SACRAMENTO STATE

CE CONNECTION

Your Link to the Department of Civil Engineering

SUMMER 2016 | ISSUE 20

INSIDE

SACRAMENTO STATE
Department of Civil Engineering

SUPPORT THE DEPARTMENT

Looking for a way to support the Civil Engineering Department?
We have four different funds that enhance our ability to educate students:

- The Ken Kerri Endowment Fund – Gifts to this fund support faculty and student enrichment activities.
- The CE Freshman Scholarship Fund – Scholarships are given to outstanding freshmen.
- The Graduate Environmental/Water Resources Scholarship Fund – Scholarships go to deserving graduate students in the environmental or water resources engineering areas.
- The Department Trust Fund – These resources support student attendance and participation at conferences and competitions, senior design project team expenses, and equipment for labs when other funds are not available.

To donate to any of these funds, go to www.ecs.csus.edu/ce/support.html and follow the directions for online donations. Or mail a check made out to the appropriate fund to the Department of Civil Engineering, Attn: Ashley Mihok, California State University, 6000 J Street, Sacramento, CA 95819-6029.

UPCOMING EVENTS

Gain access to all of these events through the Department of Civil Engineering Sponsorship Program! Information for 2017 sponsorship will be distributed during the upcoming fall semester.

November 3, 2016:
13th Annual An Evening with Industry

December 9, 2016:
CE 190 Student Project Presentations

December 17, 2016:
Commencement

Spring 2017:
Mid-Pac Competitions at California State University, Chico

April 2017:
Ninth Annual Ken Kerri Endowment Fund Luncheon

September 2018** :
Sixth Annual Civil Engineering Golf Tournament

***** The Department of Civil Engineering golf tournament is moving seasons from spring to fall! The next tournament will be hosted in mid-September, 2018.***

On the Cover...

Students proudly applaud a speech during the spring 2016 commencement ceremony.

CE CONNECTION

Chair's Message

Dear Colleagues and Alumni,

I hope this edition of CE Connection is reaching you at the end of a fun and productive summer.

Along with updating grade records for our matriculated students and preparing for the new academic year, civil engineering has hosted multiple orientation sessions during the summer, welcoming 80 new transfer students and 120 new freshmen into our program. Compared to last year, the number of transfer students increased by 41 percent whereas the incoming freshman growth was a more modest 3 percent. In addition, the fall semester graduating class is shaping up to be the largest in recent memory with over 70 students projected to walk across the stage in December. It's clear that civil engineering remains one of the most attractive programs at Sacramento State and is doing a fantastic job of producing highly skilled and educated engineers to meet the increasing infrastructure needs of our society.

Our faculty are the keystone of the program and have been as productive and energetic as ever. As you can read more about in the newsletter, Richard Armstrong received a grant to investigate the seismic response of two dams damaged during the Loma Prieta Earthquake and John Johnston was part of a project team that won an ASCE section award for the best urban development project of the year. Cristina Poindexter and Ghazan Khan received grants to redesign two civil engineering lab courses using technology. In addition, I'm happy to announce that Kim Scott-Hallet has accepted a position as a full-time lecturer in the department, and will begin her position in the fall.

Are you looking for a way to support our program? Our 13th annual An Evening with Industry is November 3 from 5-8 p.m. and we need several panelists to answer students' questions about the profession. If you would like to serve on the panel, please contact me (fellb@csus.edu) or Ashley Mihok (ashley.mihok@csus.edu).

Thank you for taking the time to read through the summer newsletter and for the fantastic support you give to our department.

Ben Fell—Chair, Department of Civil Engineering

Ken Kerri Luncheon Speaker Outlined EchoWater Project

The Alumni Center was packed on April 13 for the eighth annual Ken Kerri Endowment Fund Luncheon, featuring keynote speaker Prabhakar Somavarapu, general manager of the Sacramento Regional County Sanitation District ("Regional San") and the Sacramento Area Sewer District. The topic was the massive EchoWater wastewater treatment project.

In opening remarks, Environmental Engineering Industry Advisory Committee Chair Marco Palilla, PE (of HDR Engineering), welcomed guests and mused that the late Dr. Kerri was looking down on the luncheon, saying "Finally, they're doing a topic I relate to!"

Dr. Ramzi Mahmood, professor and director of the Office of Water Programs, also spoke of Dr. Kerri's legacy by asking the students in attendance to stand up and be applauded. "[Dr. Kerri] wanted to help students have better opportunities," said Dr. Mahmood. He encouraged students and all those in the room to return to next year's luncheon with a guest. "Wherever Ken Kerri is, he's smiling because this is successful. Let's keep him smiling."

Department Chair Dr. Ben Fell told the crowd, "Our department prides itself on our connection to the civil engineering industry. We want students ready on the first day [on the job], but also ready for a lifetime of success."

Introducing the EchoWater project, keynote speaker Mr. Somavarapu gave the group some context: "EchoWater is larger than the airport Terminal B, the Downtown Arena, or the Folsom Dam Project." He gave a brief history of wastewater in Sacramento beginning in the 1970s, when the existing Elk Grove treatment plant was built. The facility treats wastewater for the entire Sacramento region, plus Walnut Grove and Courtland.

Very stringent new state regulations on discharging wastewater into the Sacramento River were established in 2010, necessitating a sweeping upgrade to the facility, with a 2023 completion date. "The water will be recycled and reused, hence the name 'echo,'" said Mr. Somavarapu.

"There are concerns about ammonia harming species propagation, and therefore the food supply," he said. The current secondary treatment process will be replaced with a tertiary system. "We will remove ammonia, nitrates and further reduce pathogens in the water."

In terms of size, the plant is among the top 25 water treatment facilities in the world. The overall cost of the project will be between $1.5 and $2.1 billion, and it employs nearly 700 workers. A new road was built just to get to and from the project, which Mr. Somavarapu likens to a "small city we're creating."

"It's not just engineering planning but financial and community relations," he said. "The expertise needed for this project is great. [The potential for] protests and lawsuits with a project like this is very high."

EchoWater must be funded by customer rates, which he said were about $32 per month. A July 2016 increase would bring the rate to $35, and by 2023, when the project is complete, rates are anticipated to rise to the high $30s. "The project is currently under budget and on schedule," said Mr. Somavarapu.

A question and answer session rounded out his presentation. In response to a question about water reuse and recycling, Mr. Somavarapu spoke to agricultural irrigation: "We want farmers to get away from using groundwater and start using recycled water," he said. "We want to improve the habitat for the Cosumnes River, and the recycling will bring the river water level up."

CE CONNECTION

Professor Selected for $80K Award to Study the Relationship between Earthquake Shaking and Embankment Dam Deformations

Dr. Richard Armstrong, who joined the full-time faculty of the Civil Engineering Department in fall 2015, was selected for an $80,000 research award to work with the California Geological Survey and its California Strong Motion Instrumentation Program (CSMIP) on a research project over the next two academic years.

His project will analyze the strong-motion data recorded from CSMIP "lifeline structures" – in this case, embankment dams – that are instrumented with accelerometers, as well as earthquake data from other sources, with the goal of better understanding the response of dams during seismic events. The specific dams chosen were Lenihan Dam and the Anderson Dam, both of which are owned by the Santa Clara Valley Water District and were shaken in the 1989 Loma Prieta earthquake.

"I'm going to develop numerical models to predict the response of these dams during the 1989 earthquake," said Dr. Armstrong. "These dams had instrument recordings during shaking, measuring both the acceleration along the dam as well as how much the dams moved from the earthquake. For both dams, the movement was relatively small so there were no significant concerns for safety, but this data will provide a way to evaluate my numerical analyses."

Utilizing additional earthquake data recorded by CSMIP and from other sources, "I want to use the numerical analyses of these dams developed for the 1989 Loma Prieta earthquake to then investigate how deformation of the dams is linked to higher and lower earthquake shaking based on other earthquake recordings," said Dr. Armstrong. "Loma Prieta was a strong event, but we know based on characteristics of the fault that you can produce higher and lower shaking as well."

Dr. Armstrong's winning proposal was chosen by CSMIP to address various aspects of interpreting strong-motion data. His proposal addressed lifelines, while the others proposals focused on buildings and ground response. All are intended to improve seismic design and code practices and response to earthquakes.

"I'm grateful I had those six years at [the California Division of] Safety of Dams," says Dr. Armstrong of his time as a design engineer before coming to Sacramento State. "The practical research made me very competitive for this particular project. The outcomes of this work will be discussed and presented in the undergraduate and graduate classes I teach in geotechnical quake engineering."

> **"I'm excited to see what will come about and the opportunities to infuse what I learn into the curriculum. Hopefully this will be the beginning of other fruitful research endeavors."** *— Dr. Armstrong*

This being his first funded research project at Sacramento State, Dr. Armstrong is looking ahead to how future projects might allow him to more closely involve the students. "I'm excited to see what will come about and the opportunities to infuse what I learn into the curriculum," he says. "Hopefully this will be the beginning of other fruitful research endeavors."

Stormwater Project Garners Awards

The rain gardens and bioretention planters that sprouted up around campus have been recognized with significant awards from two professional organizations.

Funded by the State Water Resources Control Board's Proposition 84 Stormwater Grant Program, the project involved implementing Low Impact Development (LID) Best Management Practices (BMPs) on campus (see the Fall 2015 CE Connection). In May, the Sacramento Section of the American Society of Civil Engineers (ASCE) awarded the project its 2015 Urban Development Project of the Year. Later in the month, the California Stormwater Quality Association (CASQA) designated the project as the "Outstanding Best Management Practice Implementation Project" for 2016. Formal recognition will occur at CASQA's annual meeting in September.

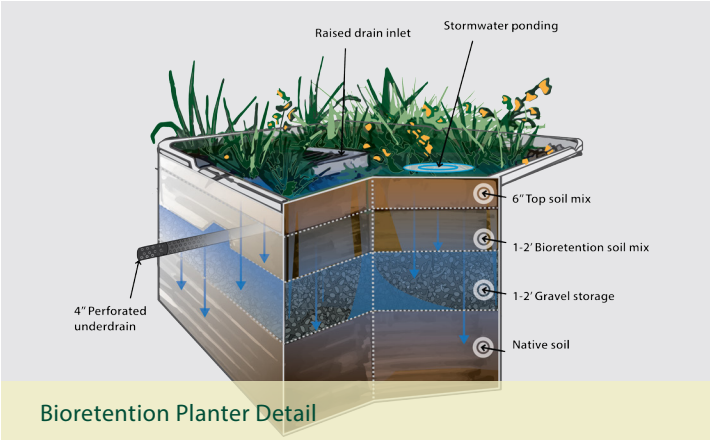
Both awards are shared by the three main entities that collaborated on the project: the City of Sacramento (the grant awardee), Sacramento State's Office of Water Programs (OWP, which wrote the grant application and coordinated the project) and the Sacramento State Division of Facilities Management, which contracted the design and construction services. Other project partners included Cunningham Engineering Corp., Urban Rain Design, the Dry Creek Conservancy and Sacramento County.

"This was a unique collaboration tying together the expertise of multiple stormwater organizations," said Maureen Kerner, research engineer at OWP and project manager. "All those involved are honored to be recognized this way. Based on inquiries and interest from the public, and these awards, the project is already having an effect on LID implementation throughout the Sacramento region and elsewhere in California."

According to John Johnston, civil engineering professor and a member of the OWP project team, the project is exemplary in a couple of ways. "There are not many places where you can see this number and variety of BMPs in close proximity. In addition, everyone involved gained valuable experience in retrofitting BMPs in an existing urban setting."

To get the word out, the grant is funding ongoing education and outreach activities to engage the public, stormwater professionals, and construction contractors. These include presentations at professional meetings, a CSUS STEM lecture, hosting a regional LID conference on campus, a project website (www.owp.csus.edu/CSUS-LID), and campus signage. In addition, John has incorporated a stormwater LID lab/field trip into CE 170, the environmental engineering class, and for their senior project, a team of computer science students helped develop a self-guided walking tour for mobile devices.

"The signs and walking tour will be available this fall," adds Maureen. "We hope people will visit the campus to see what we're doing to improve stormwater quality and make the campus more sustainable."



Bioretention Planter Detail


View of a Bioretention Planter installed in Lot 10

CE CONNECTION

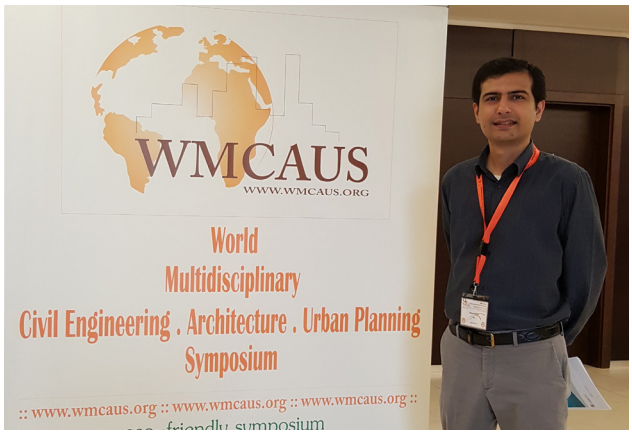
Student Project Leads Professor Khan to Symposium in Prague

What began as a senior project for a group of students led Dr. Ghazan Khan to write a paper he presented in June at the World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium in Prague, Czech Republic.

The paper originated from a group of Computer Science seniors who took Dr. Khan's Engineering 115 (Statistics) course earlier in their studies at Sacramento State. "A group of students came to my office and said, 'We're doing a senior design project and have no good ideas. Do you have any?'" says Dr. Khan, who gave the students several suggestions.

"They chose to develop a mobile application to help transportation engineers easily collect and manage infrastructure data in the field," says Dr. Khan. "Mobile devices have cameras, GPS sensors, accelerometers – all this different technology. As a transportation engineer, say I want to collect data of all the signs on the road. I should be able to take a picture, collect the locations of signs, come back to my office to download data and work with it. That was the vision, and I told the students to build an app."

With Dr. Khan's guidance, the six Computer Science students built the app to do that and more. Dubbed TAMS (for transportation asset management system), the mobile app is available for iOS and Android devices and works with Google Maps to provide location and navigation.



Users can identify and classify features (like bridges) as points, and can also collect data such as pictures, voice and typed notes.

According to Dr. Khan's abstract for the symposium, "The back-end system of TAMS consists of the web app, which has been developed to work directly with the remote server that is hosted on a personal computer. Multiple users can collect data using the apps in the field and synchronize the data using the web app with the remote server."

> **"All these folks came together to develop this idea…"** — *Dr. Khan*

Data can be uploaded directly to the server so it can be edited or updated in the field, and can be exported into multiple formats. TAMS is compatible in a Geographical Information System (GIS) environment to leverage location and attribute information.

"Once the students wrapped up the project last December, I put together an abstract and submitted it to the symposium in Prague," says Dr. Khan. "It was a multidisciplinary gathering to discuss ideas, so I thought it was perfect. This research was a multidisciplinary effort in civil engineering and computer science. All these folks came together to develop this idea that can be used not just by civil engineers, but by others."

Approximately 500 attendees from 50 different countries attended the symposium, where Dr. Khan reported each session was followed by robust discussion and collaboration.

The Computer Science students who worked on TAMS were named in Dr. Khan's abstract. They are: Andreas Bueff, Javier Garrido, Ivan Mihov, Arash Parnia, Chris Russel and Nati Tessema.

SWE Shadow Day Boasts High Attendance, Enthusiastic Participation

The Sacramento State chapter of the Society of Women Engineers (SWE) is celebrating its highly successful, sixth annual Shadow Day event that took place on March 10.

More than 70 middle and high school girls from the Sacramento region attended Shadow Day, which is designed to familiarize young women with the engineering fields and give them an opportunity to experience the life of a college engineering student for a day.

"We wanted to make girls feel as welcome as we can in the world of engineering," said Mary Sanchez, SWE Shadow Day coordinator. "We wanted to reassure them that it's not scary and they can be successful if they just give it their all."

The day began with welcoming remarks by Dean Dr. Lorenzo Smith and an explanation of the different branches of engineering by Dr. Ramzi Mahmood. The girls were then split up based on their stated interests and taken to various lecture and lab sessions, including a hydraulics lab by Civil Engineering Professor Dr. Cristina Poindexter. They also had the chance to meet various engineering campus clubs.

"We made sure to have our Engineering and Computer Science (ECS) team be part of it as well because it's not just an event for us as a club, but also for the school," said Mary, "so the girls get to see how much our staff and faculty care about us as students and engineers."

Other SWE officers were heavily involved in carrying out the event – including Srishti Thakur, Malak Alhaidari and Margarita Kovalchuk – as were volunteers from throughout the College of ECS. One of the challenges this year, said Margarita, was overcoming the low attendance of last year's Shadow Day.

"I realized that instead of emailing local high schools like we had done in the past, it would be better to go in person to invite their students," Margarita said. After a fortuitous visit to Rosemont High School where she happened upon a meeting of the math and science teachers and convinced them to make Shadow Day a field trip, other SWE members followed suit. "Once schools saw we were real people and not spamming them, other SWE members began going to high schools and meeting with principals." (Nearly 40 girls from Rosemont High alone attended.)

Rounding out the day was a panel of five professional women engineers, including Eileen Crawford, PE (BS '82). "The panel included women who had recently graduated and joined the workforce and those of us who've been doing it for a few decades," Eileen recalled. "There was a nice variation between civil, mechanical and electrical engineers. The girls wanted to know what we did, how we chose the careers we'd chosen. A lot

of them were really good at math so we were encouraging them to see what they wanted to do next; what path to take."

> **"Through the process of elimination, you discover what your true passions are."**
>
> ***— Eileen Crawford***

Reflecting on the women who had helped her make her way through the ranks as a young engineer, Eileen enjoyed offering her insight to the girls. "I told them how when I got into college I took different types of engineering courses to decide which type to major in," she said. "Through the process of elimination, you discover what your true passions are. I'm always trying to encourage young girls to think about all the options out there."

Eileen and the SWE officers all praised the faculty who helped orchestrate the day's activities, which received very positive reviews from the girls who attended. The College of ECS and the Office of Admissions donated items like pens, mugs and gift bags. "The girls who came and participated got a lot of goodies," said Mary. Shadow Day was even named Outstanding General Program by the campus Student Organizations and Leadership Office, a peer-nominated honor.

"The girls who participated seemed to be really enjoying all the activities," Mary recalled. "They got to see firsthand what kind of labs, activities and ideas that engineering can offer. It was a great turnout of volunteers and students. It's a great feeling knowing we're all in this together – I couldn't have asked for more."

Margarita Kovalchuk Wins Mead Paper Competition at Mid-Pac

At this spring's American Society of Civil Engineers Mid-Pacific (Mid-Pac) Conference competitions, Margarita Kovalchuk emerged in first place for the Mead Paper portion – even though at first, she was erroneously awarded second place.

Students vying in this competition were given a topic about ethical obligations to provide safe and sound engineering solutions when working in foreign locations. "Going into the paper, I assumed based on previous years' results that most students would use a case-study approach," said Margarita. "But I thought since there are

so many different fields within civil engineering, it would be better to present some sort of methodology in determining design standards versus saying 'this is one design standard that will work every time without fail.'"

> **"I was so happy just to have won something…to bring back to Sac State."**
>
> ***— Margarita Kovalchuk***

The Mead Paper is submitted in advance of the Mid-Pac competition along with a PowerPoint presentation, and then students must present their work at the competition before a panel of judges from industry. "They judge both the content of the presentation and our speaking skills – our speech, our poise, that type of stuff," says Margarita. "They also judge us on how closely it relates to the written paper."

Because of her thoughtful approach, Margarita felt confident she'd given her best effort and would be pleased with the outcome regardless. So when she was announced as the second-place winner at the awards reception, she says, "I was so happy just to have won something to be able to bring back to Sac State."

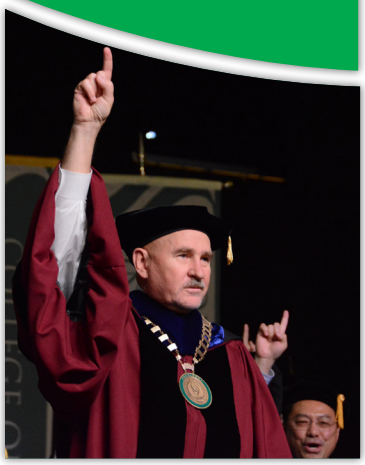
The following Monday, when detailed scores were released online, Margarita noticed her overall score was higher than that of the UC Berkeley student who was awarded first place. When others began texting her, puzzled about the scoring, she emailed the Mid-Pac coordinator, who soon apologized – Margarita had actually won first place.

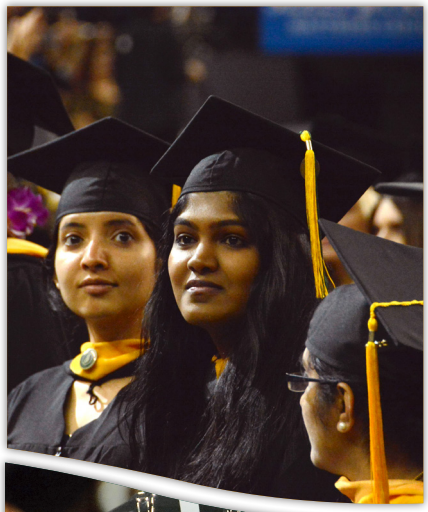
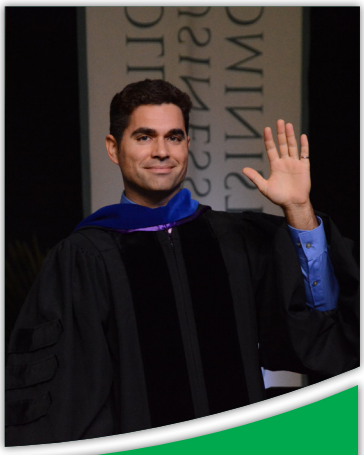
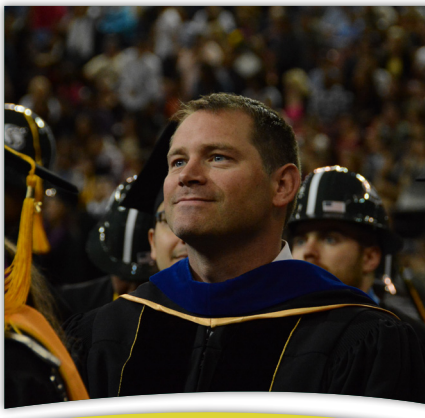
"It was a lesson that engineers aren't perfect no matter how much we can strive to be in our math," laughs Margarita. "Small mistakes can happen. It's great to be optimistic about things, because even second place would've been awesome."

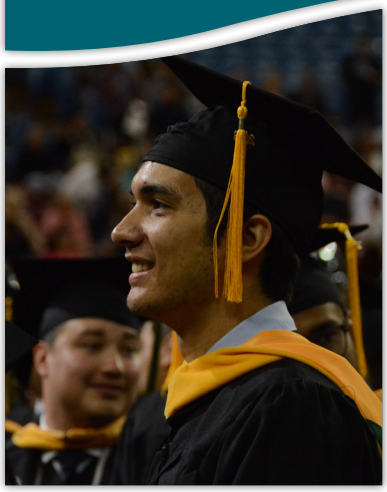
Annual Civil Engineering Golf Tournament

The team of Wood Rodgers, Inc. captures the moment of a fun day on the green.

Congratulations





Class of 2016

NEWS & NOTES

Faculty

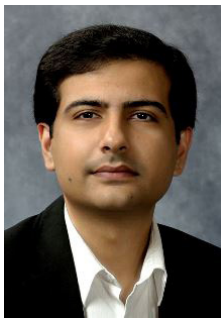
Two Professors Awarded Course Redesign with Technology Grants

Two civil engineering professors are pleased to be the recipients of grants intended to improve certain courses by adding a virtual lab component meant to increase student comprehension and success.

The California State University system awards a limited number of Course Redesign with Technology grants, and Drs. Ghazan Khan and Cristina Poindexter will each be receiving them for the coming academic year. "The idea is to use new technologies to redesign a course in order to improve student learning, but also try to alleviate some bottleneck issues so courses that have a lot of students failing or not finishing courses, we can try to reduce those and improve graduation rates," says Dr. Khan.

Dr. Poindexter will be adding a virtual "pre-lab" to her existing hydraulics lab, which is a required course for all civil engineering students. The plan "is to give additional hands-on time with the materials," says Dr. Poindexter, "so before the lab students can work with simulations that don't exactly replicate the phenomena in the lab, but they come close. It will also expose them to the concept of numerical modeling, which many will do in their careers, such as modeling of rivers, estuaries or bays."

She acknowledges it's very difficult to simulate fluids and hydraulics lab experiences, but says, "I'm really excited to try something new. It's a great lab already; I'm very impressed by the equipment and by the different experiments that have been part of the lab for many years. This is a great starting place to add something to it."



Dr. Khan plans to add a virtual lab component to his undergraduate transportation engineering course. "A lot of the lab activities are conducted in the field," he says. "That will not change. This is to try and develop some pre-lab exercises for students to complete so when they go out into the field they already know the basics: what to do, procedures, caveats. There was a gap [between theoretical coursework and practical fieldwork] where some of the students were struggling with applying the procedures and caveats of connecting field data. These pre-lab activities will better prepare students for fieldwork."

The grant funding provides each professor with two units of release time to work on their projects, meaning they can reduce their teaching courseload by two units.

Dr. Poindexter recently attended the Course Redesign with Technology Summer Institute consisting of grant recipients from the past academic year, as well as others like her and Dr. Khan who are about to embark on their own course redesign projects. "There are many different educational technologies out there, some being used at Sacramento State and others CSUs," she said. "It was nice to see those all in one place and get to talk to people from the companies that produce those educational technologies."

Dr. Julie Fogarty attended the North American Steel Construction Conference (NASCC) in Orlando this past April. This conference is offered by the American Institute of Steel Construction (AISC). She reports that the conference featured presentations and discussions on potential research collaborations, and information from industry on how steel fabricators and manufacturers impact the design decisions of structural engineers. "Of particular interest was the educator session, which provided information on the latest methods for teaching steel design at the undergraduate level," said Dr. Fogarty. "To continue discussing topics introduced in the educator session and improve my teaching at Sac State, I'll be attending the AISC Educator Workshop in Chicago July 18-19."

Students

Margarita Kovalchuk

ASCE Sacramento Ladies Auxiliary Scholarship ($1,000)

"I'm incredibly grateful to these ladies who have years of experience and are willing to invest in my future," says Margarita of receiving the scholarship. "It was great talking with the ladies at the award luncheon. Some of them were wives of civil engineers and so it's a different perspective than the Society of Women Engineers, but both groups are incredibly supportive of girls who are interested in going into engineering. The Ladies Auxiliary is doing all it can to encourage us."

Graduate Profile

Wyatt Arnold

2015-16 Outstanding Student, Department of Civil Engineering

In this new feature, we spotlight a recent civil engineering graduate. Wyatt Arnold has a unique background, having studied in India for five years before returning to the U.S. to focus on civil engineering studies. Wyatt, who earned his degree in May, finds engineering to be a very logical pursuit.

Did you always know you wanted to major in civil engineering?

No. I was moving back from living for five years in India and wanted to finish my bachelor's degree. I wanted something very practical, skills-oriented and science-based. I thought civil engineering could offer both. It's not just the pure math and science but also something around social value and context as well.

Will you be attending graduate school?

Yes, I want to do grad studies at some point. But if I do apply to a graduate program I'm going directly to a doctorate. So I thought I'd take a few years to gain some work experience first.

Do you know what branch of civil engineering you want to focus on?

I knew from the beginning that I'd want to focus on water resources, because it's a basic resource. There are a lot of challenges around water management and planning because of population growth, climate change and managing resources sustainably. I took all my electives in water-related courses and now I'm working at Department of Water Resources, so that's been my focus.

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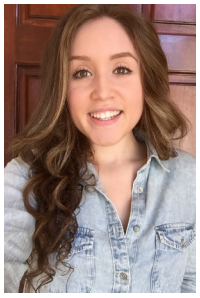
NEWS & NOTES



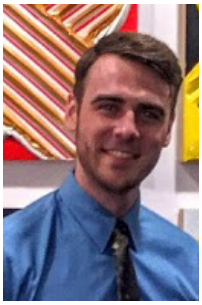
Diana Villegas Sanchez

2016 Freshman Scholarship ($1,500)

"I applied for the Civil Engineering Freshman Scholarship, and through my grade point average and community services, It was awarded to me," says Diana. "It is great to know I have the support of the Civil Engineering department so early on in my college career. This financial aid not only allows me to accomplish my dream, but represents the department's support of women in the field. I thank you, again, for believing in me."

Michael Pitcock

2016 Freshman Scholarship ($1,500)



George Brown

2016 ASCE Golze Scholarship ($1,500)

"Winning this scholarship has helped me afford to work less, so that I can spend more time on studying," says George. "Being able to meet some of the professional engineers from companies with project awards at the awards ceremony was further inspiration for moving forward in the field of civil engineering. I am so thankful for the support of the Alfred Golze Scholarship and the Sacramento Section of ASCE for their contributions, which help so many students."

Malak Alhaidari

2016 ASCE Golze Scholarship ($1,500)

Bryce Leuschen

2016 Ronald W. Smith Scholarship ($1,500)

Alumni

2010... Cody Milligan, PE, joined Wood Rodgers in August 2010 as a water resources engineer and obtained his PE in June 2013. He's worked on projects as small as one acre to as large as the entire Sacramento River Basin. "For me, the most interesting project I've worked on was the Lower Sacramento River System Central Valley Floodplain Evaluation and Delineation (CVFED) Program," says Cory. "For CVFED I worked to develop two-dimensional models and then map over 2,000 square miles of floodplain for communities like Sacramento, West Sacramento, Natomas, Davis, Woodland and Yuba City. The project had a legislative deadline, which meant it had to be met at all costs; I spent a few long nights that reminded me of nights spent working on my senior project." Cory and his wife, April, have been married since June 2014.

2010… After graduating, Lindsay Jones, PE, moved to Seattle to work as a field engineer for Kiewit Pacific Company, where she had previously interned. Her job entailed the construction of a large sewer pump station to accompany a new wastewater treatment facility.

Missing family and friends, Lindsay returned to California in late 2011 and joined Tricorp Hearn Construction as an estimator, writing bids in the private and public sector focusing in the hospitality and multi-family segments. "This experience taught me to price construction projects, understand the scope of work in a project, and understand the clients' financial expectation of a job – and the importance of relationships in the engineering/construction industry."

> **"Every day I am excited to go to work…"** *— Lindsay Jones*

In 2014 Lindsay began working for MacKay & Somps Civil Engineers in Roseville. "Our market segment is land development focusing on residential communities," says Lindsay. "I have found my construction background and estimating experience to be extremely advantageous in design work. Every day I am excited to go to work and know that I am producing a product that brings families and communities together."

Lindsay makes time for fun – she enjoys walking her dog, golf, and wine tasting with friends. "My latest goal to achieve is completing this year's Tough Mudder in Tahoe with my boyfriend," says Lindsay.

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Graduate Profile, Wyatt Arnold

What were your favorite classes at Sacramento State? What about professors?

I never took a class that I didn't enjoy or find interesting. They were all really valuable and very well-designed and taught. Even though it wasn't my eventual focus, Professor Cyrus Aryani's course in soil mechanics was so well-thought out and he knew the material, almost like he was teaching from photographic memory. I thought he was really inspiring. Professor Cristina Poindexter was my faculty advisor for the research project I did on wetland hydrology and hydrodynamics. She's relatively new but maybe that made her more accessible. She was enthusiastic to learn from her students, and was so present and willing to talk through things.

Tell us about your senior research project you completed with help from Dr. Poindexter.

The study was a look at mainly tidal wetlands in north America and their hydraulic properties, their hydrology, and a little about how wetlands are restored. It started out with a lot of literature review of recent and older flagship studies. Then it became a very intensive research project about what physical processes affect sediment supply over varying time cycles – from the daily diurnal and semidiurnal fluctuations all the way up to yearly physical cycles that affect sediment to tidal marshes in the Suisun Bay.

This was done using a statistical analysis known as Singular Spectrum Analysis with Missing Data, a technique that had been perfected by David H. Schoellhamer of the U.S. Geological Survey. We looked at one variable measured every 15 minutes for 10 years: turbidity – the measure of the cloudiness of water, how much light refracts in water based on the particles reflecting light. There is a database that holds all these water quality indicators in different wetland reserves and estuary reserves across the U.S.

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CE CONNECTION

Alumni Spotlight

Bill Busath: It's Never Too Late

Every civil engineer knows that working toward a degree is no easy feat; the rigorous program can occupy a significant portion of one's life. Earning that degree while running a business and supporting a large family? That requires some serious dedication.

In 1996, Bill joined the City of Sacramento Department of Utilities as an associate civil engineer, where he managed sewer and storm drainage infrastructure capital improvement projects. After that, he managed the city's Stormwater Quality Improvement Program as supervising engineer for six years, then moved to supervising engineer overseeing the city's Floodplain Management Program. He next managed the Drainage Capital Improvement Program.

Around that time, Bill returned to Sacramento State to fulfill a personal goal of earning a master's degree with a focus in engineering management, which he completed in 2012.

> **"Sacramento State's strength is that they train – specifically in engineering – very practically for students to be able to start working when they get hired."** *— Bill Busath*

Bill Busath was a self-employed garage door contractor for more than 10 years – with a wife and children – when he embarked on an engineering degree in the 1980s. "It probably took me six years to get through two years' worth of [education at] Sacramento State," he says. "I appreciated the teachers – their attention to my education and their encouragement. I had five or six kids by the time I graduated with my BS, so it was critical that there be some flexibility and Sacramento State did a great job."

Earning his bachelor's degree in 1990, Bill went to work for Caltrans in 1991 and stayed there for five years working as a transportation and bridge engineer. "I remember my boss at Caltrans being very impressed with my ability to hit the ground running," says Bill. "Sacramento State's strength is that they train – specifically in engineering – very practically for students to be able to start working when they get hired."

Now Director of the City of Sacramento Department of Utilities, Bill can look back on a career with many high points. "Some of the significant things that have are happening under my watch are the $160 million rehab of our drinking water treatment plant," says Bill. "Plus delivering a $230 million accelerated water meter installation. This program will install the last 42,000 meters in the City of Sacramento. We're going to do it over four years and by the end of 2020 all of Sacramento will have meters.

"The thing I appreciate about my time as a program manager with the City of Sacramento is the level of trust and responsibility that was given," continues Bill. "I was given some very challenging projects, including some significant storm drainage pump station projects and underground piping projects, and was allowed to move projects forward as I saw fit with very little oversight. That was highly motivating for me."

Bill has come a long way since his days as a student, but he is never far from the Sacramento State campus. Since 2007, he's represented the city on the university's Environmental Engineering Industry Advisory Committee. "I'm the vice chair of that group," says Bill. "Marco Palilla is the chair and he does a great job. My main responsibility is heading up the Ken Kerri Endowment Fund subcommittee. We do the annual luncheon and coordinate fundraising. It's been a great joy to work with Marco, Ben [Fell], Kevan [Shafizadeh] and Ramzi [Mahmood]."

Bill's office also sponsors the Civil Engineering Department's annual An Evening With Industry, and he's assisted with teaching some evening classes.

With a large family (seven children, 10 grandchildren and one more due any day now), Bill and his wife stay busy visiting them and participating actively as members of the Church of Jesus Christ of Latter-Day Saints. His involvement at Sacramento State, he says, stems from the debt he feels he owes to the Civil Engineering Department and his enjoyment of working with the faculty.

"I love the term 'alma mater,' because in Latin it means mother of the soul," says Bill. "I just really consider that Sacramento State gave me the tools, and the degree I received has opened so many doors for me. It has made a huge difference in my life and my family's life. I will always be grateful for that."

And to anyone considering a college degree later in life? "Don't be afraid to go back to school, and don't ever think it's too late," says Bill. "Even if somebody's 40 and it takes them eight years to get their degree, that eight years is going to pass anyway and at the end, you'll either have a degree or you won't. You can do it. Life never gets less complicated, it only gets more, so the time to do it is now and not later."

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Graduate Profile, Wyatt Arnold

In the end, particularly with the two-dimensional non-steady model of the tidal marsh, the project became quite closely related to my open channel hydraulic course elective I was taking with Dr. Poindexter, so the work I was doing helped a lot.

Are you working now?

I had an internship at the Department of Water Resources starting in June 2015. I worked around 10-20 hours a week for that last year of school. I'm in the water supply evaluation section at one of four regional offices in California. Our section focuses on how to calculate water demand and supply for the north central region of California. I started working as a full-time engineer two weeks after graduation. I am so lucky. I'll take the PE in 2019.

What are your plans going forward?

At the end of August my wife, Elise, and I are expecting a child. We're having a boy. Also, I volunteer for the Khyentse Foundation. We grant about $3 million a year in scholarships and institutional money to Buddhist programs at universities and monasteries. I'm on the executive board there and have been for a few years. I plan to stick with that for the foreseeable future; it's really important to me. When I was in India [for five years], I studied Tibetan language and Buddhism. The philosophy for me is very relevant and compatible with a scientific view of the world. The core philosophy behind it is very logical.

We also have three dogs, two street dogs from India and one street dog from Rio de Janeiro, where my wife is from. They're part of the family.

How do you feel about the degree you just earned?

I don't think there's a better civil engineering program in California. I'm biased, but it's an amazing program. All the teachers are so inspiring and such good teachers. I hope to stay a part of that community for the rest of my career.

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