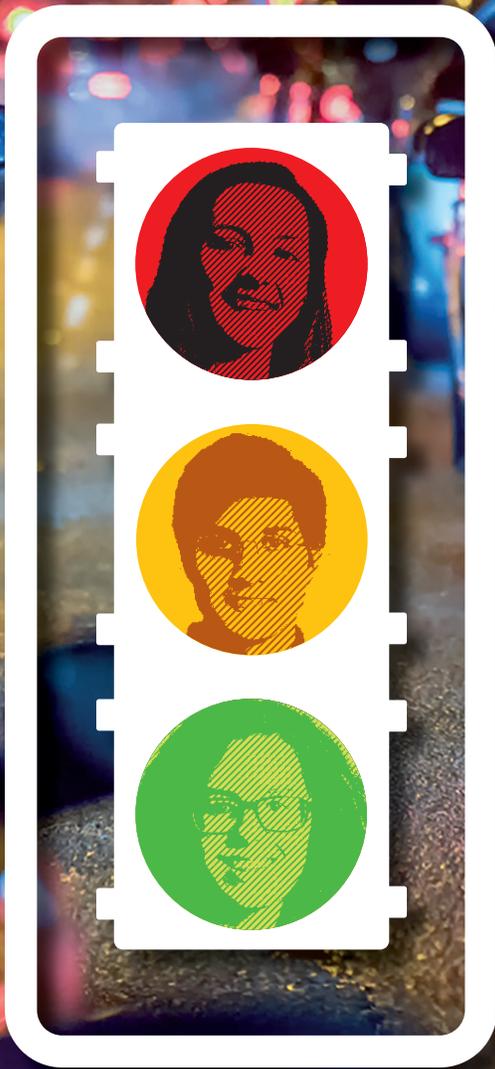


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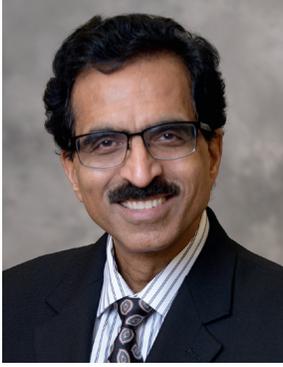
# ENGINEERING IMPACT

PURDUE UNIVERSITY | SPRING 2019

## UNDERGRADUATES ENERGIZE TRANSPORTATION RESEARCH



## HEAD'S MESSAGE



As I look outside my window and see the spring colors returning to campus, I am filled with a sense of joy for what the new year will bring. It is ironic, though; spring also means that the end of the school year is rapidly approaching.

Like any proud educator, I look forward to hearing about the successes of our newest soon-to-be civil engineering graduates. At the same

time, it is always a little bittersweet seeing all the students I have made connections with over the years leave us.

But our loss is certainly the world's gain. Whether they choose to further their education or to enter the working world in the public or private sector, our graduates are highly sought after because our students receive the best education and research opportunities available. This reputation we and our alumni have earned is well-deserved. Each year, our students, faculty and staff strive to improve, influence and innovate the civil engineering field.

In this edition of IMPACT, we will share a few concrete examples of what the Lyles School of Civil Engineering is undertaking to ensure that our undergraduate students receive the very best education and hands-on research experience possible.

We have students assisting in researching nano-clay, which could prove to be crucial in designing more resilient structures at the soil level. Students are also researching the potential impact that autonomous vehicles will have on the environment. And they are joining faculty on a Purdue-led, worldwide research effort to study poverty challenges around the world.

Also in this issue, we will detail the additions and improvements we have made both to our building and to our curriculum. We have started one-credit courses aimed at offering students — those enrolled and those not enrolled in civil engineering — a diverse, interactive overview of the many disciplines within our school. We have completed the first phase of renovations for Hampton Hall, which includes several new labs and a student lounge.

These are just a handful of examples that illustrate how the Lyles School of Civil Engineering is working to create a fulfilling educational experience for our undergraduates. We will continue to innovate how we educate. If you have recommendations, be sure to share them with me. I am always interested in hearing about ways to better our program. ■

All the best,

### RAO S. GOVINDARAJU

*Bowen Engineering Head of Civil Engineering and  
The Christopher B. and Susan S. Burke  
Professor of Civil Engineering*

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**On the cover:** Undergraduate student researchers in the Lyles School Traffic Laboratory are prepared for real-world applications in the transportation sector.

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**Moving?**  
Send change of address to:

Lyles School of Civil Engineering  
Delon and Elizabeth Hampton Hall  
550 Stadium Mall Drive  
West Lafayette, IN 47907-2051

Or email: [heathk@purdue.edu](mailto:heathk@purdue.edu)  
Or call: 765-494-2166

# NEWS AND EVENTS

## OPAL AWARD

Ron Klemencic (BSCE '85) has been selected to receive the 2019 OPAL award — a prestigious honor presented by the American Society of Civil Engineers — for his innovation and excellence in civil engineering design.

Klemencic is the chairman and CEO of Magnusson Klemencic Associates



and has been the structural engineer-in-charge for more than 175 buildings over 27 stories high in 19 countries. His firm has completed projects in 47 states and 54 countries with an

aggregate construction cost of \$99 billion.

Additionally, Klemencic served as chairman of the Council on Tall Buildings and Urban Habitat for five years and currently serves on the Board of Directors of the Charles Pankow Foundation, the most influential research funding organization supporting building construction in the United States. ■

## TRANSPORTATION STUDIES ABROAD

Every year, Lyles School of Civil Engineering students have opportunities to study abroad.

In summer 2018, professor Darcy Bullock led a trip through England, France, Germany and Austria. Students experienced a variety of approaches to mass transportation

infrastructure. On a trip through Singapore, professor Samuel Labi led students on a tour of the country's under-sea highway that is currently under construction.

For info about CE study abroad experiences, visit [purdue.edu/CE/Global](http://purdue.edu/CE/Global). ■



Students study transportation in Europe.

## IN MEMORIAM: KEN CURTIS

The Lyles School of Civil Engineering mourns the loss of professor and alumnus Kenneth Curtis, who died in October 2018. He earned his civil engineering bachelor's degree in 1946 and his master's in 1949.

Professor Curtis taught at Purdue from

1948 to 1992 and was instrumental in establishing the land survey engineering degree. He earned many awards and accolades throughout his career and continues to be an inspiration to engineers. He will be missed. ■



## 2018 WINTER GRADUATION

A big "Thank You" to everyone who joined us in December for the winter commencement ceremony and festivities.

Nearly 100 graduate and

undergraduate students earned their civil engineering degrees last semester. We were honored that so many of those graduates — along with their families and friends — joined us at Delon and Elizabeth

Hampton Hall to celebrate. We at the Lyles School of Civil Engineering wish all of our graduates the very best in their professional and personal pursuits. ■



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# CIVIL ENGINEERING STACKED

One-credit courses in the Lyles School give students a taste of the profession

Sometimes the best way to gain a taste for something is to sample a little bit of everything — and the Lyles School of Civil Engineering now allows Purdue students to do exactly that.

In fall 2018, the school began offering a series of one-credit courses as part of the College of Engineering's "Stackable Ones" modular course plan.

Stackable classes are one-credit-hour courses focusing on an area of study that can be "stacked" to create a custom curriculum. For example, the college provides a series of one-credit courses in the field of data science.

"Stackable Ones' provide a refreshing degree of flexibility to engineering curricula," says Mung Chiang, the John A. Edwardson Dean of the College of Engineering. "This effort in the Lyles School of Civil Engineering is an important experiment for our students."

## CIVIL ENGINEERING STACKED

In the Lyles School, stackable classes are one-credit courses focusing on different specialties within the field of civil engineering.

Cary Troy, associate professor of civil engineering and co-coordinator of the project, says the idea behind the one-credit classes is to provide a kind of smorgasbord of civil engineering specialties for anyone to try — be they first-year engineering students, students who have already chosen their discipline or students majoring in something outside of engineering.

"We want to provide students with an overview of all the different areas that civil engineers address every day," Troy says.

The Lyles School started off with two one-credit offerings: the Engineering of Water, an environmental, hydraulics and hydrology class, and Smart Mobility, a transportation class. Both courses were taught by multiple Purdue Civil Engineering faculty. Classes centered on in-class projects.

Troy says that the stackable classes are a unique opportunity to experience junior- and senior-level civil engineering topics, affording students the chance to directly interact with faculty.

"It's a great way to get newer students involved in what is typically higher-level material without being overwhelming," he says. "They get to participate in simulated research activities and experience real-world applications in civil engineering."

Examples of in-class projects include taking water samples from a creek, constructing

a rudimentary water distribution system, using a driving simulator and participating in connected vehicle demonstrations.

## STUDENTS INTRIGUED

Civil engineering major Meg Hunter participated in the Smart Mobility class and was impressed with the wide variety of subjects covered in a single semester.

"It was great to see and participate in something new every week," Hunter says. "I'm actually a huge nerd when it comes to mass transportation, so to see what's in store for the future of civil engineering was great."

Ethan Edwards, a civil engineering sophomore, attended the Engineering of Water class and said it was easily one of the best classes he has taken at Purdue.

"The professor-student interaction we had was great," he says. "I chose the class because I have an interest in environmental engineering and water quality, and this class really showed me what could be in store should I choose to pursue it as a career."

## FUTURE OFFERINGS

Jon Fricker, civil engineering professor and project co-coordinator, says he sees great potential for expansion in these types of classes and was impressed by the extent of faculty interest after just one semester.

"What's so great about our new stackable courses program is that there is so much room for it to grow," Fricker says. "When we approached the CE faculty about the one-credit classes, we received 10 recommendations in pretty short order."

Fricker believes that the appeal to students and faculty is that the classes have a fun, relaxed atmosphere, while also highlighting the unique aspects of civil engineering.

"It's a great chance to show off what our faculty members are up to and how civil engineering touches every part of society," he says. "It's an eye-opening experience for most, and the material is presented in a way that keeps students constantly engaged with activities and demonstrations."

Fricker adds that the professors themselves have learned quite a bit from the fall semester and have already come up with tweaks and improvements for next year.

For spring 2019, the Lyles School added a third one-credit course to its rotation, a materials course on 3D printing. Fricker and Troy are planning to offer the Mobility and Water courses again in the 2019-20 school year. ■



Top: Transportation research engineer Mathew Jijo Kulathintekizhakehil explains to students in the Smart Mobility class how connected vehicles collect and transmit data.

Middle and bottom: Students gained hands-on field experience in the Engineering of Water class. Civil Engineering professors Cary Troy and Antoine Aubeneau had students track how quickly dye was transported through a stream.

# LYLES SCHOOL RESEARCHERS SEEK TO PREVENT SOIL LIQUEFACTION



## Undergraduates aid faculty in the study of a synthetic nano-clay called laponite

Purdue researchers continually innovate how structures are built — and that includes improving the very soil that structures are built upon.

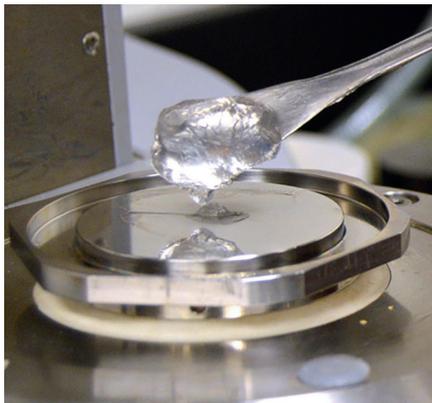
A chief concern when designing structures in areas vulnerable to earthquakes is liquefaction. Liquefaction is a phenomenon in which the strength and stiffness of a soil are reduced by earthquake shaking or other rapid loading. It is a result of the pressure build-up, during shaking, in the water-filled space present between the sand grains. Liquefaction is a common occurrence during seismic events and can lead to catastrophic failure of structures and lifelines.

### CLAY YOU CAN SEE THROUGH

Enter Marika Santagata, associate professor of civil engineering. Together with colleagues Antonio Bobet, Cliff Johnston and Joe Sinfield, Santagata first explored the use of a nano-clay called laponite for treating sand deposits susceptible to soil liquefaction. NSF-sponsored research by PhD student Felipe Ochoa — now assistant professor at the University of Chile in Santiago



Lyles School undergraduate student Haillie Swanson pours the powder form of laponite in preparation to mix it.



Once mixed, laponite takes on a clear, gel-like form.

— provided the first evidence of the effect of laponite in increasing the liquefaction resistance of sands, at least at the lab scale.

Laponite is a synthetic nano-clay that has found application in many industries, from consumer products to electronics. With it, Santagata says, there is great potential for a number of applications — including preventing liquefaction. “Working with this synthetic clay provides a number of opportunities in geotechnical research,” Santagata says.

Though referred to as “clay,” laponite looks considerably different from clay one would find in the ground. Once mixed with

water, the material, which starts as a dry powder, transforms into a clear substance that initially exhibits fluid behavior close to that of water, but, over time, develops a gel-like structure.

“Laponite presents a novel approach to addressing liquefaction,” Santagata says. “In its fluid form, the material could be used to infiltrate the ground around existing structures.”



Marika Santagata, Lyles School of Civil Engineering associate professor.

### UNDERGRADUATE RESEARCHERS

Assisting Santagata in her most recent research on laponite are civil engineering undergraduates Haillie Swanson and Daniel Espinoza and PhD student Amy Getchell. This work is examining how the flow properties of laponite water dispersions can be carefully tailored using dispersants and how such chemical modification affects the structure of the gel formed over time.

Espinoza says it has been a privilege to work alongside Santagata.

“This is definitely something I never would have learned about in class,” Espinoza says.

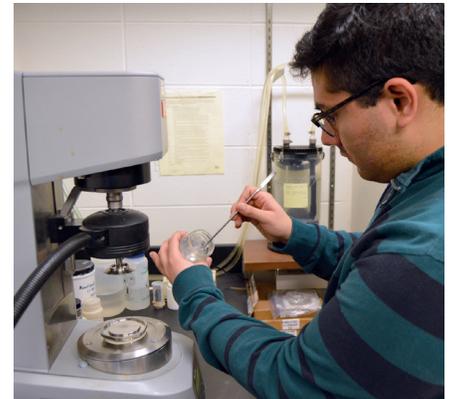
“This has been an incredible opportunity to aid Professor Santagata in a pretty new area of study.”

Swanson echoed Espinoza, adding that her participation will surely aid her beyond the classroom.

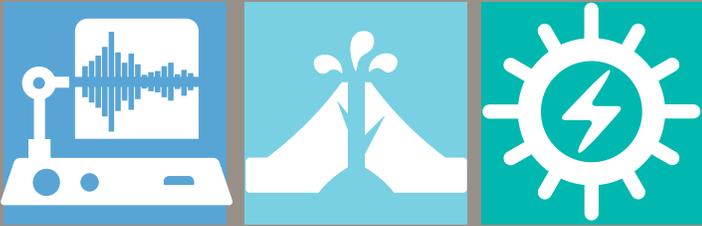
“Having a chance to actively participate in high-level research like this has been great for me — not just for getting exposed to a whole new class of soft materials, but also for my resume,” says Swanson, a senior. “Being able to say I’ve been a member of a research team at Purdue University, and that I have published a paper on my work, has definitely helped me stand out.”

For Getchell, this work has provided an opportunity to interact with researchers from other universities. Last summer the work on laponite took her to Politecnico di Torino — one of the top universities in Italy — for a joint study of the material.

Santagata says, “The current study provides insights into laponite behavior relevant to applications well beyond civil engineering.” ■



Lyles School undergraduate student Daniel Espinoza places a sample of the laponite gel onto the rheometer. A rheometer measures the way in which a sample flows in response to applied forces.



# TRAINING GROUND FOR HAZARDS ENGINEERS



Bowen Laboratory project researcher Thomas Bradt and Purdue Civil Engineering undergraduate student Joshua Harmon examine load versus displacement data on web bending of a wide flange beam loaded in compression.

## *Researchers at Purdue's Bowen Lab train and employ undergraduate researchers*

The Lyles School of Civil Engineering strives to make every avenue available for undergraduate students to participate in meaningful research — and that includes opportunities at the Robert L. and Terry L. Bowen Laboratory for Large-Scale Civil Engineering Research.

The 66,000-square-foot Bowen Laboratory is home to research and investigations on the behavior of large structural models and elements subjected to loads representing extreme events, such as earthquakes, blasts and impact. With the knowledge gleaned, engineers can design future structures to better withstand extreme events.

The lab also serves as an invaluable and unique educational resource. Outside of Purdue, few civil engineering undergraduates will get a chance to use equipment such as a strong floor, earthquake simulators and hybrid simulation facilities. From preparing materials for testing to analyzing data, undergrads at the Bowen Lab are involved in just about every stage of research.

Amit Varma, the Karl H. Kettelhut Professor of Civil Engineering and director of the Bowen

Laboratory, says a core mission of both the lab and the school is to serve the students.

“The involvement of undergrads is central to our educational mission,” Varma says. “All too often at other schools, labs and universities, it is rare to include undergrads in meaningful research. But times have changed. Our students have proven to be invaluable. They bring in fresh ideas and are incredibly eager to learn.”

Joshua Harmon and Rob Singer, civil engineering seniors and research assistants at the Bowen Lab, say they feel as if their overall knowledge and understanding of civil engineering have taken giant leaps forward, thanks to their experiences here.

“I definitely feel that this sets Purdue Civil Engineering apart from other schools,” says Harmon, who has been assisting with research on seismic and wind behaviors and on the design of concrete-filled composite plate shear walls. “What I have learned here in just one semester has put me much further ahead than if I had only attended classes for my studies.”

“It’s also been a great way for me to get a jump-start on grad school,” adds Singer, who has been assisting with research on performance-based fire engineering of steel and composite building structures. “And it is certainly something that looks impressive on any résumé.”

The benefits gained from undergraduate participation are hardly one-sided. Thomas Bradt, Bowen Laboratory project researcher, says the vital assistance provided by students makes research endeavors at Bowen go more smoothly.

“The students definitely help make our jobs a lot easier,” Bradt says. “They take their work very seriously, and their enthusiasm to assist and learn on the job is infectious. The opportunities and relationships our school and lab provide undergraduate students sets us apart from pretty much every other school out there.”

To learn more about the research and research opportunities at Bowen Laboratory, visit [engineering.purdue.edu/Bowen](http://engineering.purdue.edu/Bowen). ■

# UNDERGRADS ENERGIZE

*At the Lyles School,*



When entering the cozy Traffic Lab in Purdue's Hampton Hall of Civil Engineering, you're met by a life-size traffic light hanging from the ceiling. (Yes, it's functioning!) Road signs and street signs line the walls. Students are manipulating colorful shapes and graphs on computer screens.

Officially called the Harold L. Michael Traffic Operations Laboratory, the facility is a hub for transportation research at Purdue University. Darcy Bullock, Lyles Family Professor of Civil Engineering, leads the lab and directs the Joint Transportation Research Program.

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"I try to have a blend of undergraduate students, graduate students, staff and agency engineers engaged on my research team," Bullock says. "Right now we have one of our senior undergraduates mentoring a junior in the lab, so we'll have continuity in the work."  
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## **ANALYZING TRAFFIC PATTERNS**

The lab performs vital traffic engineering research for a variety of sponsors, including the National Cooperative Research Program, several state departments of transportation and the Federal Aviation Administration. One focus of undergraduate research over the past few years has been the analysis of vehicle data to monitor Indiana interstate congestion that is due to traffic growth, work zones and inclement weather.

In Purdue's Hall for Discovery and Learning Research, undergrads Cassie McKee (left) and Meg Hunter give the Jelly scooters a workout.

# TRANSPORTATION RESEARCH

## *undergraduates thrive in the Traffic Lab*

During the summer months, transportation agencies provide a list of interstate construction projects they want to monitor. Civil engineering senior Cassie McKee, in her second year at the lab, creates weekly reports for the Indiana Department of Transportation on traffic patterns around those work zones. Her analyses help INDOT identify unanticipated congestion and to pinpoint and mitigate work-zone congestion and queuing.

"I take speed and position data for highway vehicles, and I use that with our visualization tools to get an idea of what's happening in the work zones," McKee explains. "I also look at the crash database to determine if crashes are causing congestion, or if crashes are associated with queued traffic upstream of the work zone."

Students perform similar analyses on how inclement weather affects interstate traffic. Using the lab's computer-visualization tools, students generate winter-weather traffic reports for INDOT to monitor the efficiency of their winter operation activities.

McKee and fellow undergrad Meg Hunter are recipients of the Jack V. Skillman Award, which enabled them to attend the 2019 Transportation Research Board meeting in Washington, D.C. "They even had a chance to ride in an autonomous vehicle on their trip," Bullock says.

Undergraduates also perform research out in the field. Senior Alek Venturino has been studying the efficiency of Purdue's electric vehicle charging stations. For one project, he visited each of the eight charging stations on campus, twice a day. Venturino recorded data such as occupancy and plugs. He took geotagged photos and noted whether or not the vehicle was authorized to park in the spot.



Undergrad Alek Venturino studies Purdue's electric vehicle charging stations.

"Working with Professor Bullock on this project has been fascinating," Venturino says. "When I am working as a civil engineer in transportation, this sort of experience will come into play for companies considering upgrades to things such as parking lots, rest areas, service stations, you name it."

In another effort, Bullock's team is working on next-generation cars that interact with traffic signals to improve the vehicle efficiency and engine control. The research employs an Audi sedan tricked out with a real-time interface to traffic signals on U.S. Highway 231, adjacent to campus. Undergraduate Bill Morgan was part of the team that looked at the performance of a 10-intersection deployment of the system, in which the signals communicated with the Audi as it traveled. That system will be deployed at 30 additional intersections in the West Lafayette area later in 2019.

### HIGH-PROFILE PARTNERSHIP

In 2017, Ford Motor Company and Purdue formed a research-and-development alliance for developing an array of technologies for automobiles — and more broadly for mobility solutions and transportation services.

One high-profile Purdue-Ford project explores best practices for e-scooters. Led by Bullock, the effort is thought to be the first academic research to examine how the oft-maligned e-scooters can best be incorporated into an urban environment.

In late 2018, 40 of Ford's "Jelly" brand scooters were distributed across Purdue's campus. The Traffic Lab's Cassie McKee, who uses a longboard or a bike to get around campus, provided student input for the study and was part of the team gathering data on the scooter usage.

"Students love scooters because they solve the 'last mile' problem," McKee says. "You get close to your destination, say a parking garage, but you still have that last mile on campus." On the other hand, students tend to leave the scooters lying in walkways and ride them on sidewalks, making for accessibility and safety problems.

"That's my main concern with them. The responsible use and storage of scooters. We want to make sure people use them safely," McKee adds.

"Scooters are a new transportation mode that we have no design guidelines for, and agencies are looking for guidance," Bullock says. "In the city of Indianapolis alone, over 475,000 miles were driven on by 8,000 scooters from September to November 2018. It is important to understand how these vehicles are used and how to safely integrate them." ■



  
**CIVIL ENGINEERING ALUMNA  
 ENCOURAGES GIRLS  
 TO BECOME ENGINEERS**

A professional civil engineer for over 30 years and author of three children's books, Purdue Civil Engineering alumna Cheryl Cunningham (BSCE '80) says she wants girls to feel empowered to pursue interests in STEM fields

Although this was somewhat intimidating at first, Cunningham says she was quick to make friends with the guys in her classes and was immediately accepted by faculty and fellow students.

"Honestly, it's funny, but the one place where my gender didn't present an issue was among other civil engineers," she says. "After graduation, there were issues with other professionals, but never the engineers. All they seemed to care about was if you could do the work."

After Purdue, Cunningham went to work for Bechtel Corp. in California, first working on construction of a nuclear power plant in San Onofre, California, and then a plant in Palo Verde, Arizona. With nuclear power on the wane, Cunningham moved to consulting work in Austin, Texas, and Southern California, where she became an expert in drainage, hydraulics, hydrology and site-plan engineering.

In 1992, she moved back to Indiana, taking a job at Parsons & Shartle Engineers Inc., founded by Chet Parsons (BSCE '74) in 1986. Two years later, she became president of the firm, which was renamed Parsons, Cunningham & Shartle Engineers Inc. She served as president until the company was sold in 2017.

Since her retirement, Cunningham has taken up writing a children's book series with her sister, Judy Cunningham, an early education specialist. The series is called "I Can Be an Engineer," and the books encourage young girls to pursue their passions.

"It's important that all children receive encouragement about their passions and see how engineering is part of everything they do," Cunningham says. "Whether it's tinkering with their bicycles or playing with a stream of water — what they are doing is connected to engineering."

For more information about the book series, visit [icanbeanengineer.com](http://icanbeanengineer.com). ■

such as engineering. She would like the next generation of children to have even more female role models.

In short: Cunningham strives to be the example for young girls that she never had.

Cunningham grew up in Crawfordsville, Indiana. She loves her hometown, but she knew she would have to go elsewhere to achieve her dreams.

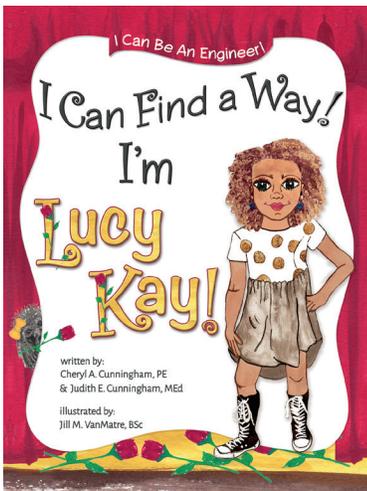
"I knew I wanted to build things, and I knew if I was going to get the education necessary to do that as a career, Purdue University was where I needed to go," she says.

However, her career choice was not as clear as it was for the boys in her grade school.

"I remember very well when I was a little girl and we were given aptitude tests," Cunningham says. "The results listed appropriate careers segregated by gender. There wasn't even an engineering career option result for us girls. Even my teacher said I'd make for a great engineer — if I were a boy."

Despite less-than-overwhelming support in her younger years, Cunningham remained determined to get an engineering education — and to Purdue she went. Unsurprisingly, female contemporaries were few.

"Pretty much all the friends I made at Purdue were guys," she recalls. "In all of my engineering classes, I was the only woman."



Cheryl reads "I Can Be an Engineer" to a class of elementary school students.



## LYLES SCHOOL STUDENTS TO COLLABORATE WITH USAID

It is a rare opportunity.

Lyles School of Civil Engineering students will assist in global research that aims to create long-lasting solutions for low-income countries.

In August 2018, Purdue University was awarded a five-year, \$70 million grant from the United States Agency for International Development (USAID) to lead a multi-university consortium — titled Long-Term Assistance and Services for Research (LASER), Partners for University Led Solutions Engine (PULSE) — and build capacity of in-region higher-education institutions to devise evidence-based solutions to global developmental challenges.

Joseph Sinfield, associate professor of civil engineering and director of the College of Engineering Innovation and Leadership Studies Program, is a co-principal investigator on the effort — along with Arvind Raman, Andrea Burniske, Gary Burniske and Yuehwen Yih. Sinfield co-authored Purdue's bid to lead the consortium, which was selected from a pool of more than 100 proposals.

"We aim to employ innovation-science principles to understand the full scope of issues faced in lower-income countries," Sinfield says. "To properly address these challenges, we are developing methods to frame complex, multilayered problems. Our early work shows that socio-technical problems like improving basic education, health, water and food security involve literally hundreds of success factors spanning issues of commitment, awareness, motivation, leadership engagement, barriers and access, technology, resourcing and sustainability, among others. Our new models are beginning to capture this breadth of requirements."

The effort has already engaged a number of graduate and undergraduate students, giving

them exposure to real-life needs and to ways engineers can help frame complex problems and develop responsive solutions. Sinfield says that the work is particularly exciting for civil engineers who are inherently involved in building communities, developing sustainable environments and creating networked infrastructure.

Already on the team with Sinfield are civil engineering PhD students Romika Kotian and Maggie Busse. Kotian says she never dreamed she would be part of such an ambitious undertaking when she came to Purdue.

"It was very surprising when I was told about the award, and that I could be involved. But I am so happy to be a part of it," Kotian says. "I didn't think I'd get a chance to have such a major impact on the world as a student."

The five-year project, which will engage stakeholders in multiple regions around the world, is getting started with the consortium's first international conference in the spring of 2019. The event will take place in Uganda and will focus on improving systems for health care, water, basic education and food security in East Africa. Preparation for this activity is providing a real-world focus for a course called Breakthrough Thinking for Complex Challenges, which serves as a capstone to the College's new Minor in Innovation and Transformational Change — also led by Sinfield. In addition, a number of undergraduates interested in the project have been able to get involved by participating in the student-run organization called IMPACT, short for Innovation Methods for Purdue

Advanced Collaboration Team. IMPACT helps organizations on- and off-campus employ the best practices of innovation science to address their key challenges.

Winning the USAID grant illustrates Purdue's stature in international development research.

"Our standard for global activities is that they have real-world effects at significant scale," said Purdue President Mitch Daniels during the grant announcement ceremony. "This project more than meets that test."



Purdue University was selected to lead a multi-university consortium to tackle issues facing developing countries. Lyles School of Civil Engineering Associate Professor Joseph Sinfield is one of five co-PI's on the program.

Purdue's partners in the consortium are two universities in Indiana — Indiana University and the University of Notre Dame — as well as Catholic Relief Services and Makerere University in Uganda.

The consortium has a corporate advisory board that includes General Electric Energy, General Electric Healthcare, Dr. Reddy's Labs, Dow Agrosciences, Cargill, Land O'Lakes, Procter & Gamble, PepsiCo, Cisco, Infosys, Tetra Tech, Chemonics, Hewlett Packard Enterprise and Whirlpool Corp.

PULSE includes a faculty fellows program that will recruit faculty from each consortium member university as experts in food security, water, global health, infrastructure, microfinance policy and other topics to assist with various aspects of the center and network activities. ■



# HIGH-ACHIEVING UNDERGRADUATES SEEK, FIND RESEARCH EXPERIENCES AT THE LYLES SCHOOL

Today, many top engineering undergraduates want to participate in high-end research, and each year the Lyles School of Civil Engineering provides outstanding opportunities for these ambitious students.

In addition to research efforts of Civil Engineering faculty — efforts that often include undergraduates — the school is involved with two programs that encourage students to work alongside researchers over the summer. These programs are the Purdue University Summer Undergraduate Research Fellowship (SURF) and Purdue Undergraduate Research Experience (PURE).

“The civil engineering undergraduate landscape has changed significantly over the years for both domestic and international students,” says Rao S. Govindaraju, Bowen Engineering Head of Civil Engineering and the Christopher B. and Susan S. Burke Professor of Civil Engineering.

“There is an ever-growing desire among students to become more actively involved in research — to gain a deeper understanding of what they are learning about in the classroom — and we want to do everything we can to encourage this aspiration.”

## CAREER — AND ACADEMIC — REWARDS

Through Purdue’s SURF program, students have a rich opportunity to take part in academic research. The 11-week summer program includes attending professional development and research seminars, presenting research discoveries at the SURF symposium and enjoying social activities with other members. SURF students receive a stipend and are eligible for housing support.

Professor Na “Luna” Lu, a SURF mentor on the Lyles School faculty, says the program is an excellent way for students to deepen their knowledge of engineering and learn what it’s like to pursue a graduate degree.



"The students involved in SURF are all highly engaged. You can see it in every one of them: a passion to gain a greater understanding," Lu says. "These are the types of students any professor would be happy to have on their research team as master's and PhD candidates."

In the summer of 2018, civil engineering student Adlan Amran assisted Lu and civil engineering PhD student Yen-Fang Su as they continued their work determining optimal traffic opening times using piezoelectric sensors.

"It was exciting but a bit intimidating, at first," Amran says. "I really wanted to explore the SURF program because I was still on the fence about whether I should go to grad school. The research was fascinating, and my mentors were incredibly patient with me. And, in the end, it helped me decide that pursuing a graduate degree is what I want to do."

### INTERNATIONAL INTEREST IN THE LYLES SCHOOL

PURE is one of the marquee programs of the Purdue-India Initiative. Top undergraduates from three Indian Institutes of Technology — IIT Madras, IIT Bombay and IIT Hyderabad — are matched with Purdue civil engineering faculty to work on summer research projects.

Professor Brandon Boor, a PURE program mentor, says he is impressed with the eagerness and the engagement level of the students involved.

"The students in the PURE program have a clear passion for research and learning," he says. "Months later, I am still in contact with my student. Honestly, my only complaint is that the nine-week program doesn't last longer."

Satya Sundar Patra, a civil engineering major at IT Madras, assisted Boor's team in collecting indoor pollution data through low-cost air quality sensors.

"Working with Professor Boor confirmed my intention to develop my research goals and pursue a PhD," Patra says. "Throughout the summer, I learned that research can be very exciting. Sometimes we fail, sometimes we succeed, and the joy of success is extraordinary."

For more information about Purdue's undergraduate research programs, visit [purdue.edu/research/ugrad](http://purdue.edu/research/ugrad). ■

AMONG THE  
**TOP 5**  
IN THE NATION  
U.S. NEWS & WORLD REPORT

# PURDUE CIVIL ENGINEERING AMONG THE TOP FIVE IN THE NATION

For 2019, U.S. News & World Report ranks the Lyles School of Civil Engineering undergraduate program as No. 5 in the nation.

Rankings are computed from responses to a survey sent to deans, heads and selected senior faculty.

For over a decade, Purdue Civil Engineering has been ranked as a top 10 undergraduate program by U.S. News & World Report.

“I am honored that our school has been consistently recognized as having one of the best civil engineering programs in the country,” says Rao S. Govindaraju, Bowen Engineering Head of Civil Engineering and Christopher B. and Susan S. Burke Professor of Civil Engineering.

“These rankings are a reflection of the incredible efforts made by our students, faculty and staff — and I look forward to seeing what we can accomplish together in the future.”

A full listing of the Purdue Engineering national rankings can be viewed at <http://bit.ly/COE-rankings>.

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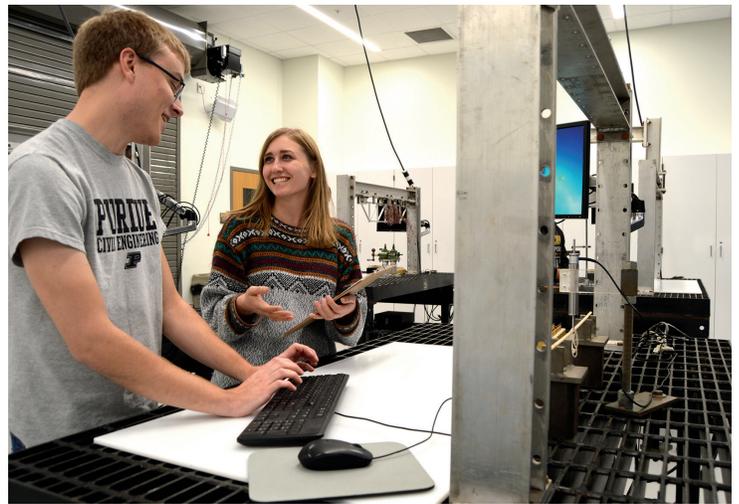
# RE NEW VA TIONS



The first phase of the \$5 million renovation project for the Delon and Elizabeth Hampton Hall of Civil Engineering was officially completed in December 2018.

Renovations to the Lyles School of Civil Engineering's facilities included upgrades to the ground floor and basement areas. Improvements to the building are an accessible entryway, improved air circulation, updates to existing laboratories for state-of-the-art civil engineering teaching and research, and new flexible-use teaching laboratories. The plan includes the following:

- Three flexible teaching labs: 1,735 square feet for architectural engineering; 1,151 square feet for geomatics engineering; and 1,395 square feet for structural engineering.
- Additional geomatics storage, lab prep and surveying lockers — 492 square feet.
- A new student lounge to promote collaboration — 204 square feet.



LYLES SCHOOL OF CIVIL ENGINEERING

Delon and Elizabeth Hampton Hall of Civil Engineering

550 Stadium Mall Drive

West Lafayette, IN 47907-2051

— LET'S RAISE THE BAR —  
**ON APRIL 24!**  
**MARK YOUR CALENDAR**

Are you ready to take the Next **GIANT LEAP** and propel Purdue University even further ahead?

April 24th marks Purdue's annual Day of Giving. For 24 hours, the Lyles School of Civil Engineering — and nearly all the other schools and organizations at Purdue — will host hourly activities and events in an effort to raise funds and improve educational experiences for our students.

Last year, the Lyles School of Civil Engineering received 325 gifts totaling nearly \$690,000. Overall, Purdue University raised more than \$37.6 million — a record for the daylong fundraising event. And this year, we intend to set the bar even higher!

Be sure to catch all of our news and announcements — as well as live coverage of this year's event — on our Facebook page at: [facebook.com/PurdueCE](https://facebook.com/PurdueCE). ■

