graduation, some students were formally recognized for their excellent work at annual award ceremonies. The 2017-18 academic year was an active one for our student organizations. We welcomed our own chapter of the Mechanical Contractors Association of America. Our American Society of Civil Engineers student chapter once again competed at the Pacific Southwest Conference, placing eighth out of 18 schools overall. Our faculty and staff continue to excel in research. These projects bring to the forefront ways in which our department can help alleviate poverty, aid in disaster recovery and otherwise improve life for people around the globe while respecting natural resources. Throughout this newsletter, you've received a glimpse at some of the achievements of our exceedingly talented faculty and student engineers.

We appreciate all your support and encourage you to stay connected with our department. We look forward to continued success and great adventures.

**Lucio Soibelman, PhD**

*Chair of the Sonny Astani Department of Civil  
and Environmental Engineering*