CPP ENGINEERING

MAGAZINE 2022

SPACE BRONCOS 4

Nothing less than to the stars for these intrepid engineering students.

BroncoSat-1, now in space!

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At Last!

After two years, the 2022 commencement ceremonies were held where they rightfully belong—in the central quad of Cal Poly Pomona. Split across three days, over 1,000 engineering graduates walked down the ceremony ramps and thousands more family and friends gathered to celebrate this milestone.

SPACE BRONCOS

Nothing less than to the stars for these intrepid engineering students.

BY CHRISTOPHER PARK AND CYNTHIA PETERS

This moment has been years in the making for these happy faces at the Friends of Amateur Rocketry rocket test site. Located in the Mojave Desert, the team witnesses a successful hot fire of their liquid rocket engine, a crucial step in their rocket's development.

History is Made

Bronco Space, a scrappy club of undergraduate students and their faculty advisor, has done it—their CubeSat, BroncoSat-1, is in space, which lifted off on May 25, 2022 from a SpaceX Falcon 9.

This marks the first space launch in Cal Poly Pomona's history. And it took them just a year to build a launch-ready satellite.

"I'm over the moon excited," says Zachary Gaines, aerospace engineering student and the project's testing and integrations lead. "Especially after 1,000 hours of work it's a big achievement."

The project's timeline sounds impossible. Typically, university teams take at least two years to launch anything into space. Further, space projects are often the domain of tier 1 research universities, which Cal Poly Pomona is not.

For Bronco Space, these precedents did not matter.

The opportunity first came in June 2020 when space launch startup Momentus was looking to prove its capabilities with their scheduled Falcon 9 launch. A typical space launch costs $100,000 at minimum, so Bronco Space saw tremendous opportunity. Over a manic weekend they produced a viable design for their CubeSat—a miniature satellite about half the size of a loaf of bread.

"We hacked and slashed together a clean sheet design in a weekend. It was 54 hours of design work," says Michael Pham, aerospace engineering student, founder of Bronco Space and BroncoSat-1's team lead.

The team aimed to prove that the hardware and software needed for artificial intelligence (AI) and machine-learning algorithms can be put into a satellite this small. In short, if the satellite in space sends back information derived from their algorithm, then it's nominal mission success. Even that's a step below core mission success, which is getting any kind of response from the satellite. Regardless of whether they hear back from BroncoSat-1, this is a major milestone, and it was never easy getting here.

Everything Went Wrong and That's Okay

The team started with around a dozen members and doubled over time, calling forth the help of students across a wide set of disciplines—aerospace, mechanical, electrical, and computer engineering, and computer science. Throughout the project, the team only had one mode—full sprint—while solving one confounding problem after another.

The pace peaked in Jan. 2021, when too much went wrong at the same time.

"We had five boards, and all five died in a span of three days," says Katherine Orozco, electrical engineering student and the club's head analyst.

Printed circuit boards are an essential part of BroncoSat-1 as they transport power from one component to another. Imagine a highway with shipping trucks and replace the trucks with electrons.

> **"At the beginning, we knew that if we were able to launch this, we would undisputedly be some of the greatest students who have ever gone to this university."**
>
> —MICHAEL PHAM, AEROSPACE ENGINEERING STUDENT AND FOUNDER OF BRONCO SPACE

Tarek Elsharhawy (left) and **Michael Pham** (right) at the launch pad for BroncoSat-1's launch. Elsharhawy is Bronco Space's faculty advisor and Pham is an aerospace engineering student and Bronco Space's founder.

One board had its power supply interrupted from a software error, killing it. Another board fried due to a flaw in its assembly. Each board went down in quick succession. There's a small box containing every dead board, and Orozco has thought of pithy eulogies for each one.

Setbacks like these were the norm, and the team overcame them time and time again. Orozco built new boards and the team soldiered (and soldered) forward.

This was just the half of it. Regulatory hurdles proved to be its own challenge, but Tarek Elsharhawy, faculty advisor for Bronco Space and a lecturer for the aerospace, electrical and computer, and mechanical engineering departments, was the man for the job.

Anything related to flight is heavily regulated. Anything related to space flight even more so. First, Cal Poly Pomona has its own procedures and rules for conducting flight projects. Outside of the university are two regulatory bodies, the Federal Aviation Administration (FAA) and NASA. From the former, you need to obtain a permit to be given clearance to fly. From the latter, you must meet a stringent set of design requirements for your design to be considered space-ready. Navigating these regulatory hurdles is a full-time job in and of itself.

Elsharhawy has advised Bronco Space and all its projects since 2020, connecting the club with industry, navigating bureaucracies, and guiding the students on technical and academic subjects. In addition, he guides the students' long-term vision for Bronco Space—elevate Cal Poly Pomona's status within the astronautics academic community.

Now, BroncoSat-1 orbits the Earth at roughly 17,000 miles per hour. Pham makes no reservations about the significance of the moment.

"At the beginning, we knew that if we were able to launch this, we would undisputedly be some of the greatest students who have ever gone to this university," he says.

Whether or not you agree with this sentiment, what's undeniable is that this assembly of student talent and faculty have done the improbable.

And this isn't the end of it.

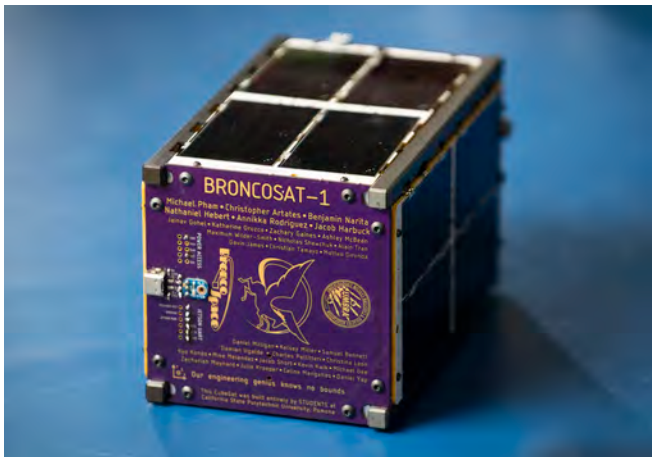
A (Launch) Date with NASA

After BroncoSat-1, it was a question of what's next.

"Our success is finding a project that can be done in a one-year timeframe," says Pham.

Taking what they learned and developed with their CubeSat, they worked on more earthly concerns. Derived from the AI and machine-learning work done for the BroncoSat-1 launch, the team developed a practical application for it.

Bronco Ember, a CubeSat designed to detect nascent wildfires, passed its final inspection in the NASA TechLeap Prize and conducted a suborbital flight test with a Raven Aerostar high altitude balloon that took the satellite 18.5 miles above Earth for eight hours. Tracking the balloon, students lit fire pits to test the satellite's ability to detect the fires and send them a message with the coordinates. NASA was impressed—the team earned $500,000 over the course of the competition.



BroncoSat-1, now orbiting Earth.

Bronco Space was one of just three groups selected nationally to advance in the competition, which "focused on the advancement of integrated, compact precision pointing systems for small spacecraft that can be used to autonomously detect, locate, track, and collect data on transient terrestrial events."

The students developed their CubeSat and its mission last summer under the orange skies of one of California's worst wildfire seasons. Designed to be part of a network, Bronco Ember will scan for small wildfires, record the coordinates and send those coordinates to first responders giving them the opportunity to respond before the fires burn thousands of acres.

After advancing, the team had eight months to show NASA a proof of concept and just 10 months to finish their satellite. Bronco Ember weighs about three pounds and consists of a camera, a custom 2DOF (degrees-of-freedom) precision pointing system, and an edge computing system for onboard AI and advanced machine learning, all of which must fit into a compact container the size of a very slim shoebox.

"Early on, we focused on what we could build to show NASA some progress by the first review," says Cristian Rodriguez ('22, master's in mechanical engineering), the student principal investigator. "We wanted to show them how we would control the camera, get our data on altitude, and what a fire looks like in our optics. What we really needed to do was figure out was what was possible with our camera, and how we would determine what a fire even looks like from that distance."

With supply chain issues in the initial phase, students began creating their own custom parts. Even with easing supply chains, about 40 percent of Bronco Ember's parts are student-made.

A bigger hurdle was finding a dataset to train the Ember's AI to recognize a fire. The team is imaging in shortwave infrared, which will give Bronco Ember the advantage of being able to see through smoke and clouds, but infrared images from space in that wavelength were not publicly available.

"What that forced us to do is to figure out ways to simulate images from space without going to space," explained Gaines, the project manager for Ember. "We had a lot of skill testing, climbing mountains, going to beaches, making small fires, and scaling light sources—all to curate an environment similar to what we will see from altitude."

In May, the team set up a campfire in the overflow parking lot and Gaines, who was on a hill 1.5 miles away, turned on the camera.

"There was this tiny little campfire glowing bright on my screen," says Gaines. "It was so obvious where it was. I was looking at the same spot with my eyes, and I saw nothing, but my camera was just lighting up. That was the moment when I realized that what we're doing is really possible, and what this imaging technology can do is really powerful."

Tarek Elsharhawy points at the monitor while both him and **Zachary Gaines** observe BroncoSat-1's orbit. Gaines, aerospace engineering student, is project manager for Bronco Ember. He was also the test and integrations lead for BroncoSat-1.

With their work on Ember, the students are gaining hands-on experience in a leading edge of space technology. The dramatically lower cost of CubeSats and their shorter development time compared to traditional satellites "is opening up space exploration like never before," according to JPL. CubeSat technology is cited as a driver for miniaturization of systems and a new approach to packaging and integration as well as widening opportunities for space-based research beyond governments and the aerospace industry.

"Small satellite technology is really revolutionizing the industry," says Gaines. "People are realizing they can get the same performance or better in smaller and dramatically less expensive satellites."

In the case of Bronco Ember, there are fewer sensors and a smaller field of view than a traditional observation satellite, but a Bronco Ember network would be able to provide more consistent monitoring of an area for wildfire with its short-wave infrared imaging for a much lower total cost.

Gaines came to Cal Poly Pomona for its strong engineering program but didn't expect the opportunities he's had.

"It's crazy to know that as a [student], I have a satellite orbiting overhead," reflects Gaines. "I'm a senior and getting support from NASA to do things I want to do. That's the most enabling thing about Bronco Space. We really encourage people to do the things they love to do. We have a new lab space that anyone in the club can use, and Bronco Ember has brought in more funding for different projects allowing students to work on really cool space technology."

Actually, This is Rocket Science

The Kármán line is 62 miles above the Earth's sea level. Considered the boundary between Earth's atmosphere and outer space, that's 327,360 feet or 1,091 football fields. It's this illusive line that competing universities are trying to be the first to cross.

Being first is never easy, and these students aren't settling for second.

Since 2017, a team of undergraduate students and faculty have operated under the banner of the Liquid Rocket Lab (LRL). Their aim for the last half-decade has gone unchanged—be the first university to launch a liquid rocket into space. Before that, a baby step—win the Friends of Amateur Rocketry's Mars competition (FAR-Mars), which challenges teams to launch a liquid rocket 37,000 feet into the air in a timed and monitored test launch.

Several universities, like USC, UCLA, and SDSU are in the competition. To date, none have done it, illustrating just how hard this is.

This year, the team made significant headway with several successful tests on various aspects of their rocket, including the first successful static hot fire test of their liquid bipropellant engine, dubbed ACE. This a huge step as it confirms that the engine is working as expected.

"It hit more home for me since it was my third year on the

team," says Destry Lister, LRL's overall project manager and aerospace engineering student. "Seeing all the work everyone has put into the engine from design to firing was a really amazing feeling."

Essentially, their engine design works both in theory and practice. For their next step, the team will continue building the next iteration of ACE, the Z1 engine. This engine design aims to get their Bronco-2 rocket to space. It'll be like ACE, except "completely on steroids."

Up to now, the most successful liquid rocket launch has been conducted by UCLA during a FAR-Mars competition launch, where they reached 22,000 feet. LRL aims to soar past that by a significant amount with a goal of 37,000 feet with the proven ACE engine.

To achieve this, LRL's earned $2.4 million worth of help from the Air Force Research Laboratory.

This federal funding is primarily put towards a 2,100 square-foot laboratory space dedicated to the sole purpose of building and launching liquid rockets. The lab houses a vast and necessary collection of hardware to shape and weld metal materials. Hand tools like saws and drills, a lathe mill, tube bender, and much more will give students hands-on experience to build their liquid rockets.

> **"The Liquid Rocket Lab program has had an immeasurable impact on student learning and my career at Cal Poly Pomona."**
>
> —MELODY NEU, FORMER PRESIDENT OF THE LIQUID ROCKET LAB

An assembly room will enable students to assemble parts in-progress, leave them, and continue progress on another day. Prior to this enclosure, this basic convenience was impossible—teams borrowed the college's structures lab to assemble parts, disassemble them, and then had to put them away to make room for classes taught in the lab. Tedious inefficiencies like these are now in the past.

"It is a great increase to our capability to perform well," says Frank Chandler, Ph.D., director of LRL and aerospace engineering associate professor.

The journey continues. While the destination is important, what's been done up to this point—both success and failures—have proved to be demonstrative in what it means to be an engineer. "The running joke is that LRL is like an industry simulator," says Lister. "LRL alumni are doing what they did in the program but now in industry."

"The Liquid Rocket Lab program has had an immeasurable impact on student learning and my career at Cal Poly Pomona," says Melody Neu ('22, aerospace engineering), former LRL president and now a propulsion components test engineer at Virgin Orbit. "The hands-on experience I've gained through this project has directly prepared me in securing this dream career. I think the Liquid Rocket Lab project is the absolute embodiment of the learn by doing philosophy and I'm so grateful for my time here."

The team cheering after their first successful hot fire of their liquid rocket engine.

Winny Dong Does it Her Way

To make sense of why Winny Dong, Ph.D. has poured all 22 years (and counting) of her career into Cal Poly Pomona, we must go back roughly 70 years to rural Taiwan.

BY CHRISTOPHER PARK

Here, Dong's father, Min-Ten Jahn, is 11 years old and divided. He's brilliant, but as the fifth child of seven, his family needs him to forgo his education and work now. His siblings before him chose work, and so have his parents and his grandparents. Perhaps serve as a shoemaker's apprentice? Sell vegetables on the side of the road?

Do neither, his school urged. The school took the primary objection of the family needing money head on. They found scholarships for Min-Ten and colleges that pay their students in exchange for serving as teachers for a few years after graduation. This was persuasive and Min-Ten was the first in his family to complete sixth grade, high school, and college, and earn a Ph.D.

"My mentoring philosophy is rooted in my father's experience," says Dong. "In order to be an effective mentor and advocate, one must understand the whole student—their goals, family obligations, educational history, what motivates them, and the barriers they face."

Eventually, Min-Ten would marry, have little Winny, settle in the U.S., and teach as a materials science and engineering professor at Cal State Long Beach. In the same way that his school in Taiwan advocated for him, he did the same for his students. They came over often to the Jahn household like extended family, seeking guidance on their life and education.

"I remember having these people around that looked up to my dad," she says. "It made me think, 'Oh, this is the kind of job I want when I grow up.'"

With encouragement and nudges from her father ("Try materials science," he once suggested, "Engineering has a lot of physics in it."), Dong got her bachelor's, master's, and doctorate in materials engineering at UCLA. The first teaching position she ever applied for was Cal Poly Pomona, and it'd be her last. She was hired by the chemical and materials engineering department.

Two Lessons that Changed Everything

Her time at Cal Poly Pomona is long, storied, and distilled in two key lessons.

Lesson #1: Your position and title matters.

By her seventh year at Cal Poly Pomona, she was called to serve as chair for her department. Seemingly overnight, her new title conferred a level of authority that took her by surprise.

"The minute I became chair, external partners treated me completely differently," says Dong. "People came with questions that were so deferential. I always thought of academia as having very flat hierarchies, so this was an important lesson."

Lesson #2: There are a lot of reasons why decisions are made.

Before Dong was chair, the decisions that came out of the department seemed mysterious, as if the rationale behind them was housed in a black box.

"I'm always the kind of person who says 'Why can't we do it this way?'" says Dong. "As a chair, I started seeing behind the scenes. Not everything is reasonable, but there are always reasons."

With these essential lessons, Dong would change Cal Poly Pomona forever.

Small Beginnings

In her time as chair, Dong saw a need—there was a hunger for research from engineering faculty and students but few resources allocated towards it. As she stepped down from chair, she asked for one thing: a title.

"I said to the dean, 'You don't have to pay me anything, but can you give me a title?'"

With the request granted, Dong founded the Office of Projects and Research in the College of Engineering and was named director. Funding? None except from a small external grant, but the mere existence of the office and her title was sufficient. She started applying for and earning additional grants to fund the office. Perhaps she had the cart before the horse, but as Dong asks: Why can't we do it this way?

Indeed! So she did—she became the director for the McNair Scholars Program and founded the Achieve Scholars Program to better prepare students to pursue a doctorate. In short, both programs provide stipends, research opportunities, and workshops. And both operate on the central pillar of mentorship that listens, guides, and encourages students to excel beyond both limitations they set on themselves and their own life situations.

But for Dong, founding these programs wasn't enough. Each program could only accept a handful of students every year. She aimed to institutionalize an undergraduate research culture in the university. So she did, and again, in her own way.

Institutionalizing Mentorship

Established in 2013, Dong founded the Office of Undergraduate Research (OUR). Like before, the title and office were invented. Its authority as the de facto undergraduate research office was built by Dong over several years.

"For the first three years, it was just external funding," says Dong. "I called it the Office of Undergraduate Research and some person on the federal level is like, 'Wow!'"

"And so they started funding us. And then after a while, everybody's referring to us as the Office of Undergraduate Research and the university recognizes us."

The once burgeoning office is now the central hub of all undergraduate research. Instead of replacing existing research efforts and programs throughout the university, it amplifies them. For example, OUR holds annual research conferences that invite all undergraduate students to present their research at one centralized event. And just like the programs she founded before, mentorship is OUR's core value.

"It goes back to my dad again," says Dong. "He really enjoyed working with his students and I wanted that relationship as well. I found that I got that relationship by mentoring students."

"I get to know these students for two to three years while they're undergraduates. Then they graduate and go on to do amazing things."

Dong is speaking of graduates like David Kok, Ph.D. ('14, chemistry), a McNair scholar who earned his doctorate in materials science and engineering from UC Irvine. Today, he's a parts, materials, and process engineer for Millennium Space Systems, a Boeing company. "Professor Dong was a guiding light during my years at Cal Poly Pomona," says Kok. "She helped guide me into directions in life that I didn't know was possible for myself."

Or like Luis Valenzuela ('16, electrical engineering), another McNair scholar who's close to earning his doctorate. "If not for Professor Dong, I wouldn't have done half the things I have been able to do," says Valenzuela. "She taught us that with all of our hard work, we deserved to succeed."

Or like the 3,000+ students that have been impacted by the programs Dong founded and funded in no small part by $14 million in grants that Dong has earned over the years.

Finally, we must mention this: This year, she was just one of 12 individuals in the country to earn the White House's U.S. Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring. After all she has done for Cal Poly Pomona in the last 22 years, it's no surprise.

1978: **Winny Dong** (left), with her dad Min-Ten Jahn and her brother (right).

STAFF MEETING

BY CHRISTOPHER PARK

Mark Bailey (center), with the college's technicians. Left to right: **Ulus Ekerman**, **David Lefay**, **James Cesari**, **Joey Tulpinski**, **Matthew Rodriguez, Andy Gustilo**, and **Michael Johnson**. Not pictured: **Anan Hamdan** and **Bill DeRuyter.**

At its peak, Cal Poly Pomona hums with the energy of 30,000 students, faculty, and staff populating the campus. Of the 30,000, over 6,000 of them are engineering students. And for these 6,000 eager souls with aspirations to make engineering their trade, just over 40 staff in the College of Engineering help shepherd them on their way.

This staff is a diverse group of disciplines, offices, and programs, but they, like the university at large, share a common mission: student success. Here, are but a few of them who above all, care deeply for their students.

Resident Handyman

Mark Bailey ('73, electrical engineering) has worked at Cal Poly Pomona for 49 years and has never worked anywhere else.

Why?

"I've thought about this a little bit. You know, life's been good to me," says Bailey. "There are goal-oriented people and there are people who take what life brings their way. Me? I didn't know what to do. Everyone thought I should go to college, so I went to college. I always liked playing with electrical stuff, so I thought I should be an electrical engineer. Next thing you know a position opens up and the department asks me to apply."

"Life has always brought me something."

He and his team of nine technicians are the college's principal builders—it's what they do on and off the clock. Tables are made, wiring is installed, and labs are renovated and maintained. The college has 116 laboratory and instructional spaces that are cared for and maintained by people who love it.

Bailey alone is responsible for maintaining and upgrading a few dozen labs. When a student hurries into a lab, places their backpack on the desk, sits on a chair, and starts analyzing the results from an oscilloscope, Bailey and his crew had a hand in making all of that possible.

"I love to see students sharing, learning, and working together in the spaces we've built," says Bailey. "I've enjoyed fixing the equipment. I like virtually all aspects of my job."

At home, he's renovating his backyard, refinishing his arbor, building a pipe and steel rack, and upgrading his workshop. Back at work, it's the same thing—building, doing, upgrading. It's hard to discern where his professional and personal lives begin and end. For Bailey, it's one and the same—a hobby he gets to do all day.

He has no plans to leave. "I'll die on the job first," he jokes.

As he says, he'll take what life brings his way. And according to him, life has brought him the good fortune of doing what he loves and playing a vital role in the education of all our students.

What Mark wants you to know: "My team is a fantastic group of guys who know and love what they're doing for these students."

Causing Ripples

Lita Patel's something of a Swiss Army knife—she does a little bit of everything, and then some.

As the administrative support coordinator (ASC) for the mechanical engineering department, she's essentially the department's front desk. On most days, she's addressing anxious lines of student inquiries. "Am I graduating this year!?" "Something's wrong with my financial aid!" Or "I'm having trouble registering for my classes!" Her answers are as calming as they are informative. If she can't help directly, she knows who can and will. Patel holds within her a complete understanding of the how the university operates, a kind of understanding that only comes with the 27 years she has worked at Cal Poly Pomona.

> "I've had the good opportunity to help students pave their path."
>
> —LITA PATEL, ADMINISTRATIVE SUPPORT COORDINATOR

On other days, she's a listener and advocate. She'll listen to all sorts of worries and personal concerns before giving a reassuring response that they're going to make it, which she means in earnest any time she says it.

"I've had the good opportunity to help students pave their path," says Patel. "It really has been a fulfilling position for me. You know, it's like throwing a rock into a pond. You cause ripples in the water—there's a real effect. My hope is that the students I'm helping then become people who create their own ripples. That they become people who pay it forward and help guide someone else."

It's what all seven department ASCs do in the college, more or less—causing ripples in the pond. It's a combination of administrative support and nurturing every new generation of students that enter the college and saying farewell to the seniors leaving it.

"I get sad in a way because it's like 'Wow, another group of kids are leaving but I'm very happy they're going to the next chapter of their lives.'" says Patel. "But sometimes, they'll come back to visit and it's really amazing to see them again. Some come back married with kids. It's just interesting and fun to hear about how they've grown up."

Every year, hundreds of new students enter the department and hundreds earn their degrees and leave. Throughout this annual cycle, Patel continues her work diligently and lovingly, creating new ripples.

What Lita wants you to know: "The students are our main priority. They're the one reason we're all here. We serve them and get them through whatever it is."

Lita Patel (center), with some of the college's administrative support coordinators. Left to right: **Phuong Pham**, **Alice Tokunaga**, **Evelyn Garcia**, **Stacey Holderness**, and **Kelli Nursall**. Not pictured: **Kimberly Davis** and **Taneshi Noel**.

> **“Our students are successful not necessarily because of me, but because I help them reach their full potential. It drives me to be the best I can for the students.”**
>
> —KENNETH PARTNER, STUDENT SUCCESS ADVISOR

Kenneth Partner (center-back) with some of his advising collegues. Left to right: **Alexandra Retana**, **Lorena Facio**, **Cindy Chavez**, **Monica Kays** and **Wendy Lopez**. Not pictured: **Porshe Gipson**, **Francisco Cornejo**, and **Evelyn Garcia.**

Good Advice

Kenneth Partner graduated with a degree in industrial technology and had just one job in the field. After that, he worked in insurance for three-and-a-half years. Professionally speaking, this wasn't what Partner was expecting, but education always spoke to him.

“My major had an emphasis in technical education, so education was always on the back of my mind. I wanted to do something more holistic, more of a contribution to society,” he says. For Partner, cutting a check as a claims adjustor wasn't that.

He went back to school at the age of 28 and earned a master's in education. He began his new career as a coordinator for Upward Bound, a federal program designed to help kids primarily from low-income families be the first in their lineage to attend and graduate college. Eventually, he became an advisor for the college's Engineering Advising Center (EAC) and has been there for the last seven years.

It's at the EAC where engineering students come for a one-stop shop on all things degree progress. They come here to understand what courses to take, how to navigate university policies and procedures, and much more. And if the EAC can't help directly, they get students in contact with people who can.

“You help students see the light at the end of tunnel. Whether they're just starting or close to graduating, you give them a good idea of when they'll graduate,” Partner says.

With a student population of over 6,000 in a busy semester, he's responsible for about 800 of them. Of those 800, at least 75 percent of them will at some point ask Partner for help every semester.

But it's much more than that. Sometimes, Partner's lending an ear to a student who just needs someone to listen. Other times, it's encouragement—the path to an engineering degree isn't easy and Partner relates by sharing his own challenges when he was working towards his industrial technology degree. These conversations in-between the business of answering, “When will I graduate?” constitutes a non-trivial portion of the work they do.

Take it all together and it drives Partner, just like it does the six others who work alongside him at the EAC.

“My favorite part of the job is when you tell a student they're done and ready to graduate and seeing the satisfaction on their face. Our students are successful not necessarily because of me, but because I help them reach their full potential. It drives me to be the best I can for the students.”

What Partner wants you to know: “We're going to do the best for our students to be successful. Rest assured that we're going to put our best foot forward when it comes to our students.”

Cultivating Belief

Here's the thing about Scott Chang: he can sell.

Before Cal Poly Pomona, Chang worked in sales, listening to a client's concerns and needs before offering a sales package that met their goals. Not every part of the job spoke to him, but it taught him enough about himself to direct him towards the work he does today.

"I discovered that I liked coaching and guiding clients to solutions that were tailor-made for them," says Chang. "I'd consider all the different pieces of their situation in order to find them a package that was going to meet the needs of their circumstances."

He translated his skills to higher education as our academic retention coordinator for the Maximizing Engineering Potential (MEP) program. It's a program made to prepare historically disadvantaged students—low-income, first-generation, and underrepresented minorities chief among them—to graduate as capable, sought-after engineers. On any given semester, approximately 150 to 200 students are in the program.

At MEP, Chang does a different kind of selling—he gets students to buy into themselves. It's not uncommon for MEP students to either harbor a level of doubt in their own ability or not understand the full medley of resources and programs that can help them. Chang listens to these students and offers a set of solutions and ideas that gives them a level of self-belief they didn't have before.

"My favorite thing about the job is talking to students, finding out about their lives and through the course of conversation, I say something they didn't know and see their brains expand and their eyes light up," says Chang. "That's very cool."

"Whether it's education or sales, the underlying goal of offering a solution is the same. So it can be something like, 'Hey, you're having a hard time so what you can do is take this tutor in this supplemental instruction class and attend this workshop.' You're giving them these opportunities and ability to be able to walk through those doors."

It's these conversations that drive Chang the most. The course of conversation takes natural and surprising shapes, where students expecting a two-minute chat becomes a sprawling hour of newfound belief and understanding. It's why he's been here for seven years and why, just like others in this feature, have no plans to work anywhere else.

What Scott wants you to know: "Helping students see success is one of the greatest impacts we can possibly have on them. We do everything we can to help them have a bright future."

Scott Chang (center), with MEP students **Jonathan Shorter** (left) and **Shameemah Sally** (right).
Not pictured: **Lily Gossage, Ph.D.**,**Shannen Allado**, **Phuong Pham**, and **Steve Quintero**.

A VOICE THAT CANNOT BE DENIED

How Vy Li ('21, master's in systems engineering) went from refugee to entrepreneur.

BY MARISA DEMERS

> **“Engineering gives us a method to address problems so that we can make the world better in ways both small and large. That is why I love it so much.”**
>
> —VY LI (’21, MASTER IN SYSTEMS ENGINEERING)

For much of Vy Li’s life, silence was essential to her survival.

In 1981, as a toddler aboard a refugee boat, her mother kept Li quiet with cough syrup. Drawing attention from other passengers or, worse yet, nearby pirates could have cost Li her life. Years later, Li held back words and tears after an enraged boyfriend threw a knife so close to her face that it knocked Li’s glasses off. Lacking financial security, Li continued living with her abusive partner until she earned her bachelor’s degree.

Today, the Orange County resident’s life is vastly different. She is a co-owner and managing member of four financial technology startups, including one that recently sold to a publicly traded company. Yet, she is still fighting assumptions about the role of a female executive. Board members and employees look to her husband and co-owner Timothy Li for guidance, not her.

“We are supposed to believe that equality exists, but it does not,” Li says. “People may not look down at me, but they certainly do not care what I have to say, and I am tired of nobody listening.”

At 43, Li will no longer be quiet. She credits the graduate program at Cal Poly Pomona for giving her the self-confidence to assert herself more in the classroom and the board room. Li is using her position as a fintech leader, a Cal Poly Pomona alumna and a philanthropist to inspire others like her—immigrants, first-generation college students, and female engineers—to find their voice, too.

A New Home

Li was just three years old when she and her parents fled Vietnam’s communist-run government. The stories Li’s mother and father share about their journey to a Malaysian refugee camp are more vivid than Li’s personal recollection of them. Still, learning how much danger she endured as a child motivates her to succeed. “Something inside of me always made me feel I should accomplish more in life,” she says.

Li’s family eventually resettled in Ottawa, Canada. The next 15 years were challenging. Li’s mother and father worked as many as three jobs so they could leave their government-assisted housing and gain a foothold into middle-class life. Li took on the responsibility of helping with all household chores, including caring for her sister and brother.

Finding Her Passion

When the time came for college, Li’s mother and father offered financial support, but only if she majored in computer science. Li abided by their terms and enrolled at the University of Ottawa. During Silicon Valley’s explosive growth in 1999, Li transferred to San José State University. The new start connected Li to her true passion—engineering.

“Engineering gives us a method to address problems so that we can make the world better in ways both small and large,” Li says. “That is why I love it so much.”

In the years following her graduation, Li enrolled and dropped out of graduate school, met and married Timothy Li and had four children. When she was looking for ways to be taken more seriously at work, Li thought about the master’s degree that she never completed.

Paying It Forward

When Li walked onto the Cal Poly Pomona campus in spring 2020, she expected to face challenges as a working mother and student. The COVID-19 pandemic made every aspect of her life more stressful.

Li was not ready to give up again. Faculty from the Department of Industrial and Manufacturing Engineering (IME) did not know about Li’s successful businesses or her personal reasons for returning to school. Instead, they saw a driven student and wanted to help. Assistant Professor Payam Parsa, for instance, met with Li once a week to discuss her research project. Others, including Associate Professor and Chair Shokoufeh Mirzaei, would meet online to ensure students understood class materials. In December 2021, Li earned her master’s degree.

Because of her positive experience at Cal Poly Pomona, Vy and Timothy pledged $120,000 to the Department of Industrial Manufacturing last March. Funds will support an IME excellence fund and help renovate and purchase new equipment for the department’s computer-integrated manufacturing lab. In gratitude, Cal Poly Pomona’s renaming the space the Vy and Timothy Li Automation Laboratory for Industrial and Manufacturing Engineering.

Ellips Masehian, assistant professor in IME, has spent the past four years trying to modernize the lab for students. He applied for several grants and even used funds from his faculty startup package to pay for instrumentation. With the Lis' support, Masehian can fast-track his plans.

“This gift is very impactful,” he says. “We can act on our ideas without having to wait for grant funding.”

By naming the lab after her and her husband, Li hopes that immigrants who enter the engineering space will feel proud and driven to succeed. And, by providing a relevant, hands-on curriculum, Li says Cal Poly Pomona students can achieve social mobility that is critical to a safe and healthy life.

“When you have experienced trauma it is very hard to take the next step to a better life,” Li says. “I want all the young women to know that they can absolutely get an education and find a better situation. It is really hard but I know they can do it.”

CALL TO ACTION

An impassioned group of alumni and industry leaders make student success their mission.

BY CHRISTOPHER PARK

Maggie Hoang, electrical engineering student, with **Eric Schmidt** ('92, aerospace engineering) (right) and **Elias Wilson** (left) at the Power of Food event.

A Question of Legacy

For Clark Rucker ('83, engineering technology), it's a simple but large question.

"What legacy are we leaving behind as we transition into our soon-to-be retirement years?" asks Rucker, a now-retiree from Boeing after 33 years of hard work. "How have we assisted to shape the minds of young, impressionable college students to not only think, but believe that they have a solid chance to be whatever they want to be in life if they put their minds to it and work hard?"

It's the question that loomed over not only Rucker, but 26 other men and women. Together, they comprise the College of Engineering's Dean's Leadership Board (DLB), an advisory board of high-level executives and alumni who bring their expertise and knowledge from their respective engineering fields. Collectively, they leverage their resources to help students on their way.

And in 2019, they had an answer to the question.

They established a common mission called SOAR—Support student success, Offer opportunities, Actively advocate, and advise and Resource acquisition for engineering education. In short, leverage their professional perspectives to offer tangible, actionable value. With a North Star established, the DLB divided themselves into three teams, each delivering on their share of responsibility to fulfill the mission.

Across the last two years, they've done much: seven virtual tours, a four-part seminar series, and a huge on-campus mentorship luncheon for hundreds of engineering students.

First, the virtual tours gave students an inside look in the professional engineering world. Employees (many of them alumni) from companies like Boeing, Fluor, Tilden-Coil, and LA Sanitation represented a diverse set of engineering firms and companies students learned about and from.

Second, was a series titled "Stuff They Didn't Teach You in School," a four-part seminar hosted by DLB members that gave students the rundown of securing their first job in the field. It covered the essential elements of job-hunting—creating a compelling resume, preparing for the interview, following up from an interview, and negotiating a salary.

"Before participating in the seminar, I had a shabby resume and a poor understanding of the nature of the workforce," says Jordan Sycip, industrial engineering student. "Listening to the knowledge and experiences of high-level executives helped me redefine how I view and act in a professional setting."

DLB capped off their multi-year effort with In-n-Out on the house thanks to Larry Gates ('87, civil engineering), DLB member, perennial Cal Poly Pomona philanthropist, and co-founder and president of DRC Engineering. Dubbed the "Power of Food" event, engineering students enjoyed lunch and more importantly, actionable advice from DLB who attended the event. The main message? Build and maintain your networks and seek mentorship to keep opportunities open.

"Life is about relationships," says Eric Schmidt ('92, aerospace engineering), DLB member and president of Exquadrum, one of the many members present at the event. "Nurture them and be a part of them in an engaged way."

For electrical engineering student Maggie Hoang, she took his advice to heart and earned the first job of her life.

Outcomes of Salary Negotiation

- **Win-Win:** Each side wins. Through cooperation, both sides win.
- **Win-Lose:** One side perceives the outcome as being positive. In this outcome, it is likely to be voluntary.
- **Lose-Lose:** Both parties lose. An example might be a budget-cutting negotiating.

Virtual tours and seminars were attended by hundreds of students.

Generational Impact

A second-year student and well-versed in power and radio frequency, Hoang went up to Schmidt that day, picking his brain about how she can go about establishing her own career. Schmidt answered from experience—instrumentation engineering is a great niche for electrical engineers. She thanked him for his time and connected with him on LinkedIn and Cal Poly Pomona's mentorship network, PeopleGrove.

From time to time, she'd catch up with Schmidt and post her personal engineering projects on LinkedIn. Eventually, Schmidt saw enough in Hoang to extend her an internship opportunity at his company, where she's spent a productive summer working with instrumentation, collecting data, and converting digital signals to analog.

"Not only did that event and networking program connect me with Exquadrum, but I also now have a female mentor from Raytheon that I call bi-weekly to catch up with school, work, and life," says Hoang. "I love having the opportunity to be a part of the STEM industry even though I am very young."

Hoang is illustrative of exactly the impact DLB aimed to have over these two years—empowering the next generation with decades of industry experience and insight. And they have plans to keep it going.

"We plan to build on past momentum and expand the already successful content in the year ahead," says Michael Beckage ('87, engineering technology), DLB member and chair, and chief technology officer of Diversified Technical Systems. "DLB members share a common appreciation for the challenges facing students preparing to enter the job market, and we simply wanted to do something to help!"

Have you noticed? Rucker, Schmidt, Gates, and Beckage are all alumni. Coming back to their alma mater to pay it forward in ways that aren't simply material, Rucker makes a plea to all his fellow alumni.

"I encourage, no, I implore you to think about what legacy you are leaving behind. Ask yourself 'Wouldn't it be nice if one, maybe a few, or a handful, of students could look back one day as their professions get started and think about how you were the spark in their life that helped to begin their career?'"

The question looms large. For the DLB, they have their answer.

READY FOR TAKE-OFF

$5 million from the Air Force Research Laboratory supercharges advanced drone technology

BY MARISA DEMERS

Subodh Bhandari, Ph.D., aerospace professor, instructs aerospace engineering student **Rick Ramirez** on utilizing the unmanned ground vehicle (UGV) for autonomous UAV-UGV mission coordination.

In the future, our skies may be dotted with small flying machines tasked with delivering packages to our doorstep, monitoring traffic flow, and even helping with search-and-rescue missions. Once a tool for the military, unmanned aerial vehicles (UAVs), or drones, have found mainstream appeal for jobs too dangerous, time-consuming, or cumbersome for humans.

Yet, engineers and computer scientists will need to push the limits of technology to realize that vision, says Subodh Bhandari, Ph.D., professor of aerospace engineering. The biggest challenge, he adds, is getting UAVs to "think" on their own.

"I want to make UAVs more like driverless cars," says Bhandari. He works with UAVs that look like either helicopters or airplanes, weigh less than 55 pounds and fly at a maximum altitude of 400 feet. "Humans are supervising the action, but they are not actively maneuvering the vehicle. To harness the full potential of UAVs, we will need this level of autonomy."

Thanks to funding secured for Cal Poly Pomona to advance the Educational Partnership Agreement (EPA) with the Air Force Research Laboratory (AFRL), Cal Poly Pomona is receiving $5 million for research to help the U.S. get closer to a more autonomous world. These funds will support seven UAV projects, and Bhandari will play a critical role in several of them. For instance, he is leading efforts to improve how UAVs detect and avoid collisions and help streamline communications between UAVs and other unmanned air and ground vehicles. With these advancements, humans can design more complex, multi-robot missions. Bhandari is also partnering with Cal Poly Pomona faculty to leverage remote sensing technologies to accurately monitor the quality of air, water, and crops as well as detect geographic hazards such as faults, landslides, and ground erosion.

As Bhandari embarks on each of these projects, he can freely focus on his research and students, and not worry about paying for state-of-the-art equipment.

"Faculty and students are working with UAVs and sensor technologies that are actually used in industry," Bhandari says. "This is an invaluable experience and would not be possible without this level of support."

For nearly 20 years, Bhandari's research has pushed forward the autonomous capabilities and real-world applications of UAVs. Most recently, he has helped farmers customize the amount of nutrients, fertilizer, and pesticides that crops receive, a practice known as precision farming. Instead of relying on grainy satellite images or expensive manned flights, UAVs fly over vast swaths of farmland and take high-resolution photographs of crops. Then, a sophisticated machine learning algorithm identifies plants that need attention. Bhandari's approach has helped farmers increase their yield on strawberry crops, detect powdery mildew on grapes, and identify weeds that need to be removed.

Bhandari dedicated his research career to UAVs in the early 2000s while he was in graduate school. At the time, they were not widely studied outside of the military even though UAVs have been in existence for more than a century. Today, the UAV industry has grown exponentially. The number of UAV patents more than doubled between 2016 and 2018, and its market size is valued at approximately $22 billion.

> **"This is an invaluable experience and would not be possible without this level of support."**
>
> —SUBODH BHANDARI, PH.D., AEROSPACE ENGINEERING PROFESSOR

Aerospace engineering student Eve Javier did not know about UAVs until she transferred to CPP and was invited to do summer research with Bhandari. Now, she gets a thrill when she sends her UAVs on a test flight.

Collaborating with electrical, mechanical, and robotics engineers, Javier worked on programming UAVs to detect and extinguish forest fires. Still in the proof-of-concept stage, the group customized two UAVs with sensors, thermal-imaging cameras and onboard computers. Ultimately, the team wants one vehicle to detect a fire and send the geographic coordinates to the second UAV. Then, the second UAV will visit the site and drop a fire suppression ball. Encouraged by the team's progress and the real-world need to address this challenge—since 1983 there have been an average of 70,000 wildfires a year—Javier plans to continue this research throughout the school year.

Participating in the summer project gave Javier new insight into robots and, more importantly, her fellow humans.

"Coming from various disciplines, the group struggled to find our groove in the beginning," Javier says. "We each had different perspectives and methods on how to approach this project. Each member had to figure out how to be part of a team, and I am so glad we did because we all learned from each other."

If Javier decides to pursue a career in UAV engineering after graduation, she will be joining several other Cal Poly Pomona engineering alumni who are employed at AFRL, Lockheed Martin Corporation, and Boeing.

"UAVs is one of the fastest growing sectors in the aerospace industry," Bhandari says. "Yet, there are not a lot of people who are qualified to work in this area. Funding, which helps accelerate our EPA with the Air Force Research Laboratory, will enable Cal Poly Pomona student and faculty researchers to help the U.S. maintain its global leadership in technology and innovation by continuing to provide a skilled and diverse workforce pipeline."

Eve Javier, aerospace engineering student, working on a UAV.

POMONA'S **OUTSTANDING FACULTY**

Chemical and Materials Engineering Professor Earns Major Navy Fellowship

Vilupanur Ravi, Ph.D., professor and former chair of the Department of Chemical and Materials Engineering, was one of only six professors selected for the U.S. Navy's inaugural Distinguished Fellows Program.

The program provides funding for Ravi to commit to his research full-time for the next three years. Additional funding allows for the purchase of lab equipment and stipends for student research assistants. With the fellowship valued at over $1.2 million, this is a substantial commitment with a commensurate expectation from the Navy.

"It was a tremendous piece of good news delivered all at once! It took some time to process this," says Ravi. His research will center around better understanding the role of calcium oxide sulfate in corroding gas turbine engines. Vehicles like aircrafts and ships use this type of engine and corrosion is a common foe in both the air and sea. If corrosion runs amuck, engines fail. The results could be catastrophic, including loss of life.

Furthermore, Ravi is the only professor among the inaugural class of fellows from a university not categorized as a high research activity institution, speaking to the significant and compelling value of his research. His aims are high—he hopes this is not just three productive years of research, but a lasting partnership to help Cal Poly Pomona establish a stronger and sustainable research culture.

"I'm overjoyed by this opportunity. My students and I will work with cutting-edge, world-class universities and research and development personnel from industry leaders across the country," Ravi says.

Aerospace Professor Earns Cal State University Award

An educator for 30 years with a lifelong love for all things flight and space, **Don Edberg, Ph.D., aerospace engineering professor, earned the 2022 Wang Family Excellence Award for Outstanding Teaching Faculty.**

Edberg is one of just five recipients selected from across all of the 23 campuses of the California State University system. As an awardee, Edberg receives a $20,000 cash prize.

"It's hard to comprehend winning this award over the entire CSU system, which has thousands of great instructors," Edberg says. "I am very honored to be recognized and humbled at the same time."

Edberg has taught in Cal Poly Pomona's aerospace engineering department for 20 years. In this long and fruitful tenure, he has advised over 500 students across 120 design teams in aircraft, spacecraft, and launch vehicles.

"There are professors that become faint memories while others are forever engrained in our memories, guiding us with their knowledge and wisdom," says Miguel Maya ('13, aerospace engineering), propulsion development engineer at Virgin Orbit. "Dr. Donald Edberg is the epitome for how a professor's teachings should guide students not only in the present, but also in the future."

Chemical and Materials Engineering Associate Professor Recognized as Outstanding Advisor

Jonathan Puthoff, Ph.D., chemical and materials engineering associate professor, earned this year's Outstanding Faculty Advisor award. Puthoff is just one of eight faculty to receive the annual award from Cal Poly Pomona. Among his efforts, Puthoff redesigned the department's advising forms to better visualize the path to graduation for students and was central to advising efforts during semester conversion.

Mechanical Engineering Professor Wins National Teaching Award

Paul Nissenson, Ph.D., professor and associate chair of the Department of Mechanical Engineering, won the American Society for Engineering Education (ASEE) 2022 National Teaching Award.

Nissenson was selected among a national pool of nominees for his ongoing dedication to both his students and aspiring engineers across the world. In the classroom, Nissenson has dramatically reduced failure rates in mechanical engineering bottleneck courses—classes where student demand exceeds capacity—from 34 percent to 11 percent.

He's also dedicated a significant portion of his career to democratizing engineering education via digital efforts. He launched the first Massive Open Online Course (MOOC) at Cal Poly Pomona, an online course on technical subjects he provided to thousands of students at no cost. Further, Nissenson's a lead in managing the department's YouTube channel, CPPMechEngTutorials, an indispensable repository of lectures and educational videos on a variety of mechanical engineering subjects for anyone in the world. The channel has over 105,000 subscribers, 10 million video views and 1 million hours of viewing time.

Industrial and Manufacturing Chair Earns Teaching Award

Shokoufeh Mirzaei, Ph.D., chair of the Department of Industrial and Manufacturing Engineering, earned the Teaching Excellence Award from the Institute of Industrial and Systems Engineers' Operations Research Division.

Some of her notable efforts include optimizing learning outcomes in courses by combining in-person lectures with supplemental online videos. The former was utilized as an open lecture to field questions and explore areas of the course that students naturally had inquiries for, while the online videos served as a structured instruction on the course. Viewers around the world, including the United Kingdom, Turkey, and Egypt, have watched Mirzaei's videos.

She's also authored a multimedia, non-traditional textbook, offering students greater depth on the subject of operation research at a more affordable price.

Engineering Faculty Earn Two of Three Provost's Awards

Wen Cheng, Ph.D.

Phyllis Nelson, Ph.D.

The annual Cal Poly Pomona Provost's awards saw two of its three categories earned by engineering faculty—**Wen Cheng, Ph.D., civil engineering professor, who earned the Excellence in Scholarly and Creative Activities award, and Phyllis Nelson, Ph.D., electrical and computer engineering professor, who earned the Excellence in Service award.**

Cheng's research is focused on highway safety, advanced traffic operation strategies, statistical modeling, and deep machine learning in transportation. He serves as an editorial board member for multiple journals and has been either the principal investigator or co-principal investigator on projects. Cheng's earned over $3 million in research grants, much of which was focused on laboratory upgrades. He is also the author of a textbook on highway safety, "Highway Geometric Design: Application of Design Standards in InRoads," and has published more than 100 peer reviewed journal papers and conference proceedings in collaboration with his students and colleagues. In 2020, Cheng earned the Provost's award for Excellence in Teaching.

Nelson has served as vice chair and then chair of the Academic Senate, chair of the Department of Electrical and Computer Engineering, and co-director of the Center for Macromolecular Modeling and Materials Design. She also served on the veteran success committee, numerous search committees, and was a member of the Police Advisory Taskforce, the Cal Poly Pomona Foundation Board of Directors, and the Inclusive Excellence Council Executive Board. She is currently faculty director of Data Analytics. Nelson has been a member of the Mt. Baldy Volunteer Fire Department since 1999, first as a firefighter and now as a dispatcher and secretary of the board of directors.

GRANTS AND SCHOLARLY IMPACTS

A $344,995 grant awarded to associate professors **Nolan Tsuchiya, Ph.D.** and **Navid Nakhjiri, Ph.D.**, from mechanical engineering and aerospace engineering respectively, funds a research studio consisting of state-of-the-art hardware and industry-standard software. Awarded by the Department of Defense and the U.S. Army Contracting Command, the grant also offers faculty and graduate students new opportunities to collaborate and explore ideas related to autonomous vehicle design, robotics, and control systems as they work on a purpose-built, top-end educational experimentation platform.

A $122,895 grant from A.I. Innovations N.V., enables Assistant Professor **Simeng Li, Ph.D.**, from civil engineering to work on the development of superabsorbent polymers that capture and store water from moist air. When applied to agricultural soils, these polymers have the potential to reduce water use and mitigate environmental contamination. Li's research also includes financial support and career development support for one graduate and one undergraduate student research assistant.

Civil engineering professor **Wen Cheng, Ph.D.** aims to reduce roadway fatalities and injuries for vehicle drivers and pedestrians and bicyclists in California with help from a $275,000 grant from the Department of Transportation and the National Highway Traffic Safety Administration. The grant enables interdisciplinary work done by both civil engineering and computer science students for the application of computer vision and sophisticated statistical models for traffic safety.

Underrepresented students in engineering and agriculture will get to enhance their research skills in feed manufacturing technology with help from the Department of Agriculture. Mechanical engineering professor **Kevin Anderson, Ph.D.**, working together with Ondieki Gekara, Ph.D., from the College of Agriculture, will use $150,000 in grant funds to purchase new equipment in the feed mill facility at Cal Poly Pomona. Students and faculty will manufacture their own livestock feed for beef, pork, poultry, and more. Engineering students will utilize the design and layout of the new feed mill facility as a final design for an electromechanical-oriented project.

Zahra Sotoudeh, Ph.D., aerospace engineering associate professor, is conducting research using a new theoretical framework for understanding statistical energy analysis. Made possible with a $199,801 grant from the National Science Foundation, her work seeks to overcome the limitations of traditional statistical energy analysis to better measure high-frequency vibrations, like the kinds produced by aircraft. For example, her work may help protect sensitive sensors of air vehicles from structural vibrations caused by engines, turbines, turbulence, and so on. A portion of the grant will also fund stipends for students researchers.

Further, the associate professor's part of the U.S. Air Force Summer Faculty Fellowship. With a graduate student accompanying Sotoudeh, her second consecutive fellowship has her working on creating a computationally efficient and accurate numerical model for understanding gust response of air vehicles in small Reynolds numbers, such as micro air vehicles (MAVs).

Mohamed Aly, Ph.D., electrical and computer engineering assistant professor, was awarded the U.S. Air Force Summer Faculty Fellowship for the fourth consecutive year. This year, he brought his graduate student Melvin Relf to investigate the post-quantum crypto security for medical devices. They are in the process of producing the first continuous glucose meter that uses post-quantum crypto for securing the streaming to intelligent devices, which can be used for securing insulin pump communications.

A $116,405 grant from the Steel Founders' Society of America funds a study from industrial engineering professor **Victor Okhuysen, Ph.D.** He'll be investigating selected steel properties and collecting data about the casting process with the ultimate aim to improve the properties of corrosion-resistant steel alloys to extend the life of equipment in chemical processing environments such as refineries. Another aspect of the research is to obtain data to better protect material properties before making product to ensure the anticipated performance will be met.

IN BRIEF

BY ALICIA HANSELL AND CHRISTOPHER PARK

Why Civil Engineering is #1 in Three Stories

The winning student team at the 2022 ASC Reno Design-Build Competition. First row (left to right): Ayman Jaber, Tyson Sint, Annaliza Balila-Heller; second row (left to right): Lily Yang, Alexis Avila, Jeri Robles; third row (left to right): Daniel Lowe, Ryan Tran, Ezequiel Padilla, Antonious Elmallakh.

1 IT'S A FOUR-PEAT!

Our civil engineering student team has now won the ASC Design-Build competition for the fourth year in a row. When the team won for the third year in a row in 2021, the last time that happened was 15 years ago. A fourth consecutive win extends them into unprecedented territory.

The ASC Design-Build Competition's the largest of its kind. It tasks student teams with winning over fictional clients as fictional construction, design, and architecture firms. Typically, crafting a proposal for a client is a lengthy process, but the competition crunches it down to a 16-hour challenge. Conceptual design; cost analysis; construction scheduling; mechanical, electrical, and plumbing; and sustainability analysis—all this and more must be done in less than a day.

"Our team's sacrifices, grit, and perseverance are what allowed us to practice for 10 months and around 500+ hours to achieve this feat," says Ayman Jaber, civil engineering student and the team's co-captain. "But the true prize was building friendships and connections along the way."

2 NO. 1 IN INTERNATIONAL WATER QUALITY CONFERENCE

A civil engineering student team took first place at the largest water quality conference in the country, the Water Environment Federation's Technical Exhibition and Conference in Nov. 2021. They won for their proposal on restoring the Puddingstone Reservoir—a 250-acre artificial lake originally designed to control floods. The team worked with two industry advisors and the vice president of business development at West Land Group, Inc., as well as an industry advisor and the principal from John Robinson Consulting, Inc. The student team prepared an extensive proposal with cost-effective, low-impact development solutions that would protect water quality by leveraging the reservoir's natural features.

3 TOP 5 IN NATIONAL STEEL BRIDGE COMPETITION

A civil engineering student team delivered unprecedented results in the 2022 American Society of Civil Engineers Steel Bridge national competition. Tasked with planning, designing, fabricating, and constructing a one-tenth model steel bridge, the civil engineering student team landed first in stiffness and structural efficiency. This marks the first time the team came out on top in these categories, and the second year in a row to land in the top five among a competitive group of over 30 universities.

Students from the winning team. From left to right: **Citlalli Vazquez**, **Francis Manansala**, **Jordan Chung**, and **Ryan Huang**.

IN BRIEF

THE WHITE HOUSE AWARDS STALWART CHEMICAL AND MATERIALS ENGINEERING PROFESSOR

The White House awarded Winny Dong, Ph.D., chemical and materials engineering professor and faculty director of the Office of Undergraduate Research, the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring.

"I am tremendously grateful for this recognition," Dong says. "This award motivates me to continue creating opportunities where all students can thrive and to create and grow mentoring programs both within and outside of my home institution."

Dong has been part of Cal Poly Pomona for 22 years, and we hope she's here for plenty more. Read more about her on page 10.

STEM SUCCESS NETWORK SUPPORTS STUDENTS ACROSS ALL STEM COLLEGES

In an effort to amplify student success efforts across the engineering, science, and agriculture colleges, the STEM Success Network shares best practices for outreach, recruitment, retention, and graduation in all three colleges.

Under this umbrella network is a host of student success services that connect and collaborate to broaden and build new and existing efforts. For example, the college's Maximizing Engineering Potential (MEP) and Women in Science and Engineering (WiSE) programs have joined to form MEP-WiSE. In tandem, the program combines resources to scale up and enhance the quality of services and student success tracking previously not possible.

MEP-WiSE offers free summer bridge/transition programs, tutoring and supplemental instruction, workshops, peer mentoring, career development, digital badges for leadership training, and scholarships and stipends for hundreds of underrepresented and low-income students. Further, the program's assistance extends past engineering students by supporting science and agriculture students who also benefit from the STEM Success Network.

A WORD FROM LARRY

"All of you will experience highs and lows in your lives and careers, but if you remember that you had the skills and the fortitude to make it through Cal Poly Pomona's very rigorous engineering program, you can be assured that you also have the skills and fortitude to navigate through whatever pitfalls may be in your future."

Larry Gates ('87, civil engineering) speaking at the 2022 College of Engineering Commencement as its honorary doctorate recipient.

Gates is the co-founder of civil engineering firm DRC Engineering, Inc. He's a staunch philanthropist for his alma mater—Gates and his wife Amy have funded student competition teams, lab upgrades, and three scholarship endowments. He also serves on the college's Dean's Leadership Board and the Cal Poly Pomona Philanthropic Foundation Board.

DEAN'S MESSAGE

In Conclusion

For over 60 years, the College of Engineering has operated on the principle of learn by doing. Our classrooms are not just about learning theory—students put what they learn into practice every day. Further, they're taught by a diverse faculty body of both former practitioners who have spent years in industry and academics who are active researchers and scholars. Beyond the classroom, our dedicated staff are an impassioned group of advisors, administrators, builders, and more.

The stories in this year's magazine are a sample of what learn by doing looks like here. The cover story highlights our burgeoning space programs and clubs. Our profile stories highlight two resilient women who built their own paths. Plus, we take a close look at our staff and alumni—two central pillars of the college's community alongside our faculty and students. After reading this issue, we hope one thing is clear—we're teaching the next generation of great engineers, and it's what motivates all of us every day.

I hope you enjoyed this year's issue, and if you would like to share your thoughts, please send them to engineering@cpp.edu.

Best regards,

Alison Baski

Alison Baski, Ph.D.
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CPP ENGINEERING
MAGAZINE 2022

A publication by CPP College of Engineering

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ISSN 2168-6394

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They never disappoint!

Here are just a few of 2022's mortarboards from our wildly creative graduates.