CIVIL ENGINEERING IMPACT

PURDUE UNIVERSITY | SPRING 2020

LYLES SCHOOL STUDENTS PURSUING HANDS-ON RESEARCH

PURDUE UNIVERSITY

Lyles School of Civil Engineering

HEAD'S MESSAGE

Try as I might to avoid the low-hanging, narrative fruit, I cannot help but find myself focused on our school's vision for 2020 and beyond.

At the Lyles School of Civil Engineering, our vision is to remain a preeminent program — by building on our existing strengths and outstanding reputation and by amplifying our impact on society.

I am proud to confidently say that our school's vision continues to be realized — and it is entirely thanks to the inspiring work done each and every day by our incredible students, faculty, staff, alumni and friends.

While impacting the world for the better is a wonderful goal, it is completely due to the collective efforts and achievements by Purdue civil engineers — past, present and future — that our vision comes into focus and becomes real.

That said, with a new year — and a new decade — come new (and renewed) objectives and benchmarks to achieve. That revitalized passion to reach new heights and pursue a greater understanding can easily be felt throughout the halls — from our students, faculty and staff — and I find myself inspired almost daily from my interactions with them.

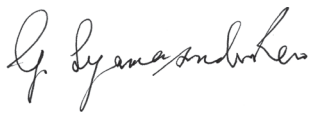
It is this consistent pursuit of excellence at Purdue University that makes it such a joy to be here on campus. And it is my honor, as both an educator and an administrator, to foster that sense of innovation and exploration.

In this edition of Civil Engineering Impact magazine, our readers will gain a greater sense of the passion and drive that those in our school have for civil engineering. Whether it be through ensuring that our undergraduates are given every opportunity available to take what they have learned in class and apply them in real-world applications or through current student-assisted research in areas such as infrastructure improvements, the Lyles School of Civil Engineering remains on track to uphold our vision as a world leader in both education and innovation.

Our educational efforts are not limited to our currently enrolled students. In this issue, we have an article about our latest efforts to encourage the civil engineering students of tomorrow. We also have a story about a new program that gives our undergraduates a head start on their master's degree.

The decade has only begun, but here in the Lyles School we are already taking the small steps required for achieving giant leaps in our profession. As always, we aim to lead, to inspire and — most importantly — to learn. And I look forward to sharing our results with you all in the years to come. ■

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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Graduate student Cihang Huang works with undergraduate Alicia Tunggal in Professor Luna Lu's lab. The pair are mixing super-absorbent polymers for use in self-healing concrete.

NEWS AND EVENTS

REAL-WORLD ENGINEERING FOR HIGH SCHOOL STUDENTS

THINK SUMMER

Purdue's Think Summer initiative is providing students an opportunity to learn key engineering concepts through its Summer College for High School Students program.

Starting in the summer of 2020, Purdue Civil Engineering will partner with the University's Summer College for High School Students program, which gives high school students a chance to earn college credit before their freshman year. The one-week, college-credit course is called "Resiliency and Sustainability in Civil Engineering: Not Just Buzzwords."

"It is our goal to spark and nurture students' interest in civil engineering," says Rao "G.S." Govindaraju, Bowen Engineering Head of Civil Engineering and the Christopher B. and Susan S. Burke Professor of Civil Engineering. "We feel this course will be especially interesting to future students as it deals with concepts that are relevant and world-impacting."

Many factors — including earthquakes, floods and hurricanes — affect how civil engineers design our communities. By addressing these factors, plus other aspects of resilience and sustainability, engineers can create a better future for people and our planet.

In this one-week course, high school students will learn why terms such as "resilience" and "sustainability" are not buzzwords but guiding principles that affect the future of our communities. Additionally, the students have a chance to tour Purdue's civil engineering labs, meet with faculty and student researchers, and gain hands-on experience related to building design, transportation planning and water management.

To learn more about Think Summer and Purdue Civil Engineering's course, visit the program's website at **purdue.edu/summer-high-school**.

CONGRATS TO OUR WINTER GRADUATES

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 feel 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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EXTRAOR

DINARY EXPERIENCES

"It was a little intimidating starting off as an undergraduate research assistant at Purdue's Bowen Laboratory," says David Derks.

The feeling is understandable. Inside the 66,000-square-foot building, the concrete walls rise 54 feet high, about five stories. A catwalk extends along the south wall. And situated throughout the expansive floor plan are heavy machinery, overhead cranes, instrumentation stations — and structural specimens in various stages of construction and testing. Everyone on the floor wears a hard hat, eye protection and gloves, as needed.

LARGE-SCALE RESEARCH

Since 2013, civil engineering research faculty at Purdue have used the lab and its technical capabilities to investigate the behavior of large-scale and full-scale structural models: bridge beams and decks, walls and slabs, steel columns and frames. Specimens are subjected to extreme loads, such as simulated earthquakes, blasts and impact, so that future structures can be designed to better withstand these events as well as the stress of time.

As an undergraduate, David Derks had a good understanding of engineering concepts from his classes, but he was curious to learn more. "I was a little timid as far as approaching graduate students and faculty and asking questions," he says. "Then as I settled in and got to know everyone better, they became great resources for learning — about the research process and the behavior and strength of reinforced concrete."

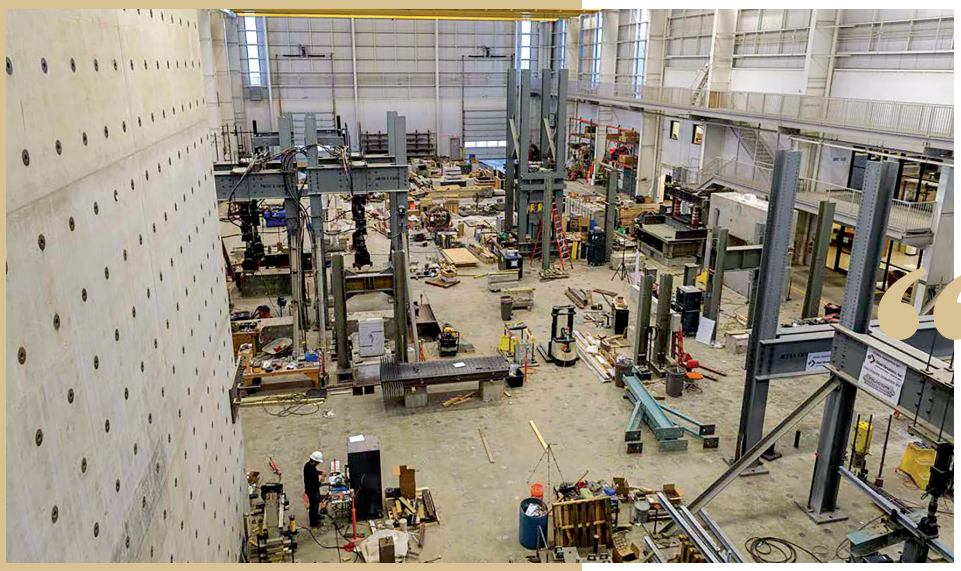
Chris Williams, assistant professor of civil engineering and Derks' advisor and mentor, specializes in large-scale reinforced concrete structures. Williams says having access to the Bowen Lab is a huge advantage for civil engineering students seeking research experiences.

BOWEN LAB SPECS

66,000
SQUARE FEET

54
FEET HIGH

82,000
SQUARE-FOOT TESTING YARD



> Just the structural capacity of the strong floor and the strong wall — they allow us to apply extreme forces to structural components. At Bowen, we have the size to do large-scale and even full-scale testing of structural components," Williams says. "If we want to test a bridge beam, we can just bring the bridge beam into the lab and test it, no problem."

BOWEN LABORATORY HONORED WITH ACI'S CHARLES S. WHITNEY MEDAL

The Bowen Lab has been named the 2020 recipient of the American Concrete Institute's Charles S. Whitney Medal. Charles Whitney (1892-1959) was world-renowned for his innovations in concrete construction and bridge building. The Bowen Lab was recognized for its researchers' consistent contribution to the economy and safety of buildings and infrastructure.

Amit Varma

"Winning the Whitney Medal is a tremendous honor," says Amit Varma, the Karl H. Kettelhut Professor of Civil Engineering and Director of the Bowen Laboratory of Large-Scale CE Research. "The ACI rarely confers the Whitney Medal on a research and testing laboratory, so we feel especially gratified to be recognized. Our faculty, staff and students look forward to making pioneering and innovative contributions toward improving the safety and economy of buildings and the built infrastructure."

LEARNING BY DOING

Students working at Bowen have a chance to get their hands dirty and to handle the materials they learn about in the classroom. "I think concepts make a lot more sense to students when they see and touch them in the lab," Williams says. Plus, student researchers have a chance to gauge their interest in certain areas, to see if working with large structures is something they want to continue.

Derks, now working on his master's degree, has been getting his hands dirty in the Bowen Lab since the summer after his sophomore year.

He learned about post-tensioning and prestressed concrete by helping a graduate student test bridge beams with post-tensioned steel strands inside them. He helped prestress the anchoring rods used to secure the test setup.

In another instance, he learned to mix and apply mortar to repair a giant bridge I-beam with a gap in the end section. "We also had to build elevated formwork around another gap on the top, then pour high-slump concrete to fill it. I'd never done elevated formwork like that."

He has proven valuable to researchers who need an experienced assistant — to help set up load tests, for example. Working on a bridge deterioration project last year, Derks helped move giant box beams, weighing several thousand pounds apiece, and place them in a test setup with loading equipment positioned to press down on each beam. "I had to get up on ladders and, with a pressurized impact hammer drill, bolt the steel test station together."

Then he helped attach the hydraulic presses (which push down on the specimen) and load cells (which enable researchers to measure the force) to the overhead setup. Putting the beams in place required both of Bowen's overhead cranes. Fortunately, the lab manager handled that task.

Derks enjoys hands-on engineering, although he knows it is not for everyone. "It's hard work. You'll leave every day covered in dirt, or steel grease or sawdust. But if you like this kind of work, then it's rewarding," he says. "If you immerse yourself in the work and ask lots of questions, you can learn a lot from graduate researchers and their projects."

Lyles School alumna Mariah Schroeder aims to change the world around her

HIGH-ACHIEVING

YOUNG PROFESSIONAL ENERGIZES HER COMMUNITY

Already recognized as one of the nation's rising stars in civil engineering, Mariah Schroeder, a Lyles School of Civil Engineering alumna, says she wants to make a lasting impact in her field and to inspire the civil engineers of tomorrow.

"I always knew I wanted to do something where I could give back to the community and the environment and, luckily, I was able to do that thanks to Purdue Civil Engineering," Schroeder says. "Because of what I learned at Purdue, I can do what I do now as a professional." She earned her bachelor's degree in 2015 and her master's in 2016.

Schroeder is a process engineer at Kansas City, Missouri-based Burns & McDonnell — ranked No. 10 in Engineering News-Record's top 500 design firms in the United States. Working in the company's Water Group, she specializes in municipal water and wastewater treatment.

Schroeder says the biggest project she is working on currently is the design of a drinking water treatment plant in Salina, Kansas.

"It's been an incredible challenge," she says. "The biggest issue we're facing is that we need to design this plant with strong drought resistance. Salina is very susceptible to droughts, so we must ensure that the plant maintains its access to water despite that."

In her first three years as a professional civil engineer, Schroeder has already distinguished herself. This past fall, she received the American Society of Civil Engineers' Region 7 Outstanding Younger Member Award. She was commended for being a vital member at a top-ranking firm and for her advocacy work in education and the civil engineering industry.

Since moving to Kansas City, Schroeder has involved herself in K-12 STEM education programs.

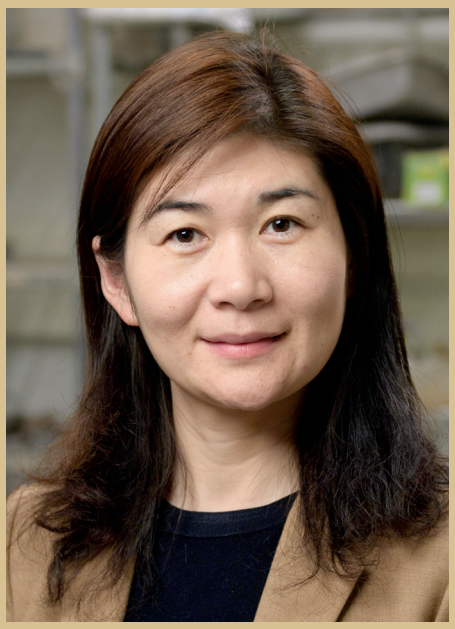
As part of her involvement with ASCE, Schroeder helped plan an ambitious outreach event in conjunction with the National Society of Black Engineers (NSBE) at the annual conference in March 2017. "We hosted more than 1,500 kids from kindergarten through 12th grade — and about 100 adult chaperones — at Cinetopia and the Museum at Prairiefire in Overland Park, Kansas. That was bonkers," she says, laughing.

"Education has always been important to me, and it's a big part of my family," Schroeder says. "My mother, my grandmother and my great-grandmother were all teachers. I've seen for myself how much they care and how much of an impact they have on children and teens. I knew that was something I wanted to do as well — but from the perspective of a professional engineer."

As for her civil engineering advocacy work, Schroeder is one of the main points of contact for her state senators and representatives in Washington, D.C. She works to promote and inform government officials on the infrastructure needs and funding required in Missouri.

"It's vital that we're able to communicate and advocate with our representatives so that our area's infrastructure needs are consistently met," Schroeder says. "Our expertise is needed so that our leaders can make informed decisions."

TACKLING THE FREEZE-THAW PROBLEM TO IMPROVE MIDWEST ROADS



Luna Lu, associate professor of civil engineering and American Concrete Pavement Association Scholar

Professor Luna Lu engages students

SELF-HEALI CONCRETE

FOR DRIVERS IN THE MIDWEST, THE PROBLEM WITH WINTERS ISN'T SIMPLY THE COLD. IT'S THE DREADED FREEZE-THAW CYCLE THAT ERODES, CRACKS AND PITS ROAD SURFACES.

After a rainy period, water saturates concrete road surfaces. If temperatures fall below 32 degrees F, the water molecules freeze, expanding by as much as 9%, and crack the concrete. Over the course of several winters, fissures in the road surface grow large enough to allow de-icing chemicals to seep in — and, in bridge decks, these chemicals will reach the steel rebar substructure and corrode it. In states like Indiana that experience the freeze-thaw cycle, winter leads to costly repairs.

Addressing the freeze-thaw cycle

In the Lyles School of Civil Engineering, Na "Luna" Lu, associate professor and ACPA Scholar, is exploring formulations for self-healing concrete, a construction material that will last longer in regions prone to the freeze-thaw cycle. For Lu, undergraduate students are an integral component to this and other research projects.

"Our objective with this project is to develop cost-effective methods that give concrete the ability to self-heal during the winter cycle," she says. "We are looking at rehealing cracks up to 50 microns, 80 microns, less than 100 microns." A human hair is about 75 microns thick.

Working with the Indiana Department of Transportation, the team is putting its primary focus on bridge decks. "They are large concrete slabs, and they have significant thermodynamic expansion. Also, bridge decks typically undergo a large deflection, so it's easier for them to develop cracks," Lu says. "Our hope is that by using a self-healing material in bridge decks, we can significantly cut down on the repairs needed."

The team sees promise with a class of materials called super-absorbent polymers (SAP). Regular cracked concrete has a limited ability to self-heal, but when mixed with SAP, the cracked concrete has a lower water permeability as the SAP swells when water enters a crack, blocking the crack and "healing" it. The healing process produces chemicals, basically calcium composites, that seal the crack.

Hands-on undergraduates

"Regardless of the career path a student may take, to graduate school or into industry, this type of independent study — which involves critical thinking, developing solutions to open-ended questions — this skill set is very important. That's No. 1," Lu says. Hands-on research also makes science more direct. "For instance, in class we talk about things like the hydration process and the hydrogen curve. It can sound very abstract, but working on a research project like this helps students understand the tangible applications of science."

Working in Lu's lab, civil engineering junior Alex Kellam has gained fundamental knowledge about the behavior of concrete. "Just understanding that concrete is inherently self-healing was insightful," he says.

Kellam tested how SAP compounds respond to the effects of shearing, which occurs during the mixing process. In the lab, his job was to mix concrete "recipes" with different mixing speeds and durations.

"When you see a concrete truck, it's constantly spinning, shearing, in effect," Kellam says. "It keeps the concrete fluid and keeps it from hardening, but we wanted to know the effects of the shearing on the polymer to make sure that it wasn't going to reduce the amount it can absorb, or change it in some other way."

Junior Alicia Tunggal works on a different problem. Using the tea bag filtration method, she's gathering data on the rate of absorption for different types of super-absorbent polymers.

She says she was a little surprised by the research experience.

as she develops
NG

Siwei Ma, postdoctoral scientist, tests SAP compounds for optimum use in self-healing concrete.

Improving the industry

"In engineering, I always thought we're trying to solve problems," Tunggal says. "But it's more. After working with Professor Lu and the graduate students, I can see they are actually thinking about ways to improve the construction industry. So, even the little things we do are useful and are actually helping to make an impact in the engineering field — and on society."

The undergrads in Lu's lab work under the supervision of Siwei Ma, a postdoctoral scientist interested in self-healing concrete materials. He enjoys the collaborative aspects of working with undergraduates. "For example, while conducting an experiment with Alex, he mentioned Pykrete," Ma says. "It's a composite material made of ice and sawdust I had not heard of, and it has mechanical properties comparable to conventional concrete. It's an idea I'm still thinking about. These kinds of interactions in the lab are inspirational."

Lu's research team is in discussions with the Indiana Department of Transportation's bridge design team and USI Consultants Inc. about potential field applications for self-healing concrete in precast bridges.

SAVING CLEVELAND'S RED LINE

CE alums help rebuild a failing retaining wall, preserve a busy rail corridor

In May 2019, a 300-foot section of retaining wall along Cleveland's busy Red Line was tipping over. Twenty feet above the Red Line, the wall supports the Norfolk Southern's New York-to-Chicago mainline, which carries dozens of freight trains and Amtrak passenger trains each day.

Three Purdue Civil Engineering alums would play crucial roles in repairing this busy east-west corridor connecting downtown to the airport.

The Greater Cleveland Rail Transit Authority, known locally as the RTA, was monitoring wall displacement. When alerted to increased movement, Director of Engineering Joe Shaffer (MSCE '86) and Project Engineer Chris Coppock (BSCE '12) hiked out to the affected area. "We took one look and said, 'Whoa, this thing has moved a foot,'" Shaffer says.

Shaffer and the RTA called on trusted colleagues at Great Lakes Construction. When Jim Fox (BSCE '90), vice president of operations for Great Lakes, saw the damaged retaining wall, he too was alarmed. "A big section of wall was starting to fail, and quickly. We needed to act fast," he says.

On Shaffer and Coppock's recommendations, the RTA shut down the busy Red Line — which runs 100 arrivals and departures every day. It was a public inconvenience, and the agency wanted the lines reopened by Labor Day, in time for the Cleveland Browns' first home game. And, although the RTA hoped to preserve both east and west tracks, initial assessments did not look good.

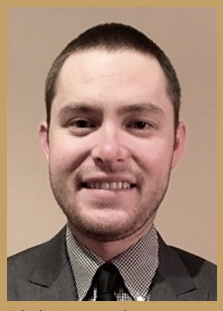
High hurdles

The project presented huge challenges. For one, there was no clear access to the damaged wall. For another, a network of high-voltage overhead wires made crane work dangerous. And because the 20-foot-wide trench didn't allow much clearance, repair materials — and repair design — had to be selected carefully. Work crews had to proceed cautiously to avoid getting boxed into the corridor. Plus, it was the height of the summer construction season, when union work crews were already booked. Compounding it all, the wall-monitoring system showed that the wall was continuing to move.

"In the beginning, while we talked about the size of beams, the clearances and the repair

Jim Fox

Joe Shaffer



Chris Coppock

that RTA wanted," Fox says, "there was a point when we all looked at each other and said: 'This might be impossible.' But we kept grinding through, coming up with ideas and coming up with solutions."

Indeed, thanks in large part to the persistence of Purdue alums on the job, the project was completed in seven weeks — five weeks early — with both tracks preserved!

The RTA's Shaffer is impressed and grateful. "They worked two different shifts. And they never stopped. They worked Saturdays and Sundays, all the way through. The project actually finished a few days before Labor Day."

For more photos and details about the project, visit the Lyles School website: **bit.ly/ce-redline**

SENIOR DESIGN: THE FINAL STRETCH

The Newman Road underpass in West Lafayette is slated for a $12.5 million overhaul. A new, 70-foot steel span bridge will provide much greater clearance for vehicular traffic. The work is part of the $1 billion Discovery Park District development on the west side of the Purdue University campus.

One of the greatest measures of a student's grasp on a subject is their ability to demonstrate understanding through practical applications.

In the Lyles School of Civil Engineering, the senior design course, officially known as CE 49800 Civil Engineering Design, is a rite of passage and proof that undergraduates are prepared for the workforce or graduate school.

Assignments differ every semester, but the goals and benchmarks remain the same, says Bob Jacko, professor of civil engineering and senior design instructor.

"Every semester is like a brand-new consulting job, and I am their director," Jacko says. "I see it as my responsibility to ensure students gain as close to a real, professional experience as possible."

For Spring 2020, senior design students are tasked with designs and redesigns in and around Purdue's Aerospace District. Projects include utility installation, existing road and railway expansion and redesign, and drainage expansion.

Because there are nine specialty areas within Purdue Civil Engineering, the student teams mirror a professional design firm more than one might think.

Student teams are expected to incorporate high-level considerations. They must recognize ethical and professional responsibilities in an engineering situation. And they must consider the impact of their solutions in global, economic, environmental and societal contexts.

Senior Kendall Kyle says the class gave her a deeper appreciation of the amount of work needed to collaborate as a functional team.

"I've been involved in group projects before, but none that had me work so closely or for an entire semester," Kyle says. "When you're working with and managing a team, you're faced with different challenges, but you're also presented with ideas and perspectives you never would have come up with on your own."

Student Casey Rodgers says the senior design class has been an eye-opening experience.

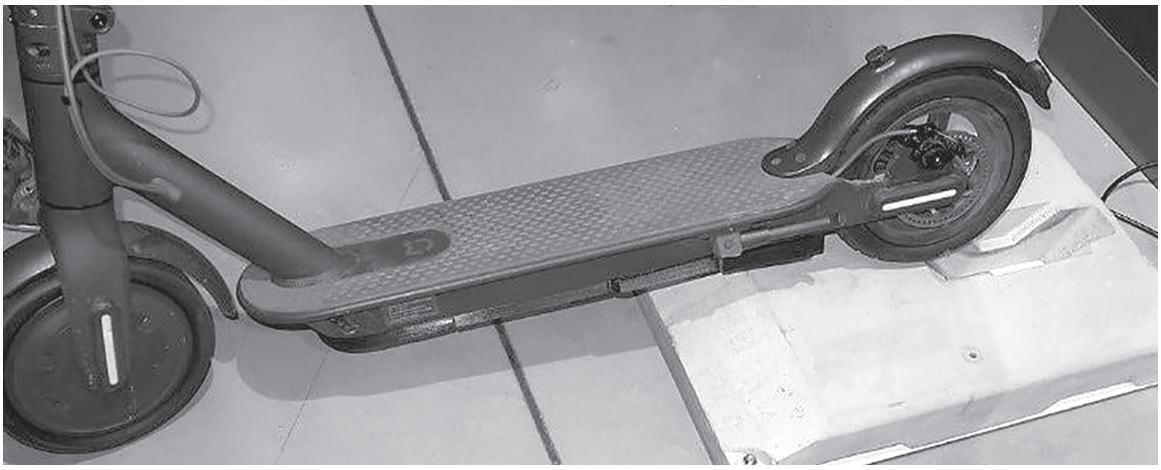
"I've interned for civil engineering firms, but my jobs were pretty well defined," Rodgers says. "In this class, we must define our own duties and responsibilities and assist and support each other wherever we're needed. You really feel like you're on a team that absolutely is dependent on you doing your part."

Select final presentations for the semester will be hosted on the Lyles School of Civil Engineering's YouTube page at **bit.ly/purduece-yt**.

DRIVING

ADVANCES IN ELECTRIC TRANSPORTATION

Pilot project in Discovery Park tests new, more practical techniques for electric vehicle charging



It is a powerful partnership. Purdue's Joint Transportation Research Program is internationally respected for successful industry and academic collaborations. And the German company Magment Concrete Wireless is known for innovations in magnetic materials for charging electronic devices. Together, this interdisciplinary team seeks to build a better transportation infrastructure.

The group will be exploring test cases in micromobility scooters, autonomous electric utility vehicle equipment and robotic shop-floor delivery systems.

"We are excited to work with the Magment team on the evaluation of e-scooter wireless charging technology," says Darcy Bullock, Lyles Family Professor of Civil Engineering and JTRP director. "We want to reduce our reliance on fossil-fuel vehicles for picking up e-scooters for charging. This pilot is a critical step in understanding how this technology can be scaled for larger electric vehicles."

Jack Bell, an undergraduate researcher working for Bullock and JTRP since January 2019, recently joined the Magment-Purdue research team. Leading up to this spring, Bell assisted Bullock by collecting data and writing research papers, one on pedestrian safety and another on speed distributions for micromobility vehicles.

"My experience doing undergraduate research has been impactful in helping me figure out my future career in civil engineering," Bell says. "This is a good example of research and academics starting to integrate."

The partnership will open the door to future research opportunities for students.

Hard tech, high reward

In the world of startups, electric vehicle research is known as "hard tech." Hard-tech problems have great potential to change the world, but the problems are complex. The solutions, aimed at an uncertain future, tend to be risky.

Magment is developing magnetized cement that can repower electric vehicles more efficiently than traditional charging systems. The growth of electric transportation systems demands faster and lower-cost solutions.

Magment CEO Mauricio Esguerra says it was only natural to partner with Purdue on this project.

"Purdue is the ultimate place to advance innovation," he says. "For a company like Magment to collaborate with so many experts at Purdue is incredible."

Magment is one of 10 companies included in the inaugural class of the Heritage Group Accelerator Powered by Techstars, a three-month investment, mentorship and collaboration program in Indianapolis.

"Purdue has been an ideal partner to help advance all of the hard-tech start-ups in the program," says Jonathan Schalliol, director of new ventures for Heritage Group.

The research takes place at Discovery Park, an innovation area on the Purdue campus focused on advancing powerful interdisciplinary research and next-generation technologies in collaboration with others.

THE PURDUE LTAP

CONNECTION

Benefits for the state of Indiana and Purdue CE students

For decades, hundreds of government departments in Indiana — as well as many Purdue Civil Engineering students — have greatly benefited from the Indiana Local Technical Assistance Program, known as LTAP.

Indiana LTAP, which started 60 years ago at Purdue University just after New York launched a similar program, is part of a nationwide system of technology transfer centers. Established by the Federal Highway Administration, LTAP is intended to improve transportation department performance. The agency helps street departments, county highway departments and local elected officials to better meet the needs of the public by acting as a resource for training, technical assistance and technology transfer.

"One of the best ways to look at LTAP is as a technology transfer agency," says Rich Domonkos, LTAP program manager. "Much of what we do is identify the needs for towns, cities and counties and then help meet their needs through transportation department and road improvements."

LTAP helps governmental agencies oversee more than 80,000 miles of roadway in all 92 Indiana counties. Indiana LTAP's avenues for outreach include workshops, conferences and programs — as well as physical resources such as the popular Equipment Loan program. LTAP manages the Road Scholar certification program and the Hazard Elimination Program for Existing Roads and Streets (HELPERS).

An LTAP undergraduate student measures the retroreflectivity of a street sign in West Lafayette. Retroreflective materials redirect the light from headlights back toward the vehicle.

Additionally, by providing work and research experience for students in the Lyles School of Civil Engineering, LTAP serves as an excellent source of knowledge.

"Our department serves as a great place for both undergraduate and graduate students to gain firsthand, in-the-field experience in both transportation engineering and partnerships with government agencies," says John Haddock, Purdue professor of civil engineering and LTAP program director. "There's only so much a student can learn in a classroom, so those who gain additional experience in a program like LTAP not only deepen their understanding of civil engineering, they also become far more desirable to future employers."

For some former students, not only did they gain invaluable, real-world experience, they went on to benefit from LTAP as professional engineers.

One such former student researcher is Jennifer Sharkey, Purdue Civil Engineering alumna (MSCE '09) and Steuben County engineer.

"It was a wonderful, eye-opening experience for me as a student," Sharkey says. "Through the LTAP program, I was able to gain a wealth of experience — both in research and by working with local government agencies. As a student, I found the work was also really rewarding."

Now, as a county employee herself, Sharkey says LTAP has been a tremendous help to her and Steuben County. LTAP helped county administrators develop information about implementing a wheel tax as well as understand how the tax would improve their transportation network. In the end, the information and assistance provided directly aided Steuben County officials in their eventual approval of the wheel tax.

"My experience with LTAP as a professional engineer only furthered my appreciation for what they do," Sharkey says. "They are a vital resource in Indiana, and I am happy our state has such an outstanding agency located at Purdue."

For more information about LTAP and the services they provide, **visit the program's website at purdue.edu/inltap.**

The Lyles School introduces a combined degree program

STUDENTS CAN EARN A BACHELOR'S AND MASTER'S DEGREE IN 5 YEARS

To provide CE undergraduates an efficient avenue for postgraduate education, the Lyles School of Civil Engineering has established a combined degree program.

Starting with the 2019-20 school year, Purdue Civil Engineering offers a combined BSCE plus MSCE degree program. The integrated program allows students to earn their master's degree along with their bachelor's in as little as five years.

The combined degree program allows students to dual-count up to two graduate-level courses between the BSCE and MSCE coursework requirements, thereby reducing the overall time required for the master's degree. This option is available only to civil engineering undergraduates enrolled at the West Lafayette campus.

Dulcy Abraham, professor of civil engineering and chair of the Christopher B. and Susan S. Burke Graduate Program, says this new initiative is designed to ensure that motivated students can maximize their educational experience.

"Purdue Civil Engineering has some of the most motivated students in all of the University," Abraham says.

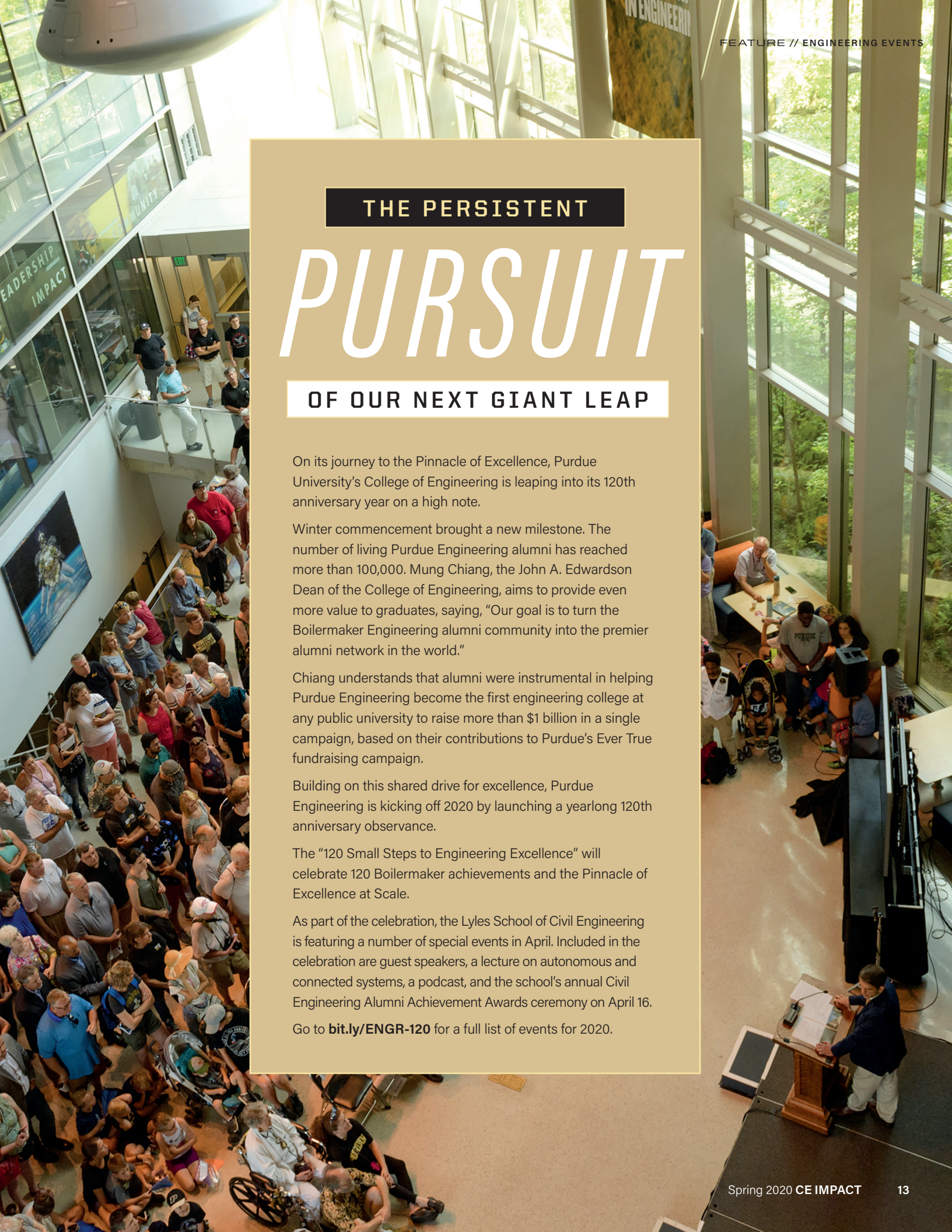
"Many of these undergrad students have shown they are willing and able to work on their postgraduate degree, and we want to facilitate them every way we can. Through this combined degree program, our high-achieving students will not only deepen their understanding of civil engineering, but they will also be able to take what they've learned and apply it to future research or their chosen career fields."

Donald Fuerstenau, a student enrolled in the combined program, says the new fast track offered by the Lyles School was exactly what he was looking for.

"I chose Purdue Civil Engineering because of its reputation for both education and the success rate of its graduating students," Fuerstenau says. "When I learned that I could enhance my studies and pursue my career faster at the same time, I knew this was a perfect opportunity for me."

Students may apply to the program in their fifth semester, typically the fall semester of the junior year. Upon admission to the Christopher B. and Susan S. Burke Graduate Program, starting in semesters seven and eight (the senior year), the student will have dual-degree status. After completing the BSCE degree requirements in semester eight, students earn their bachelor's degree and then have graduate status starting in semester nine.

Visit **bit.ly/combined-degree** for more information.



THE PERSISTENT PURSUIT OF OUR NEXT GIANT LEAP

On its journey to the Pinnacle of Excellence, Purdue University's College of Engineering is leaping into its 120th anniversary year on a high note.

Winter commencement brought a new milestone. The number of living Purdue Engineering alumni has reached more than 100,000. Mung Chiang, the John A. Edwardson Dean of the College of Engineering, aims to provide even more value to graduates, saying, "Our goal is to turn the Boilermaker Engineering alumni community into the premier alumni network in the world."

Chiang understands that alumni were instrumental in helping Purdue Engineering become the first engineering college at any public university to raise more than $1 billion in a single campaign, based on their contributions to Purdue's Ever True fundraising campaign.

Building on this shared drive for excellence, Purdue Engineering is kicking off 2020 by launching a yearlong 120th anniversary observance.

The "120 Small Steps to Engineering Excellence" will celebrate 120 Boilermaker achievements and the Pinnacle of Excellence at Scale.

As part of the celebration, the Lyles School of Civil Engineering is featuring a number of special events in April. Included in the celebration are guest speakers, a lecture on autonomous and connected systems, a podcast, and the school's annual Civil Engineering Alumni Achievement Awards ceremony on April 16.

Go to **bit.ly/ENGR-120** for a full list of events for 2020.

PURDUE UNIVERSITY

LYLES SCHOOL OF CIVIL ENGINEERING
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West Lafayette, IN 47907-2051