



FROM THE DEPARTMENT CHAIR

A letter from George Z. Voyiadjis

Welcome to the Spring 2019 edition of the newsletter. Though we have come to the close of another academic year, the department continues its success and achievements. In this issue, we share with you the numerous activities

in research and education taking place within the Department of Civil & Environmental Engineering since the fall of 2018. We are on solid ground due to the cornerstone that is the strong academic community of our exceptional faculty, tireless staff, and remarkable student body.

Our students continue to excel in academics and research, and they demonstrate an audacious fortitude, powerful drive, and heartfelt compassion with both domestic and international outreach efforts. Additionally, our student organization chapters are, as always, active and growing. I am beyond proud to stand behind our students in support of any endeavor that they may undertake in the future.

The department faculty's hard work and dedication are unfaltering. As is the case with each issue of our newsletter, this one will also feature many of their national and world-renowned achievements and accomplishments. Our faculty members continue to conduct cutting-edge research on many fronts and receive national recognition. We have also seen firsthand the broader impact of our research, both domestically and around

the world. None of this, however, could be accomplished without the extraordinary support from all of you.

The last few months have seen a lot of change, in addition to our regular busy schedule. I'm happy to say our new online program initiative has led to the launch of an online master's program in transportation engineering in fall 2019.

It is also my pleasure to introduce to you our latest CEE Hall of Distinction inductee—Professor Sibel Pamukcu (2019) of Lehigh University. The department honored Professor Pamukcu at our annual banquet, as well as recipients of the 2018 faculty awards. These recent inductees bring our Hall of Distinction to 41 outstanding individuals who have made significant contributions to our profession and to the department through their honorable achievements and support.

In closing, more and more of our esteemed alumni are now in-the-know about our departmental happenings through various channels of information, such as this newsletter or online and social media, allowing them to be more supportive of our CEE department at LSU. I would like to extend an invitation for you to join us, as well as encourage you to send any of your achievements and various accomplishments so that we can share them in upcoming newsletters and through our media channels.

Sincerely,

Dr. George Z. Voyiadjis, Boyd Professor, Chair and Bingham C. Stewart Distinguished Professor

DEPARTMENT NEWS

LSU DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING RANKED AMONG BEST GRADUATE ENGINEERING PROGRAMS

In the 2020 ranking of Best Graduate Engineering Programs by U.S. News & World Report, the Civil Engineering program received good news. The department moved up two spots to T-53 overall and T-36 among public colleges and universities. The department has gradually climbed the ranks over the past couple of years. In 2017, the department was ranked T-62, and last year, was T-55. The LSU College of Engineering as a whole ranked T-67 among public colleges and universities and T-106, overall.

For the U.S. News rankings of graduate engineering programs, 219 schools that grant doctoral degrees in the discipline were surveyed. Rankings were then calculated based on a weighted-average of peer assessment, recruiter assessment, mean GRE quantitative scores, acceptance rate, student-faculty ratio, percentage of faculty in the National Academy of Engineering, doctoral degrees awarded, total research expenditures, and average research expenditures per faculty member.

DYNAMAT 2019

For many years, a consortium of universities and research centers, including LSU; the University Carlos III of Madrid; the National Engineering School of Metz (now a department of Lorraine University); the Polytechnic University of Poznan; and the Institute of Fundamental Technological Research of the Polish Academy of Sciences, Warsaw; has organized an annual international workshop devoted to the dynamic behavior of materials. The last workshop was organized by the University of Cyprus and is conducted under the auspices of NAWA.

The event covers experimental, theoretical, and numerical aspects of the mechanical behaviour of solids at high strain rates. The following main sessions were covered—constitutive modelling, experimental investigations, modelling and numerical simulations, high-speed impact and machining, and metal forming and other industrial applications.

Dr. George Voyiadjis chaired the 13th Workshop of Dynamic Behaviour of Materials and its Applications in Industrial Processes in Nicosia, Cyprus, from April 17-19, 2019. This conference was co-chaired with Professor Alexis Rusinek of the University of Lorraine, France and was co-sponsored by Professor Panos Papanastasiou of the University of Cyprus. The event had a rich scientific program that included three keynote lectures and many oral communications covering a wide range of topics on the dynamic behavior of materials and their industrial applications.



2019 CEE HALL OF DISTINCTION

The Department of Civil & Environmental Engineering held its 2019 Hall of Distinction on May 3, 2019, and inducted Professor Sibel Pamukcu. She currently serves as a professor in the Department of Civil and Environmental Engineering at Lehigh University in Bethlehem, Pennsylvania. A globally recognized expert in the field of electro-remediation of soils and groundwater, Dr. Pamukcu's pioneering work spans more than two decades of research. Her efforts focus on soil and groundwater decontamination using electrochemical technologies and the application of direct current electric fields for enhanced recovery of oil and in-situ destruction of contaminants through enhanced redox in clay-rich soils and rock formations. Dr. Pamukcu also researches the development and application of distributed fiber-optic and wireless sensor systems for monitoring progressive changes in geo-media and underground structures to preemptively mitigate hazards.



Logan Betzer – Civil Engineering Academic Award
 Andrew DeBlanc – Civil Engineering Leadership Award
 Noah Taylor – Civil Engineering Academic Award
 Matthew Thomas – Civil Engineering Leadership Award
 Jasmine Bekkaye – Environmental Engineering Academic Award
 Duyen Lam – Environmental Engineering Leadership Award
 Chandler Landrum – Environmental Engineering Academic Award

Additionally, the department recognized deserving faculty and staff with the Educational Achievement Award, Research Achievement Award, and Departmental Service Award. These honors are given to individuals who show exemplary service to faculty, staff, and students and are constantly striving to better the department and LSU.



Also recognized at this year's Hall of Distinction, were seven outstanding graduating seniors—four from civil engineering and three from environmental engineering.



John Pardue – Departmental Service Award
 Karim Elkholy – Educational Achievement Award
 Navid Jafari – Research Achievement Award



CEE TEAM WINS 5K

The LSU Civil Striders took first place in their division at the Annual Providence Corporate Cup 5k in March. The team was comprised of Brian Harris, PhD candidate and graduate assistant in geotechnical engineering; Sam Amoroso, CEE alumnus and adjunct instructor; William Moe, environmental engineering professor; and Madison Lane, CEE graduate programs coordinator. Amoroso also took first place as an individual in his division.

FACULTY NEWS

ZHU PUBLISHED IN NATURE SUSTAINABILITY FOR WASTEWATER TREATMENT

In a recently published paper titled Wastewater Treatment for Carbon Capture and Utilization, LSU Assistant Professor of Civil and Environmental Engineering Xiuping Zhu and her co-authors make the case that changing the wastewater treatment process could have major environmental implications. The group writes that preliminary estimates from its research into alternative wastewater treatment pathways demonstrate that re-envisioning wastewater treatment could entirely “offset the industry’s greenhouse gas footprint” and “make it a globally significant contributor of negative carbon emissions.”

The paper was published in the December 2018 issue of Nature Sustainability and was co-authored by Jeremy Guest, civil and environmental engineering professor at the University of Illinois at Urbana-Champaign; Lu Lu, civil and environmental engineering professor at Princeton University; Catherine Peters, civil and environmental engineering professor at Princeton University; Greg Rau, senior researcher at University of California-Santa Cruz’s Institute of Marine Services; and Zhiyong Jason Ren, professor of civil and environmental engineering at Princeton University.



THREE LSU ASSISTANT PROFESSORS RECEIVE FUNDING FOR HURRICANE RESEARCH

Like elephants in china shops, hurricanes wreak havoc and can be hard to predict—picking up the pieces after them is no easy task but anticipating how they'll behave and what kind of damage they'll do seems near impossible. Until now, at least. Several coastal universities have banded together with LSU to encourage a plethora of collaborative research projects that should make it easier to figure out where big storms go and what impact they will have in terms of wind, rain, storm surge, and flooding. The effort is called HuRRI, short for Hurricane Resilience Research Institute, and involves—besides LSU—the University of Miami, Texas-Tech, University of Texas-Tyler, University of Houston, and University of Florida. Focused on resilience, HuRRI will help the nation as a whole get better at predicting, assessing, mitigating, and recovering from severe storms, as well as protecting and educating communities.

down the hall from each other as assistant professors at the LSU Department of Civil & Environmental Engineering.

Hongliang Zhang, Navid Jafari, and Chao Sun will now have a chance to test out their individual ideas and come up with initial findings that could lead to larger projects (and larger grants) in coming years. They're collaborating—not with each other, but with different researchers at the University of Houston (Robert Talbot of the Department of Earth and Atmospheric Sciences, Aaron Becker of the Department of Electrical and Computer Engineering, and Gangbing Song of the Department of Mechanical Engineering). Houston was greatly impacted by Hurricane Harvey in 2017, the costliest tropical cyclone on record (tied with Hurricane Katrina in 2005) with \$125 billion in damage. Zhang, Jafari, and Sun each have come up with proposals for how we can move away from the



In a first round of grants offered as seed funding by the six participating universities, three young faculty have been selected among a dozen LSU applicants—and they work just

current wait-and-pay model to something closer to anticipate-and-accommodate regarding big storms.

Flooding is something Jafari is focusing on. He's exploring new ways to get real-time data during severe weather events by deploying sensors using unmanned aerial vehicles (UAVs) in hard-to-reach areas.

"To deploy a sensor without UAVs, we need to travel to the coast, get on a boat, ride in choppy waters, go out and deploy the sensors in the wetlands, and then come back home," Jafari explains. "The main thing is doing this without jeopardizing someone's safety. That's especially difficult with a hurricane, because we don't know the exact track, and it's moving really fast." Having performed reconnaissance after natural disasters in the past, Jafari is trying to bridge the real-time data gap that currently exists—flooding is still often measured after the fact by looking for high water marks on buildings, etc., once an area becomes accessible by land again. Of course, UAVs offer limitations of their own. The sensors can't be too heavy for the drone to carry. Also, they have to stay in place during a hurricane, which easily could pick up a car. Jafari is working on a UAV-triggered anchoring system, so the sensors can penetrate about a foot into the ground as they're dropped where water meets land.

John Pardue, Elizabeth Howell Stewart Endowed Professor in the LSU Department of Civil & Environmental Engineering has been involved with HuRRI since the beginning and hopes that some of this new research will show exactly how wetlands and marsh environments work to dampen the effects of storms. "We think this is happening, but we don't really have enough data," he says. "Getting the data can be really dangerous in some situations, so doing this with drones would be a fantastic step forward.

"For this initial call for proposals—and they'll be a second one soon—we restricted the grants to assistant professors working

with graduate students and postdoctoral fellows to help young faculty because we want them to start thinking about these problems," he continues. "The goal is to be a resource to the community when disasters happen."

Chao Sun is working on a project to help protect power transmission and distribution systems during severe storms. Loss of power on a grand scale can have wide-reaching and life-threatening consequences by shutting down hospitals and communications and greatly delay rescue and recovery efforts. He's building a high-fidelity mechanical model to look at the effects of water and wind on power lines and the towers and posts that connect them, as well as the added stress that wildly moving power lines can have on those towers and posts. "The complex non-linear behavior of the wire during hurricanes, where the wind field is very irregular, is something we don't yet understand correctly," Sun explains. "Based on our results, we want to introduce techniques to mitigate the responses of the tower and wire so they can't collapse or break." He's developing a device that can be attached to a tower and counteract its motion. The frequency of the device can be tuned to that of a particular tower or building, so as to mitigate the structural response, and the trick is to make it react quickly, effectively cancelling out the movement caused by wind. "We want to introduce some smart control algorithms that can rapidly sense the hurricane information and adjust," Sun adds. The other part of his project is to look specifically at storm surge, the moving walls of water brought onto land by wind. "We're going to combine the hurricane wind and storm surge effect in our model," he says. "During reconnaissance in Corpus Christi, [Texas], after Hurricane Harvey, we saw that the foundation—the ground, the soil—became too soft from flooding and rain to support the towers. We need to incorporate that in our model, and based on the results, we'll be able to take measures to protect the power systems."

VOYIADJIS' LATEST TEXTBOOK PUBLISHED BY SPRINGER, AVAILABLE NOW

The Handbook of Nonlocal Continuum Mechanics for Materials and Structures, a two-volume textbook by Boyd Professor and Chair of the LSU Department of Civil & Environmental Engineering George Voyiadjis, was recently published by Springer. The book is the product of more than five years of work by Voyiadjis and covers all areas of nonlocal continuum mechanics, including theoretical aspects, computational procedures, and experimental advances. Its articles cover a number of disciplines and were written by internationally recognized experts in their respective fields, making it the most up-to-date, established knowledge base on using nonlocal continuum mechanics to characterize material behavior for advanced composites and nano-materials, as well as engineering scale structures.



“The handbook is basically intended as a textbook for university courses, as well as a reference for researchers in this field,” Voyiadjis writes in the preface of the book. “It will serve as a timely addition to the literature on nonlocal mechanics and will serve as an invaluable resource to members of the international scientific and industrial communities.

“It is hoped that the reader will find this handbook a useful resource as he/she progresses in their study and research in nonlocal mechanics. Each of the individual sections of this handbook could be considered as a compact self-contained mini-book right under its own title. However, these topics are presented in relation to the basic principles of nonlocal mechanics.”

WILLSON RECEIVES TEACHING EXCELLENCE AWARD

Dr. Clinton Willson, professor of Civil & Environmental Engineering and director of the Center for River Studies, was awarded the William A. Brookshire Award for Teaching Excellence. The award honors full-time faculty members in the College of Engineering who demonstrate an unwavering commitment to exemplifying the highest levels of excellence inside the classroom. A dean-appointed committee of administrators, faculty, and student leaders review the nomination packages, which include letters of recommendation from the professors' colleagues and students, who then select the winners.

Dr. Willson is a quality teacher at both the graduate and undergraduate level, consistently obtaining high teaching evaluations. Other qualities not mentioned with the award that are used to describe Dr. Willson include: mentor, an inspiration, and passionate. These attributes attract students to the Civil & Environmental Engineering program and impact them beyond their academic career at LSU as they go forward in their professional careers. In her nomination letter, Dean Judy Wornat concludes by saying “At the end of the day, that is what we as faculty should strive for, and you are a great example of what we want our faculty to be.”

LSU CEE'S ABU-FARSAKH AND MOHAMMAD NAMED ASCE FELLOWS

LSU Civil & Environmental Engineering Professors Louay Mohammad and Murad Abu-Farsakh were recently made Fellows by the American Society of Civil Engineers (ASCE) Board of Directors. ASCE members elected to Fellow status have made “celebrated contributions and developed creative solutions that enhanced lives.” Only 3% of ASCE members hold the honor of Fellow.



STATEWIDE GROUNDWATER MODEL COULD HELP CONSERVE LOUISIANA RESOURCE

Working to save one of Louisiana's most valuable resources, LSU Civil & Environmental Engineering Professor Frank Tsai is in the process of creating a statewide groundwater model that will enable future generations to conserve the state's most precious commodity—water.

“Groundwater has a very strong economic value to Louisiana,” Tsai said. “We think we're a water-rich state, so we can use all the water we want, and that's the wrong concept. The groundwater model will help us estimate how much groundwater we have left. When this project is complete, Louisiana will be the only state in the nation to have a very detailed groundwater model.” Tsai said that without proper groundwater management, the state's economy would be greatly affected. Because Louisiana farmers use more than 50 percent of groundwater for agriculture, Louisiana residents could see high water and energy bills, less agricultural production, high food prices, loss of small businesses, outmigration of industries, and degraded communities. “The two fundamental questions are how much groundwater do we use, and how much do we have,” Tsai said. “How much we use is the relatively easy part, because we survey and look into flow meters. However, water-use data is not accurate for farmers, because they aren't required by law to report how much they pump. With a groundwater model, we will understand how much groundwater we have.”

Since Louisiana geology has many layers like clay and sand, groundwater must be estimated at every depth. A groundwater model would help calculate this, as well as show which direction the water is flowing, an important factor in avoiding water disputes with neighboring states. “Groundwater has no political boundaries, so neighbors can take it from you,” Tsai said. “There is currently a water dispute case, Mississippi v. Tennessee, in the Supreme Court. This is why it's important to build a model for policy and to measure.” Louisiana's groundwater supply is also affected by land subsidence and saltwater intrusion. The more water that is removed from the ground, the more the ground level drops. Subsidence, of course, leads to flooding and structural damage.

Saltwater intrusion is just as alarming. “There is a geological fault along Interstate 10 in Baton Rouge that keeps shifting,” Tsai said. “The fault acts as a physical barrier separating fresh water from salt water. Salt water can also come from salt domes and salt basins, which are all over the state. Right now, people are pumping from shallow zones to avoid them. High salinity will kill crops. Industrial plants, which currently use very clean groundwater, will need to treat their water once they are forced to use surface water, like the Mississippi River. If salt water intrudes their wells, who is going to pay for that? It's very expensive to treat surface water. Industry could be forced to move elsewhere, which could change the economic landscape of south Louisiana. It's very scary.”

The National Institutes for Water Resources in conjunction with the U.S. Geological Survey has funded Tsai's groundwater model project for the past few years. The NIWR provides annual funding to water resources research institutes in all 50 states and the four U.S. territories, including the Louisiana Water Resources Research Institute in LSU's Patrick F. Taylor Hall, of which Tsai is the director. Though Tsai has already been working on this statewide groundwater model project for five years, he is determined to see it through, which is no small feat. “Before you develop the model, you need data,” he said. “To understand geology, you need well logs. There are more than 200,000 wells registered in Louisiana, and all of the information must be transferred from paper to digital spreadsheets, which requires lots of manpower.”

Tsai, who teaches groundwater and hydrology courses, designs a well log course project with more than 200 students working on digitizing data annually. “When they type the data into spreadsheets, they learn and realize the geology of Louisiana,” he said. “It's a lot of work without an end, but it's fun because the data benefits Louisiana's groundwater study. The mission for the LWRRRI is to train future water scientists and engineers. We want to make sure our product can be used to solve water resource problems. That's the main goal here.”

UNDERGRADUATE STUDENT NEWS

LSU ENVIRONMENTAL ENGINEERS WIN FIRST AT WERC COMPETITION

Thirty-one LSU Environmental Engineering students traveled to Las Cruces, New Mexico, to compete in the 29th Annual WERC (Waste-management Education Research Consortium) Environmental Design Contest, where they won a total of five awards and two first-place task awards, a first for LSU Engineering.

LSU competed against 20 other teams from 10 universities, including Washington State University; University of Arkansas; University of Idaho; University of New Hampshire; New Mexico State University; University of California, Riverside; Montana Tech; Ohio University; Cal Poly-San Luis Obispo; and University of Texas at El Paso.

Taking first place in Task 1 (Silver-based Microbial Check Valve for Spacecraft Potable Water Systems) were LSU Environmental Engineering seniors Morgan Lauck, Ian Smith, Dylan Bates, Brian Beck, Dana Bowman, Sheila Elhami, Gibson Fischer, and Jon Nelson. In completing the task, sponsored by NASA, the team designed an electrolysis method using silver to keep bacteria from growing in the recycled water used by the International Space Station.

This team—comprised of LSU EVEG seniors Elliot Felsher, Mark Fritchie, Erol Knaus, Teche Melancon, Justin Robert, and Lauren Westphal—designed a payload to monitor air concentrations of volatile organic compounds and particulate matter from a drone. The group won the task, sponsored by Intel, by developing an integrated sensor and communication system that could monitor industrial smokestacks, eliminating the need for manual stack test measurements.

Taking second place for Task 6 (Blight to Bioswales: Engineered Nature Parks in New Orleans' Abandoned Lower Ninth Ward Community) were LSU EVEG seniors Aaron Basso, Duyen Lam, Chandler Landrum, Holly Midkiff, Madison Moss, and Sarah Wannamaker. Also taking second place for Task 3 (Selenium Water Treatment and Recovery) are LSU EVEG seniors Muneer Al-Mamari, Lee Lattimore, Daniel Lopez, Shelbi Meynard,



and Juston West. Lastly, receiving the Freeport-McMoRan Innovation in Sustainability Award for Task 5 (Removal and Reuse of Phosphorous as Fertilizer from CAFO Runoff) are LSU EVEG seniors Jasmine Bekkaye, Rachel Ellis, Nathan Goff, Olivia Guidry, Lauren Imme, and Ryan Robinson.

WERC is a competition that brings together industry, government, and academia in search for improved solutions to environmental challenges. All winnings from the competition will go back into LSU's EVEG program to help next year's participants.

CEE'S CONCRETE CANOE TEAM AT THE 2019 DEEP SOUTH CONFERENCE

American Society of Civil Engineers (ASCE) at LSU participated in the 2019 Deep South Conference at Louisiana Tech University in Ruston this past March and had a great showing at the competition. Captains Matthew Thomas and Miriam Tariq made a tremendous effort to guarantee that each participant played an active role in the design and construction processes. This year, advances were made in the areas of hull design, structural analysis, design paper, and many more. The team of Matthew Thomas and Miriam Tariq placed second overall in the oral presentation. We are all very proud of our Tigers for both their effort and the outcomes of this year's Deep South Conference.

With the start of the new academic year, ASCE will be recruiting members to join the Concrete Canoe and Surveying teams and compete at the 2020 Deep South Conference at Jackson State University in the spring. No experience is required to participate in any of the teams, but you must be a member of ASCE. Joining a team (and ASCE) is a great way to make friends and have fun while getting a more "hands-on" experience with civil engineering applications. It also can help you improve your networking, organization, and leadership skills. To join, attend an ASCE meeting in the fall or send an email to asce@lsu.edu.



LSU CEE STUDENT PROJECT TO HELP LOWER NINTH WARD

As the saying goes, it takes one bad apple to spoil the barrel, which is exactly how residents in New Orleans' Lower Ninth Ward feel about blighted property in their neighborhood. Looking to help, LSU Civil & Environmental Engineering Professor and Environmental Engineering Undergraduate Program Coordinator John Pardue has connected six of his CEE seniors with a New Orleans nonprofit to revamp these abandoned properties and make them more aesthetically pleasing and sustainable through a project called Blight to Bioswales (B2B). The students on Pardue's team are Aaron Basso, Duyen Lam, Chandler Landrum, Holly Midkiff, Madison Moss, and Sarah Wannamaker.

Pardue, who has overseen dozens of CEE senior capstone projects over the years, said it was time to focus on helping those in his own backyard, so to speak. "I was feeling guilty because thousands of man-hours have gone into solving problems for other people," he said. "So, I said, let's focus on New Orleans and try to do some things there. This time, we're really engaging with the community."

This is Pardue's second year working on blighted projects in New Orleans, but it's the first time his team is working with a community organization. In this case, it's A Community Voice, a nonprofit organization led by Executive Director Beth Butler that is "comprised of working, poor, elderly, women, children, and families who provide a voice to its members regarding everyday issues that affect their lives." Pardue's team was matched with ACV through Flood Forum USA, a nationwide organization of community groups and 60,000 scientists that are concerned about flooding.

One issue ACV wants to solve is the blighted property in the Lower Ninth Ward, an eyesore that has existed, in some cases, as far back as Hurricane Katrina. "There is blight across New Orleans from people not being able to return home after Katrina," Pardue said. Some lots are empty with unkempt grass, while others have dilapidated homes containing rodents. In order to find lots to work on, Pardue and ACV must first find the lot owners, which is proving to be no small task. "Finding the owners is the tough part," Pardue said. "Sometimes the city has taken over the lot, or the school board owns the property. Some of the lots are privately owned, with the residents intending to

move back, or we just can't find the owners at all. We're having to look at a tax website to find them and get permission to work on their lot." For the lots available, Pardue says the owners are happy to offer their property for the B2B project.



The first thing the students do, once given a lot to work on, is design a bioswale, which is a trench filled with porous material and vegetation that is designed to remove debris and pollution from surface runoff. "The problem in Louisiana is that we don't have the right soils for doing bioswales," Pardue said. "We have clay. So, we dig out a pit, then fill it up with oyster shells, pecan shells, and other recyclables [leaving room for the water to sit]. If you order them in the right way like a parfait, you actually get good treatment." The bioswales can hold rainwater for days, which allows time for the pollutants to leave and the cleaner water to then run into the canals and Lake Pontchartrain. "We will try to do a bioswale that would be three to four lots that aren't necessarily connected," Pardue said. "We can run pipes underground."

Another element of the project is adding native plants that will maximize the removal of air pollutants through their waxy outer “cuticle” layer, which absorbs pollutants and improves air quality. “One of the things we’re adding to this is some plants on the surface that would be low maintenance,” Pardue said. “My lab is working on what kind of air plants absorb the best in New Orleans, so the students know which plants to use and how many to plant in order to improve the air quality. If we build on an empty lot and have some of this vegetation, the idea would be that if people wanted to walk around for exercise, the air quality would be a little better.” Moss said the team took leaves from different trees in the Lower Ninth Ward to test the concentration of pollutants in order to decide which vegetation to plant and how much. “We want to increase the vegetation to decrease the pollutants,” she said.

The B2B project not only teaches students like Lam about plant varieties and how to design a bioswale, but also how to work with people and get the ball rolling. “We originally chose this project because of the community component of it,” she said. “You need to know what the community

wants. You don’t want to be that engineer who throws down a design without talking to the community to see if this is what they really want.” “One of the things the students have had experience with now is seeing that if you want to do this, you have to get buy-in from locals and knock on their doors,” Pardue said. “Beth is very driven. The students are blown away by her.” “Miss Beth is a firecracker,” Midkiff said. “She’s awesome. We’re getting right in there, talking with residents and seeing how we can help. It’s a good molding experience before we graduate and go out on our own.”

At the start of the project, the team of six sat in a meeting with a New Orleans councilwoman who presented them with a map showing all the blighted lots in the Lower Ninth Ward designated by white pushpins. There were 2,000. “You had to take a minute to wrap your head around it,” Midkiff said. “That’s a big number.”

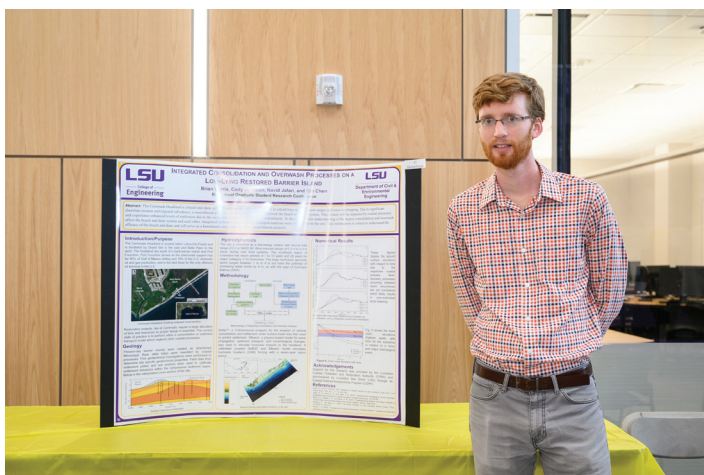
Though the project may not be completed until another team takes it over in the fall, Lam, Midkiff, Moss, and the rest of the team will present their work at the Waste Management Education Research Consortium (WERC) Design Contest at New Mexico State University in early April. “It’s going to



be interesting for us to go into an area where flooding isn’t an issue,” Lam said. “It will also be hard for [the judges] to comprehend that the Lower Ninth Ward still hasn’t been rebuilt after all this time.” Whether their team wins or not, the work the team is doing is sure to garner accolades from the Lower Ninth Ward residents. “We’re super excited that our project is helping the community move forward,” Lam said.

GRADUATE STUDENT NEWS

HARRIS RECEIVES SMART SCHOLARSHIP FROM DEPARTMENT OF DEFENSE

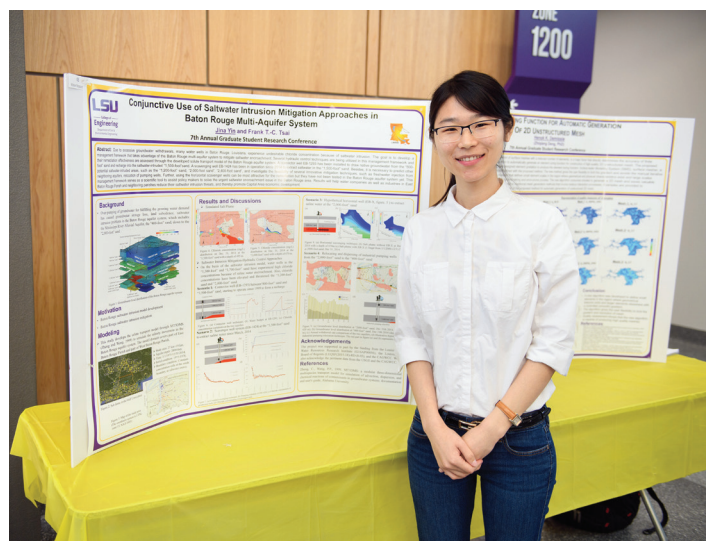


Brian Harris, a PhD student majoring in geotechnical engineering, was recently awarded the SMART Scholarship by the Department of Defense. The SMART—or Science, Mathematics, and Research for Transformation—Scholarship-for-Service Program was established as an effort by the DOD to “enhance the workforce with talented, innovative, and brilliant scientists, engineers, and researchers.” It offers scholarships for bachelors, masters, and PhD students pursuing degrees in STEM-related fields. While in school, students receive full tuition, monthly stipends, health insurance, and book allowances, as well as summer internships that range from eight to 12 weeks. Upon degree completion, scholars work as a civilian within their sponsoring facility.

Harris, a native of Morristown, Tennessee, is working under LSU Civil & Environmental Engineering Assistant Professor Navid Jafari, focusing on the resiliency of natural and restored coastal infrastructure in Louisiana. “I am so thankful for this opportunity,” Harris said. “This scholarship allows me to work in one of the nation’s top research laboratories, alongside the scientists I have looked up to throughout my studies at LSU.”

YIN TAKES FIRST PLACE AT AWWA CONFERENCE

Jina Yin, a PhD student majoring in water resources engineering, won first place in the poster presentations at the Annual Southwest Section AWWA Conference. Her poster titled Saltwater Scavenging Optimization for the Baton Rouge Aquifer System highlighted a model that can help the Baton Rouge Water Company, as well as industrial groundwater users in the Industrial District, better plan their dependence on Baton Rouge groundwater. The Southwest Section is a part of AWWA and consists of AWWA members in the states of Arkansas, Louisiana, and Oklahoma. The section conducts training operations in all three states, including the annual conference.



CADIGAN RECEIVES DONALD W. CLAYTON ENGINEERING EXCELLENCE AWARD



CEE graduate student, Jack Cadigan, was awarded the 2019 Donald W. Clayton Engineering Excellence Graduate Award at the College of Engineering's Hall of Distinction on April 25. The award is granted each year to an outstanding graduate student who exhibits extraordinary character, scholastic achievement, and evident leadership in the College of Engineering. Cadigan is currently a PhD student specializing in geotechnical engineering. He was joined by his advisor and CEE Professor of Geotechnical Engineering Dr. Navid Jafari.

CEE STEEL BRIDGE TEAM ADVANCES TO NATIONAL STEEL BRIDGE COMPETITION

Each year, LSU Civil Engineering students compete in the Student Steel Bridge Competition that involves the design, fabrication, and assembly of a 1:10 scale steel bridge. This is a student-driven experience from conception to design, fabrication, erection, and testing. Universities across North America participate in regional and national competitions, where their bridges are judged on display, construction speed, construction economy, lightness, stiffness, structural efficiency, and overall performance. Success in inter-collegiate competition requires application of engineering principles and theory and effective teamwork. Students are required to innovate, practice professionalism, and use structural steel efficiently.



On March 29, the LSU Steel Bridge Competition Team traveled to Louisiana Tech and competed in the Regional Deep South Steel Bridge Competition. The team spent the entire academic year prior to the event designing, analyzing, fabricating, and practicing, and ultimately, was able to advance to the national level of competition.



The group has been back at work since the end of the school year, practicing their build and refining their structure and will compete at the national competition over the summer break at Southern Illinois University at Carbondale.

Geaux Tigers!



8TH ANNUAL GRADUATE STUDENT RESEARCH CONFERENCE

The Department of Civil & Environmental Engineering had another successful Graduate Student Research Conference on Friday, April 25. Thirty-eight students submitted abstracts, and 33 of those presented their research to fellow students, faculty, staff, and visitors.

First Place

Zia Zihan (advised by Dr. Mostafa Elseifi)

The Relationship Between Surface-Measured Indices and In-Service Pavement Structural Conditions Predicted From Traffic Speed Deflection Devices.

Second Place

Elizabeth Whiddon (advised by Dr. Xiuping Zhu)

Sodium-ion Concentration Flow Cell Stacks for Efficient Salinity Energy Recovery and Continuous Power Production.

Third Place

Momen Mousa (advised by Dr. Mostafa Elseifi)

Evaluation of Moisture Damage Under Crack-Sealed Asphalt Pavements in Louisiana.

Honorable Mentions:

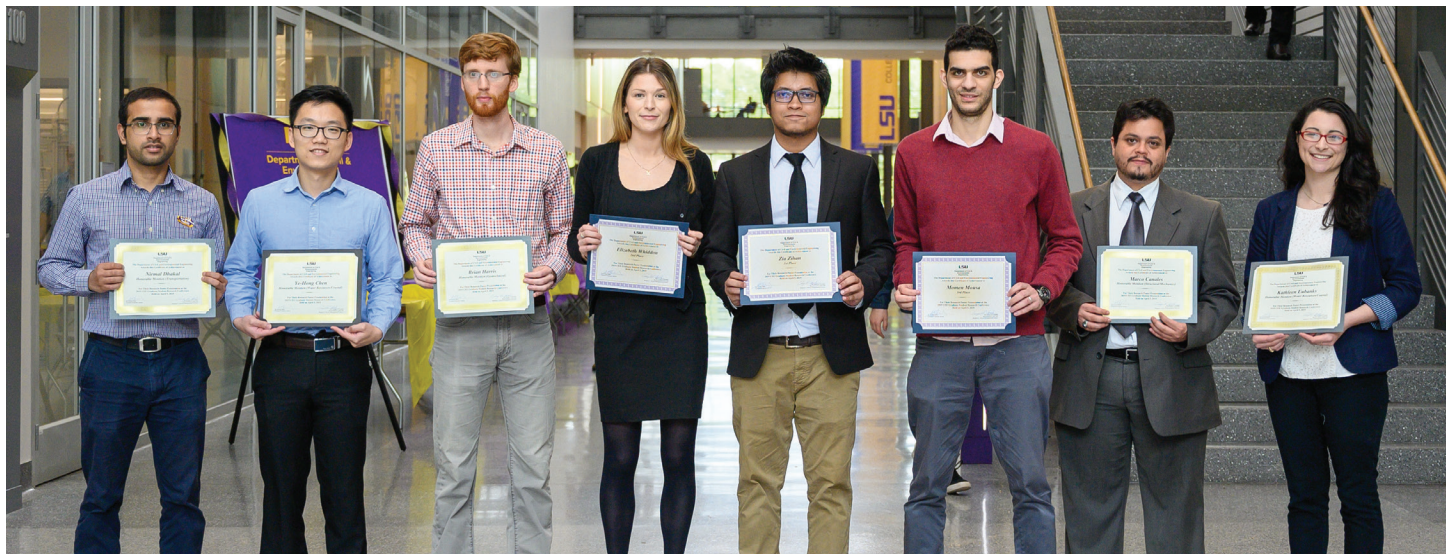
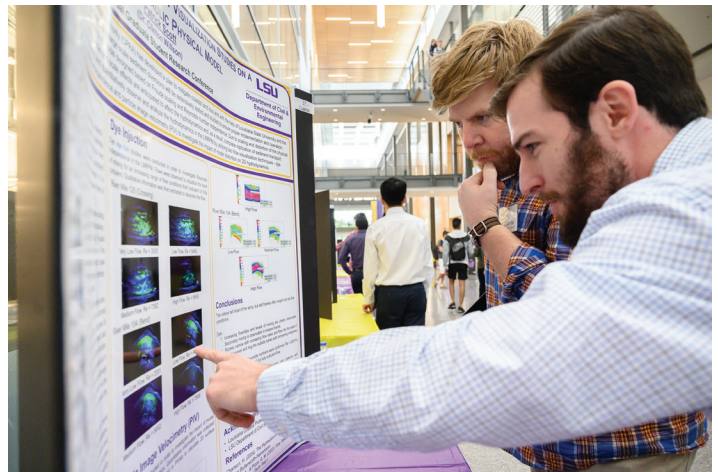
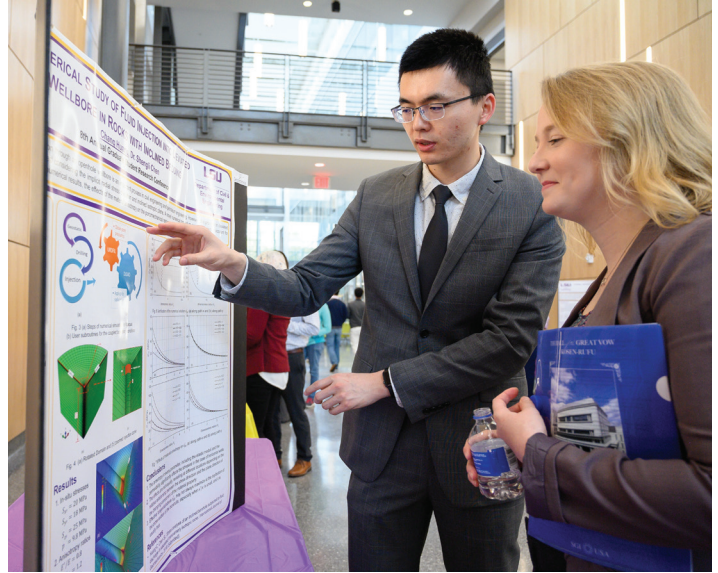
Nirmal Dhakal (Transportation)

Kathleen Eubanks & Ye-Hong Chen (Water/Coastal)

Cheng Shi (Environmental)

Brian Harris (Geotech)

Marco Canales (Structures/Mechanics)



ALUMNI NEWS

CEE ALUMNI INDUCTED INTO COLLEGE OF ENGINEERING HALL OF DISTINCTION

The LSU College of Engineering Hall of Distinction welcomed three new members on April 25, including CEE alumni Sherri LeBas. LeBas graduated from LSU in 1985 with a Bachelor of Science in Civil Engineering. She began work at the Louisiana Department of Transportation and Development that same year and went on to serve the state in a variety of roles over 30 years, including as secretary of the LADOTD from 2010 to 2016. In May 2016, she joined GEC Inc. as senior vice president of business development. LeBas is married to William Firnberg, and together they have four sons and a daughter-in-law. “The College of Engineering is thrilled to welcome Lee Boothby, Sherri LeBas, and Vic Weston—three stalwarts in their respective fields of engineering and construction management who embody the true characteristics and values of the LSU Engineer—to its prestigious Hall of Distinction,” said Judy Wornat, dean of the College of Engineering. “Their leadership, their significant contributions to industry and to the college, and their character are truly remarkable.”



SHOJAAT AWARDED BEST PAPER AWARD BY TRB

Siavash Shojaat, a recent PhD graduate in LSU’s Department of Civil and Environmental Engineering, recently earned the 2018 Best Paper Award at the 98th Annual Meeting of the Transportation Research Board in Washington, D.C. Shojaat’s paper, titled Defining Freeway Design Capacity Based on Stochastic Observations, was selected out of 80 submissions to TRB’s Highway Capacity and Quality of Service Committee, which is concerned with investigating the physical and non-physical factors that affect capacity, traffic flow, comfort, convenience, and safety.

The paper was based on Shojaat’s PhD dissertation at LSU, titled Sustained Flow Index: A Stochastic Measure of Freeway Capacity, and was co-authored by Brian Wolshon, LSU Civil & Environmental Engineering professor; Luis Escobar, LSU Experimental Statistics professor; Justin Geistefeldt, civil and environmental engineering professor at Ruhr-University Bochum in Germany; and Scott Parr, assistant professor of civil engineering at Embry Riddle Aeronautical University. It was also published in the Transportation Research Record, the journal of the TRB.



LSU CEE GRADUATE DESIGNS HOOP FOR SNARE DRUMS

After earning his CEE degree from LSU in 2015, Gabriel Martinez moved to Houston, where he spent three years working for engineering companies such as Versabar Inc. and ExxonMobil. Unfortunately, living in an apartment meant that Martinez, an avid drummer, could not practice his passion, even though he finally had the money to buy a drum set. Once he began working offshore, his chances of drumming on a regular basis grew even slimmer, until fate intervened one day. “I had just got off of an oil platform in Houston for seven weeks, and my first day back in the office, I get a random call for a project management position in Puerto Rico doing disaster relief [after Hurricane Maria],” he said. “The money and contract were incredible, but it felt like a natural fit to help these people out since I experienced Hurricanes Katrina, Gustav, and Harvey.”

Martinez, a New Orleans native, said there was something about Puerto Rico that inspired him to get back into drumming. “I had been yearning to get back to playing the drums,” he said. “The island’s natural beauty is relaxing and inspiring. The people are amazing. They’re super sweet and lively. There’s always eating, dancing, and drinking, kind of like Louisiana.” After nine months on the island, Martinez’s work contract was up, but he found himself not wanting to move back to Houston. “I loved Puerto Rico so much that I didn’t want to leave,” he said. “I had enough engineering experience, and I was playing the drums again, so it was time to finally design some drum hoops. I want to engineer drums from the ground up. I decided to rewrite the book. I wanted to seek out designing and fabricating the best possible components.”

The snare hoop Martinez designed is made of 6061 T6 aluminum, which is aircraft-grade aluminum that is very different from standard hoops used in the music industry. “Hoops are typically a cut of high-tension steel, then pressed and rolled,” Martinez said. “So, there are a lot of imperfections that come with that. It’s an unrefined way of doing it, and they’ve been using this technology for 50-60 years now. I decided to use the most premium material and process to make sure this thing is absolutely true, extremely accurate, and precise across the board. It’s pricey and takes a lot of time, so I decided to start off with just the drum hoops and tuning key.”



According to Martinez, his T6 aluminum drum hoop dampens unwanted overtones and allows the drum shell to resonate more clearly so you can hear the tone of the drum. The hoop fits any 14-inch, 10-lug snare. “Once drummers hold this in their hands, they’re absolutely fascinated by it,” he said. As far as Martinez knows, his drum hoop is the first CNC machined aluminum hoop, for which he has filed a patent. He credits a couple of his LSU Engineering classes with giving him the knowledge he needed to create the hoop. “My LSU Manufacturing Processes and Materials classes definitely helped me learn how to design and produce the hoop,” he said.

After producing the hoop, Martinez needed a way to market his design, so he created Percussion Ordnance: Weapons of Sonic Destruction—Military Grade Drums & Hardware. The company name and logo reflect the material used in making the drum hoop and also incorporate his love for Puerto Rico, which inspired Martinez to create a custom color for the hoop called Puerto Rico Purple. “It changes color in the light, almost like a royal blue,” he said.

Martinez’s next step is reaching out to the music industry to promote his creation, having recently attended the North American Music Manufacturers (NAMM) Conference in Anaheim, California. “If you have anything to do with music, you better be at NAMM,” he said. “It’s the biggest tradeshow in the world for music.” He also hopes to eventually design a full drum set. Having recently launched a successful Kickstarter campaign, Martinez can now move forward with his plan of producing more snare hoops. As for any speedbumps that may come his way, he does not foresee a problem. “I won’t stop because I don’t quit on anything,” he said.

For more information on Martinez’s company and snare drum hoop, visit www.percussionordnance.com.

CIVIL ENGINEERING PHD GRADUATE RECEIVES LSU DISSERTATION AWARD



The LSU Office of Research & Economic Development, or ORED, recently presented the 47th annual Distinguished Research Master Awards, which honor the exceptional research and scholarship of two LSU faculty each year. In addition, the LSU Alumni Association and the Graduate School

sponsor the Distinguished Dissertation Awards presented to two doctoral students whose research and writing demonstrate superior scholarship.

One of those students was Aref Samadi-Dooki, who received his PhD in civil engineering with a minor in mechanical engineering. He earned the award in science, technology, engineering, and mathematics for his doctoral dissertation that expands knowledge on the mechanical behavior of the brain. His doctoral advisor was Boyd Professor Dr. George Z. Voyiadjis of the Department of Civil & Environmental Engineering. This is his second civil engineering student to receive such a coveted award.

“I am really honored to be named the recipient of the LSU Alumni Association Distinguished Dissertation Award in Science, Engineering & Technology,” Samadi-Dooki said. “The work which resulted in this dissertation is a comprehensive study of the biomechanics of the brain, which entailed my collaboration with researchers in various fields. This recognition emphasizes the fact that the [College of Engineering] at LSU supports and

promotes scientific activities which involve interdisciplinary research that could provide solutions for problems which require a multi-angle view.”

Samadi-Dooki’s results from his dissertation, *Experimental, Analytical and Numerical Evaluation of the Mechanical Properties of the Brain Tissue*, are useful as input variables for computer simulations of brain tissue in studying traumatic brain injury, malformation of the brain folds and other pathobiological conditions associated with the mechanical behavior of the brain. While recent studies have unraveled the importance of the biomechanics of the brain on its pathological conditions, the ultra-soft nature of this tissue makes its mechanical evaluation extremely challenging. In this study, the accurate analysis of the mechanical heterogeneity of the brain tissue is performed using dynamic and pseudo-static indentation techniques. In addition, this research provides a detailed reference for modeling the nonlinear mechanical behavior of soft tissues in general, and the brain tissue in particular, while addressing important considerations for mechanical modeling. Moreover, a new model is developed for the behavior of the brain tissue that addresses the tension-compression asymmetry, taking into account the compressibility of the tissue in different loading conditions, implemented with a combined analytical and numerical scheme.

Samadi-Dooki received his bachelor’s and master’s degrees in civil engineering from Sharif University of Technology in Tehran, Iran. He received his PhD majoring in civil engineering with a minor in mechanical engineering, as well as a graduate certificate in materials science and engineering from LSU. He is currently employed as a mechanical engineering consultant at Dupont Electronics and Imaging in Wilmington, Delaware.

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ALUMNI REGISTRATION & UPDATES

The Department of Civil & Environmental Engineering is always interested in how our alumni are doing. We hope you will take the time to send your updates to mlane10@lsu.edu or, if you prefer, you can “snail mail” them to:

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Baton Rouge, LA 70803-6405**

Please include basic information, such as your full name, year of graduation, degree, mailing address, email address, telephone number, company, and your title/position. For your update, please include information on your recent professional and personal developments, along with a high-resolution photo, if available.

Thanks for staying in touch!

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