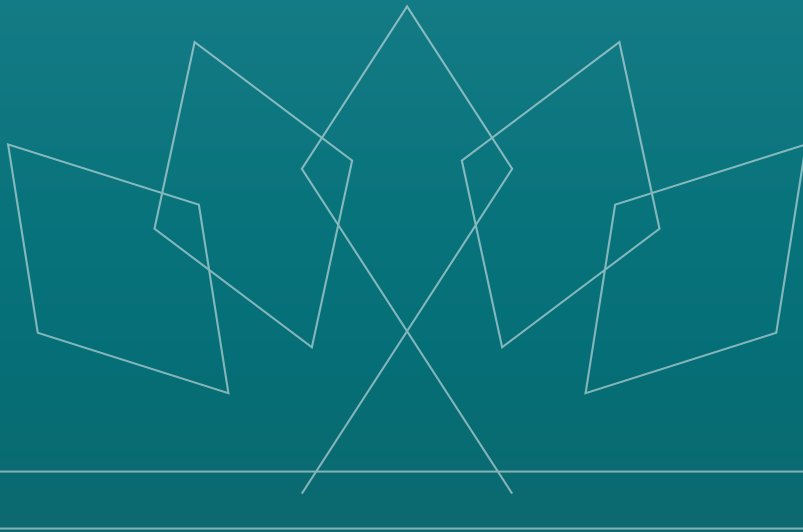


SPRING 2022

DONALD P. SHILEY
SCHOOL OF ENGINEERING

*ENGINEERING
SUCCESS THROUGH*
PARTNERSHIPS



Preparing our Students for the Future

Applied Engineering Experience in the New Shiley-Marcos Center for Design and Innovation – Coming in 2023

At the Donald P. Shiley School of Engineering, we are providing our students with opportunities to practice engineering and computer science every day. We do this by providing the academic support that our students need and implementing a curriculum that is centered around hands-on, project-based instruction with practicing engineering professionals. We know that by working on real projects for real stakeholders, our students are preparing for a future of life-long professional success.

We are also providing our students with the context to find not just professional success, but purpose. Through both the engineering curriculum and the liberal arts core, our Shiley students know that they have a covenant with society to use mathematics and science to find solutions to problems we face by building and uplifting our communities.

In the following pages, you will read examples of Shiley students, faculty, and alumni combining their applied engineering experience with a sense of purpose: the electric vehicle club winning first at the international collegiate grand prix; the team of civil engineering students designing green infrastructure to address stormwater needs and mental health on campus; the computer science student applying her minors in neuroscience and fine arts to explore user engagement in an internship; a faculty member embracing conflict to spark creativity in the classroom; and more.



The new Shiley-Marcos Center for Design and Innovation, set to open in late 2023, will allow the Shiley School of Engineering to continue building on these kinds of meaningful engagement opportunities for our students. New shops, labs, maker spaces, studios, and industry collaboration spaces will provide a home for applied engineering experiences for students across campus.

We also look forward to welcoming a new cohort of talented engineering faculty, hired over the next two years to fill positions vacated by the retirements of beloved longtime faculty. These transitions are bittersweet, but we are excited at the renewal that both new faculty and new facilities will provide.

Our faculty and staff are dedicated to ensuring the academic success of all students and preparing them to thrive in their careers. We already have a strong foundation of student support, faculty excellence, and applied engineering experience. Just imagine how much more is in store as we welcome new faculty and open the doors of the new Shiley-Marcos Center for Design and Innovation. It's an exciting time to be part of the Shiley School of Engineering!

With best regards (and Shiley Proud!)

BRIAN FABIEN, PhD
DEAN & PROFESSOR OF MECHANICAL ENGINEERING
SHILEY SCHOOL OF ENGINEERING

BY THE NUMBERS

100%

OF SENIOR CAPSTONE PROJECTS IN ENGINEERING ARE INDUSTRY-ADVISED OR WITH AN INDUSTRY CLIENT

51%

OF UNDERGRADUATE ENGINEERING STUDENTS ARE FROM AN UNDERREPRESENTED GROUP

31%

OF ENGINEERING GRADUATES (OVER LAST 2 YEARS) ARE FEMALE

#33

IN "BEST UNDERGRADUATE ENGINEERING PROGRAMS" ACCORDING TO *US NEWS & WORLD REPORT*

4+1

STEM UNDERGRADUATES CAN EARN A MASTER'S DEGREE IN BIOMEDICAL ENGINEERING IN ONE ADDITIONAL YEAR

#1

IN OREGON FOR VALUE FOR 2020-21 ACCORDING TO *MONEY MAGAZINE*

30%

OF FIRST-YEAR UNDERGRADUATE STUDENTS IDENTIFY AS FIRST-GENERATION COLLEGE STUDENTS

Stormwater Management Meets Mental Health Needs in Capstone Competition

Faculty in the Shiley School of Engineering are always on the lookout for opportunities that engage students' imaginations and allow them to tap into the creative side of engineering.

So, this year they added something completely new to the lineup of capstone projects: the EPA Rainworks Challenge Competition, a green infrastructure design competition that's open to student teams from any American college or university.



wasn't without its difficulties, the students came through with a unique plan that made a big impact on University of Portland stakeholders and gained them a wide array of real-world skills in the process. "This was different from other capstones in that they got to think really big," says Shiley School of Engineering assistant professor Jordy Wolfand, PhD. "It was intimidating but they took it in stride, and even taught themselves new programs." Among them: SketchUp, AutoCAD, ArcMap, and the US EPA SWMM modeling system.



For the team of four senior civil engineering students at UP who took on the challenge, this wasn't just a capstone project, it was a chance to dream big and come up with a sky's-the-limit plan for innovative stormwater management techniques that highlight the environmental, economic, and social benefits of green infrastructure. Although managing the competing requirements and deadlines of both a design competition and a senior capstone project

With industry sponsor Lease Crutcher Lewis (a general contractor company) providing financial and advisory support, the team of Bryson Tamaye, Elizabeth Diaz-Gunning, Sean Yoshishige, and Melissa Hamling said the competition was so open-ended it sparked endless avenues of exploration, which was both exciting and daunting. "Since we didn't have a set company we were working with, it was up to us to figure out what we wanted to do and be creative," says Hamling. "That's a special thing, being able to think creatively and not just follow what has been done in the past."

To help define the scope, the team conducted extensive research into the existing campus stormwater management plan, met with a wide array of stakeholders including students, physical plant staff, and an advisor from their industry sponsor who helped provide feasibility guidance.



"Our meetings with Nate Buddress from Lease Crutcher Lewis were so beneficial," says Diaz-Gunning. "It was good to have someone in the industry to go to for advice on how feasible our ideas would be to implement. The competition didn't have a ton of rules—our ideas could be our biggest dreams—but we decided it would be more impactful if the plan was realistic."

"I was impressed by how they dug into some existing problems, but also the human need. They interviewed students and it's that stakeholder-driven design that's really interesting."
 — Jennie Gambier, Associate Vice President for Land Use and Planning



a stormwater capture device would provide the water for the indoor fountain. It goes dry in summer to call attention to the natural seasons in the Pacific Northwest and help students appreciate Portland’s long rainy winters. “Mental health is important to students,” says Hamling. “The haven is a good place to go for mental health and have a pretty view and focus on something other than schoolwork.”

The master plan also includes 13 other living walls on buildings around campus, which would collect rainwater, reduce energy consumption, and provide an aesthetic and educational talking point. “I was really excited about the living walls,” says Diaz-Gunning. “It’s a very visual thing and a good way to educate students in other majors about green infrastructure. With global warming it reduces the heat island effects and shows students the university is doing something to help combat climate change.”

Called “Keeping Up with the Thyme,” the stormwater design master plan purposefully incorporates elements that would create a greener campus and raise awareness among the UP community about climate change. But what makes the plan truly unique is how it strives to solve two seemingly unrelated problems—sustainable stormwater management and the need for more mental health resources on college campuses—by making them work together.

How so? They designed a cozy structure deemed the Mental Health Haven with a living wall and large windows overlooking the adjacent Willamette River and forested hills beyond. Between the windows,



Inspiration from the Zags Hotel in Portland, Ore.

“ Since we didn’t have a set company we were working with, it was up to us to figure out what we wanted to do and be creative. That’s a special thing, being able to think creatively and not just follow what has been done in the past.”

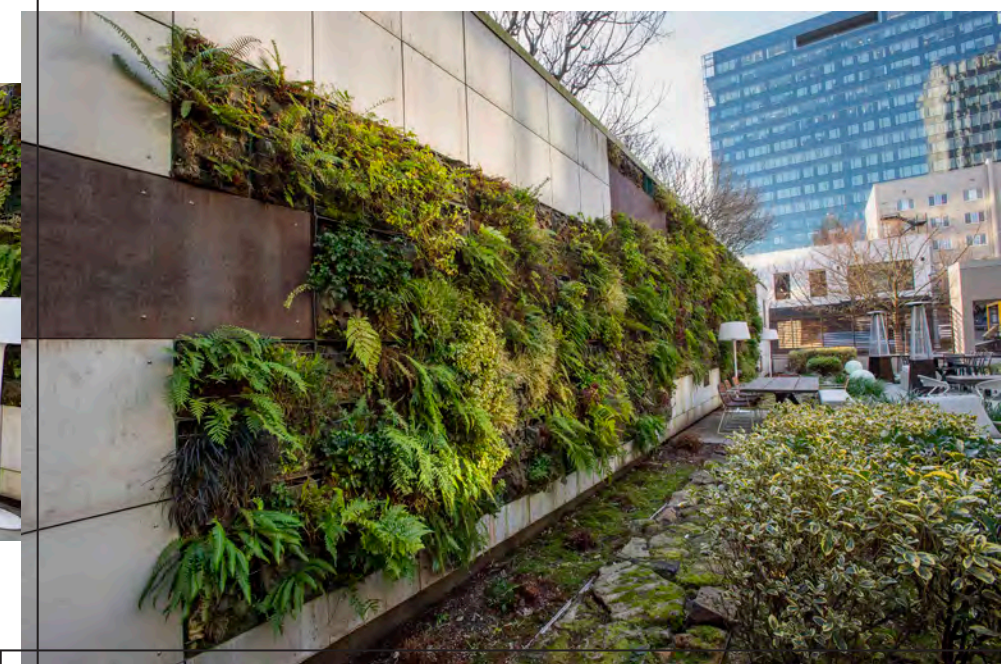
— *Melissa Hamling ’22, Senior Civil Engineering Student*

Other elements include replacing the massive green lawn in the academic quad with far-less-thirsty and even brand appropriate purple thyme (hence the name of the project), and building a massive cistern to capture rainwater instead of allowing it to flow away. In their research, they also discovered existing bioretention cells on campus that need retrofitting.

“I was impressed by how they dug into some existing problems, but also the human need,” says Jennie Cambier, UP’s Associate Vice President for Land Use and Planning. “That stakeholder-driven design is really interesting.”

Cambier says that because the students invested so much effort to discover the specific needs of the UP community and rooted

their project in the practicalities of meeting those needs, their design serves as a benchmark for the future. “Seeing reports like this helps me understand the priorities from the student perspective,” she says. “I’m going to be speaking up for a lot of these sustainability pieces to make sure we’re continuing to be as much of a sustainability leader as possible. Having the ammunition of student work and passions will help me make the case for them.”



EV Design Team Drives into a Winning Future

When given the chance to win a national competition, University of Portland's Electric Vehicle Design Club race team doesn't mess around.

After spending just three months in the summer of 2021 building an electric go-kart from tip to tail under the guidance of Shiley School of Engineering professor Gregg Meyer, they traveled to Purdue University's EV Grand Prix race in September to win—and they did.

Along the way to the finish line, the team of six juniors—five mechanical engineering majors from the Shiley School of Engineering, and one operations and technology management major from the Pamplin School of Business—learned that success has a lot to do with dedication, teamwork, mentorship, and a steady supply of perseverance.



“The winning team started in June pretty much from scratch and in three months’ time they had a national championship,” says Meyer, who serves as the faculty advisor for the club. “They learned so much in those three months over the summer. It looked to me like they grew up really quick.”

The EV Design Club gives students the perfect opportunity to hone career-building skills like collaboration and problem-solving while putting their academics into practice. “The program was started as a vehicle—no pun intended—to accelerate the learning outside the classroom,” says Meyer.

EV design is often connected to the capstone program, and the go-kart racing project is certainly as rigorous as a capstone project. But the club format offers the added benefit of teamwork across grade levels. “Often senior capstone teams start in the fall and finish in the spring and when the students graduate there’s this huge knowledge loss. We’ve put the racing team outside the capstone so it’s accessible to all students from their first year to their senior year, giving us continuity in learning and opportunities for mentoring.”



For this project, the racing team of Madi Schalk, Brendan Sample, Kayla Medof, Marc Raffaelli, Sierra Repp, and Aidan Kearney rejected the idea of using one of the club's existing go-karts because they felt it was “not a winning machine.”



“The winning team started in June pretty much from scratch and in three months’ time they had a national championship. They learned so much in those three months over the summer. It looked to me like they grew up really quick.”

— Gregg Meyer, Shiley School of Engineering Professor

So, in the race shop, they built a new one from scratch, including a complex battery pack. If they encountered something that didn't fit, say they wanted to move the instrument panel to a more visible location for the driver and needed custom brackets to hold it in place, they'd use the CAD station in the lab, design the part, bring it to the 3D printer, and have the part by the next day. “Even if the part needed to be stronger and made out of metal, they could use that system as a modeling tool and in the process learn how 3D manufacturing is a real innovative tool to use,” says Meyer.

The project also gave the students the opportunity to put the theories they've learned in their classes into practice. “Because engineering is quite complex, textbooks often simplify problems like ignoring air resistance to make the math easier,” says Meyer. “If you want to win a race, however, you can't ignore anything. It all matters—sometimes in surprising ways.”

“When our students leave after finishing their senior year, they enter the workforce with technical skills, with teamwork skills, with multidisciplinary collaboration skills, with self-confidence, and with the determination that it takes to work on a team. I want them to be able to walk into that job on their first day of work and hit the ground running.”

— Gregg Meyer, Shiley School of Engineering Professor

It was also incredibly interdisciplinary, offering a crash-course in real-world engineering where many decisions, from design and procurement to fabrication and assembly, require collaboration and compromise across multiple departments.



“Our students learned they may have to make suboptimal choices in order to maximize other criteria such as performance, cost, and reliability,” says Meyer. And since the team captain is a finance and operations and technology management major whose business skills helped keep the team on track, they all learned the value of working with people outside their major. “This is important because most every engineering job requires employees to interface with project partners outside of engineering like marketing, accounting, and even visual arts,” Meyer says.

The team was a mix of experienced auto enthusiasts and newbies who didn’t even know how to use a wrench. And without an electrical engineering or computer science student on the team, everyone had the opportunity to push themselves beyond their skillset. “This forced conversations between team members with teachers and learners, sometimes switching roles, and building critical communication skills along the way,” Meyer says.

It wouldn’t be a car race without a last-minute snafu, and this team certainly didn’t dodge that bullet when their battery pack blew out during the qualifiers and they hadn’t brought a second one to swap in.

After working late into the night rebuilding it before the race, they learned a lasting lesson in the importance of risk management and contingency planning—all essential skills in any real-world job.

“When our students leave after finishing their senior year, they enter the workforce with technical skills, with teamwork skills, with multidisciplinary collaboration skills, with self-confidence, and with the determination that it takes to work on a team,” says Meyer. “I want them to be able to walk into that job on their first day of work and hit the ground running.”



Student Profile

Haley Welliver’s UP education goes beyond classroom and industry experience to ignite her diverse passions.

Through internships and applied learning in the classroom, Welliver has found that the Shiley School of Engineering offers an education that cultivates curiosity and ingenuity.

A computer science major, Welliver also has minors in fine art and neuroscience, and she brought all three interests to her internship at Microsoft. Welliver was on a team developing a prototype experiment in user engagement. “That was a cool experience because it was a front-facing application and it engaged my art interests,” she says. “I got experience with customers, asking questions, learning about how their brains worked, and



engaging my neuroscience background.” Welliver already has a job lined up at Microsoft as a software engineer. After graduation, she will rejoin her team to continue project development.

Welliver gained more industry experience in a software engineering course, creating a catalogue for AV services equipment. “We had a number of sprints and used agile methodology for planning and organization, which is something I used at my internships at Microsoft,” she explains. “It’s a great thing for UP to offer the experience of creating a real product for a customer.”

For Welliver, the opportunity to explore diverse interests enabled her to have an integrative learning experience. In addition to a challenging major and two minors, Welliver is a member of the Engineering Student Advisory Council. “I still had time for art club, playing club frisbee, and hosting a KDUP radio show with a bunch of my friends,” she says.



Faculty Profile

Shaghayegh (Sherry) Abbasi, PhD, Assistant Professor of Electrical Engineering, isn’t afraid of conflict in the classroom.

In fact, she encourages it. Her engineering education research around project-based learning introduces conflict into the classroom to spark creativity and collaboration.

The goal is to get students to embrace conflict as a learning opportunity. “One tendency that is common in group projects,” Abbasi says, “is one or two students dominate the group, and the rest follow. I felt like a lot of good ideas go to waste this way.” With her research approach, student sub-groups investigate and advocate for a specific approach to a problem. Each idea is open for discussion, analysis, and criticism. At the end, students come together to make a collective decision. “A lot of creative solutions come out of conflict,” she says.



Although she has a PhD in Electrical Engineering from University of Washington, much of Abbasi’s research is in the biomedical field, using electromagnetic fields to modify neural activity in the brain for a range of mental disorders, optimizing patient treatment options. She has industry experience but returned to teaching because she loves the ingenuity that blossoms in settings like the Shiley School of Engineering.

“There is more room for creativity and asking questions in academia,” she says. “There’s more room for curiosity. I feel like students have more open minds, and are open to different possibilities and solutions.”



Alumnus Profile

For Ryan Szto '21, the joy of engineering comes from being in the field.

"I hated sitting behind a desk at school," he says, "so I didn't want to do that at work." Szto is a product validation engineer at Daimler, the top commercial vehicle manufacturer in North America. At their headquarters in Portland, Szto's team tests the performance of electric-powered semi-trucks under an array of weather and environmental conditions. Last summer, they traveled to Las Vegas to perform tests in temperatures as high as 113 degrees.



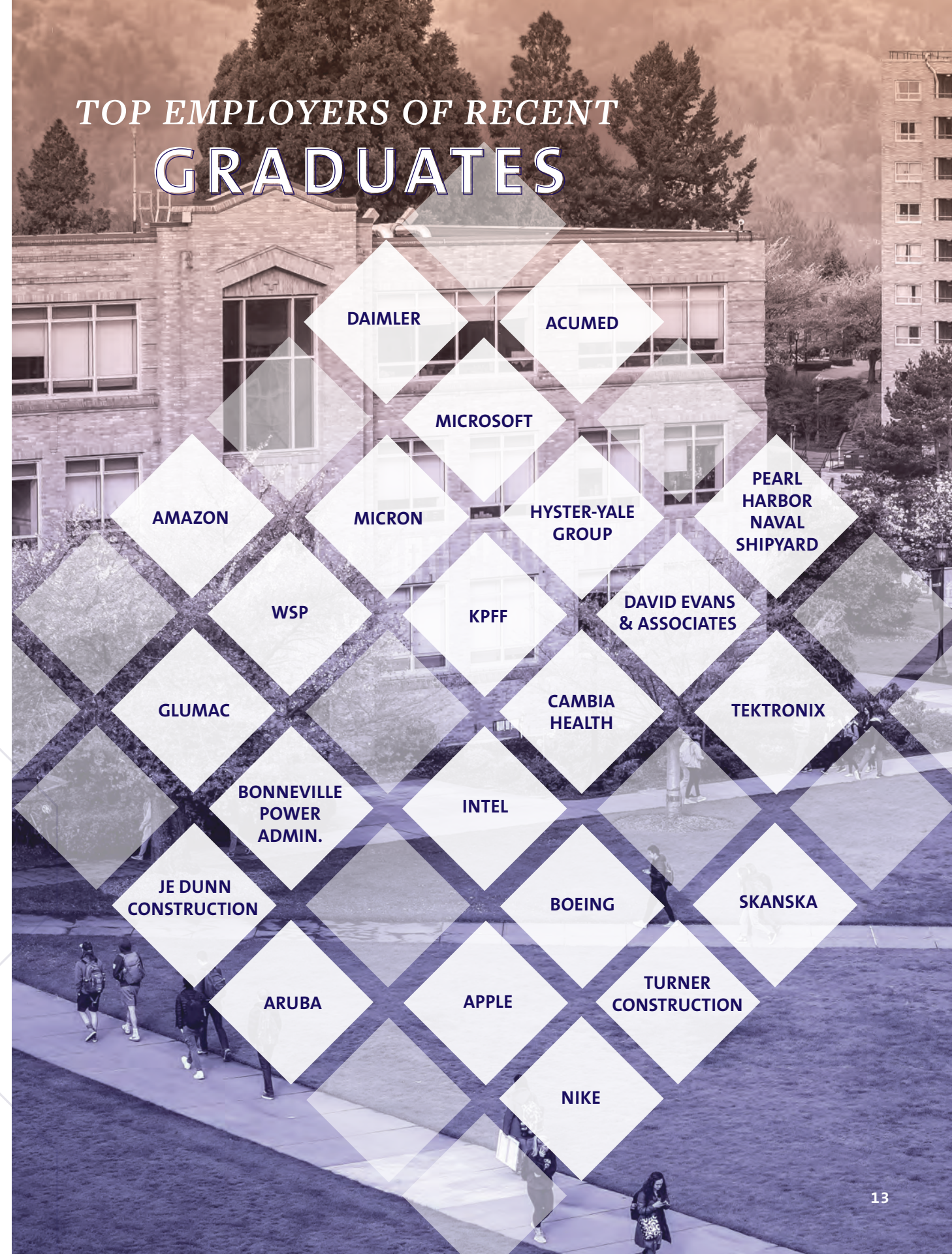
Improving electric vehicle technology was a natural career move that builds on Szto's experience at UP. As an undergrad, he interned with lift truck manufacturer Hyster-Yale Group, developing

forklifts for emerging markets in their on-campus innovation lab. He also helped launch the electric vehicle racing club, which won the Grand Prix and broke the all-time track record in 2021.

Szto also participated in multiple Maker Challenges—projects sponsored by the Shiley School of Engineering's partnership with local industries and nonprofits. In one challenge, Szto and his team adapted a video game controller to be a wheelchair attachment for a child with limited motor function. "The challenges allow us to get out of the classroom setting and let us experience what it takes to concept, design, and prototype," Szto says. "The best designs start by piecing together ideas from everyone in the group to form a unique solution to the problem."



TOP EMPLOYERS OF RECENT GRADUATES



DAIMLER

ACUMED

MICROSOFT

AMAZON

MICRON

HYSTER-YALE GROUP

PEARL HARBOR NAVAL SHIPYARD

WSP

KPFF

DAVID EVANS & ASSOCIATES

GLUMAC

CAMBIA HEALTH

TEKTRONIX

BONNEVILLE POWER ADMIN.

INTEL

JE DUNN CONSTRUCTION

BOEING

SKANSKA

ARUBA

APPLE

TURNER CONSTRUCTION

NIKE



PAGE **2**

CAPSTONE:
Stormwater Management
Meets Mental Health Needs

PAGE **11**

FACULTY PROFILE:
Shaghayegh (Sherry) Abbasi

PAGE **6**

CLUB:
EV Design Team Drives
into a Winning Future

PAGE **13**

Top Employers of
Recent Graduates

