BIG IDEAS IN POMONA
A new lab in the college has student teams working toward a big vision.
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Tilden-Coil Constructors, Inc.

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Executive Director  
Center for Regional Economics and California Center  
Managing Economist  
Milken Institute

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Founder & CEO  
Micropolitan

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Raytheon Company  
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President  
Exquadrum, Inc.

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President  
Silva-Silva International

Michael P. Smith ('85, ET)  
Former Director of Engineering  
Entercom Radio, San Francisco

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Former Group President  
U.S. Utilities  
Sempra Energy

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When I talk with prospective students and parents about Cal Poly Pomona, the first questions they ask are about jobs and salaries after graduation. These are relevant questions, but I want to share what makes a Cal Poly Pomona learn by doing education a competitive advantage for our graduates versus others: Opportunity, opportunity, and opportunity.

That is what this issue of the Cal Poly Pomona College of Engineering Magazine hopes to make clear above all else: The college provides an excellent engineering education with a surplus of opportunity that empowers students to leverage all they are learning to earn those great jobs and substantial starting salaries that parents and prospective students justifiably inquire about.

Opportunities to think. If you are an alumni, you know College of Engineering students are prepared for life—not just for a job—through rigorous courses that do not merely build knowledge, but also teach that rewards come from hard work. Those lessons are broadened through faculty mentoring and guidance that encourage students to look for creative approaches to problems, take intellectual risks, and pursue unconventional ideas. The wide variety of curricular and co-curricular experiences offered at Cal Poly Pomona, like the ones highlighted in page 8, instill time management skills and discipline as they provide significant professional growth and enrichment.

Opportunities to build relationships for success. There is an incredible value of networking at Cal Poly Pomona, where students have access to many opportunities to grow their skills and connections throughout their academic career. Faculty members have developed long-standing relationships with industry professionals, our alumni are committed to the success of our graduates, and career-development services are available the moment students enroll.

Alumni share their time and expertise speaking to classes, advising competition teams and clubs, leading or assisting with senior capstone design projects, and recruiting students for internships and jobs. These personal interactions do not happen elsewhere to the degree they occur here. This is evidenced on page 14, where the support of an alumnus will provide opportunities for students to be involved in water research for years to come.

Opportunities for the future. At Cal Poly Pomona, we look beyond the students in our classrooms today and provide opportunities to benefit the community through extensive outreach. Upcoming generations get to discover engineering and think like an engineer, too. Our remarkable Femineer® Program is a prime example, giving an opportunity to thousands of young girls through K-12 outreach. You can learn more about its national reach on the next page. Further, we have embarked on a seven-year strategic plan to provide opportunities for our students today and tomorrow. See page 24 to learn more about our journey.

Opportunities from your investment. Our supporters—alumni, donors, philanthropists, entrepreneurs—understand their investments generate opportunities for our students. It is incumbent upon us to provide them with as many opportunities to create, discover, and innovate. Page 18 shares the story of one of our opportunity makers.

I hope you enjoy reading this issue of our annual magazine, which highlights the wealth of opportunity in the college. To our alumni, whatever road you are traveling today and whatever your destination will be in the future, I hope each of you continues to find great pleasure and reward along the way. Further, when you return to Cal Poly Pomona and reconnect with this special place, you will see that while much has changed, the boundless opportunities remain and will continue to flourish.

Go Broncos!

With warm regards,

Joseph J. Rencis, Ph.D., P.E.
Dean, College of Engineering
2015-16 President American Society for Engineering Education (ASEE)

“Luck is what happens when preparation meets opportunity.”

—Seneca the Younger (4 BC-65 AD), Roman philosopher, statesman, dramatist, and humorist
THE FEMINEER® PROGRAM
THE COLLEGE OF ENGINEERING’S OUTREACH PROGRAM WITH A NATIONAL REACH

FEMINEERS ACROSS THE NATION
Project-based learning opportunities equip female students with the technical knowledge and practical skills necessary to become confident and strong in their future education and careers.

100+
PARTICIPATING SCHOOLS
Across six states

2,000+
K-12 FEMALE STUDENTS
Engaged in project-based learning

1,200+
ATTENDEES AT THE 2019 SUMMITS

Split into two summits to meet demand, the spring events invite femineers to showcase their projects at Cal Poly Pomona and to learn about the college and university.

THREE-YEAR PROGRAM
Femineers go through a three-year program, with each year increasing in complexity.

YEAR 1:
CREATIVE ROBOTICS
Femineers learn about basic electronics, wiring, sensors, and motors, as well as operation of a microcontroller that they program themselves.

YEAR 2:
WEARABLE TECHNOLOGY
Femineers concentrate on C-programming with an Arduino controller as they design and create wearable gadgets by using a conductive thread for sewing electrical circuits and learning to solder.

YEAR 3:
PI ROBOTICS
Femineers build a robot utilizing a Raspberry Pi computer with Python programming language. At the conclusion of this curriculum, femineers acquire skills that engineering students first learn in college.

Interested in the program? For more information, contact cpp_we@cpp.edu
THE BEST ARE IN POMONA

1st in Design-Build at 2019 Associated Schools of Construction (ASC) Reno Competition. Beating 18 other teams at the largest student competition in construction, their top rank finish is a first for the college.

2nd in the Senior Design Competition at the 2019 American Society of Civil Engineers Environmental & Water Resources Institute Congress. The team presented their on-site water treatment system, earning second place on the national stage.

Gold Medal for the Los Angeles Chapter of the Institute of Industrial and Systems Engineers. As Cal Poly Pomona’s chapter is the principle engine of the high reputation of the Los Angeles Chapter with its numerous regional, national and international technical paper competition awards, the college’s faculty and staff received the award at the organization’s annual conference in Orlando.

22-year-old mechanical engineering student Isabel Gutierrez earned a $250,000 grant from the U.S. Defense Health Agency for her startup company Vistendo, Inc. “The company’s goal is to end human suffering,” says Gutierrez. Her company is developing a portable TBI (traumatic brain injury) detection system for U.S. troops and veterans. The proposed system is based on Vistendo’s proprietary device that detects symptoms of concussions, heat strokes and other common youth sport injuries right on the field, which is the principle focus of the company.

“I still suffer from a muscle-tear injury I had seven years ago as a soccer athlete. My sister is still dealing with the repercussions of a concussion,” says Gutierrez. “We are not alone—over 10 million youth athletes get injured every year and have no way of knowing when to get help. This is something that we have to fix.”
GRAND SLAM BY POMONA

Undergraduate aerospace engineering student teams won 1st in all three American Institute of Aeronautics and Astronautics (AIAA) design competitions they entered. Remarkably, two teams bested a competition pool of graduate-level students in the Missile Systems Design Competition by placing first and third respectively for their theoretical design of a long-range strategic missile system.

Another team earned first in the Space System Design Competition for their theoretical design of a reusable lunar surface access vehicle, placing ahead of a dozen other teams from around the globe. This team also presented at the NASA Jet Propulsion Laboratory and Northrop Grumman’s Redondo Beach location.

Finally, a third team earned first in the Aircraft Design Competition for its theoretical design of a thin-haul air taxi. Evaluated by engineers at the world-famous Lockheed Martin “Skunk Works” design bureau and at Northrop Grumman’s El Segundo location, this team came in ahead of aerospace heavyweights University of Kansas and the University of Illinois at Urbana-Champaign, who placed in second and third, respectively.

RESEARCH IN POMONA

Two sustainability-focused mechanical engineering research projects recently earned 1st place awards—one at the 33rd Annual California State University Student Research Competition and another at the College of Engineering 2019 Project Showcase.

40 chemical and materials engineering students attended NACE CORROSION 2019, the largest corrosion event in the world. Sixteen poster displays, two awards and two scholarships later, the team made Cal Poly Pomona’s presence known.

The winning team for the Space Systems Design Competition presenting their work at a Jet Propulsion Laboratory design review.
A new lab in the college has student teams working toward a big vision.
In one of the longest-standing buildings on campus is a small corner lab with students entirely concentrated on the future.

In the lab is a virtual racing simulator that, on first blush, you would be forgiven for mistaking as an arcade cabinet installed just for fun, but this simulator is an important pillar of mechanical engineering professor Dr. Behnam Bahr’s vision for this burgeoning lab, dubbed the Intelligent Autonomous Systems Lab.

Dr. Bahr knows what is coming. The future of work will demand skillsets in the realms of autonomous and remote systems, and he is assembling the resources for students to learn and work in these new knowledge realms. “The students must become familiar with new technologies and be ready for the workforce needed by the industry,” Dr. Bahr says. “Students are learning and challenging themselves in this lab by working on a variety of topics—autonomous vehicles, robots, artificial intelligence, remote systems. We provide them the platform to learn and want them to innovate and go beyond the textbook.”

Dr. Bahr’s vision is only possible with the teams of faculty and students working together. Here is what they are working on.

THE FUNDAMENTALS

Undergraduate Team: Mutasim Abrar, Jennifer Bernert, Ryan Burila, Abraham Camacho, Lucky Douangmanivong, Victor Gutierrez-Diaz, Ruqaiyah Nurul Hasan, Casey Mckelvie, Joseph Hoang Nguyen, Hoang Phuong, Mario Robles, Juan Sanchez, Vianey Visanlo

Advisor: Dr. Tamer Omar

This undergraduate team comprised of electrical engineering students is working on a fundamental element of the projects and research that will be conducted in the lab, which is getting the simulator to speak with a small, off-road go kart to effectively remote control the kart. The industry applications of this technology is wide-ranging. Vehicles like tractors and shipping trucks could complete their travel objectives autonomously, allowing humans to intervene remotely via a simulator if manual control is needed.

With the challenge the team has taken on, the short-term goal is simpler—sending over any signal from the simulator to the go-kart and implementing an API (application programming interface) and the best wireless network to do it. This effort started with building up a knowledge base that started at practically zero. “Our advisor gave us a basic framework and left the rest to us, which I really liked because it got us to question things instead of normal classes where it’s given to us or we can look up examples in a textbook,” says Abraham Camacho, electrical engineering student and team lead.

Camacho and his team dove into academic papers on real-time network communications to look up different network protocols with little lag time, which is key. “If you’re driving your vehicle and it’s not as close to real-time as it can be, there’s really no point,” says Camacho.

Now the team’s ready to put theory into practice. “I’m so excited for the fall semester to get this going,” says Camacho. “We’re learning how to learn, learning how to teach ourselves, which I think every engineer really needs.”
As a corollary to the fundamental work being done by the team above, this undergraduate team of mechanical and electrical engineering students are studying the bumps and impacts the go kart experiences when on the road while using the simulator to drive the kart. To accomplish this, the team installed accelerometers, gyroscopes, and actuators on the kart to detect impacts. These impacts are sent back as data to the simulator, which mimics the sensations the kart is impacted by in real time.

“This haptic feedback is going to make you a better pilot or driver,” says electrical engineering student Tristen Shipman, when speaking about the industry applications. “In a simulator, you’re going to see something, but you’re not going to feel it. Haptic feedback gives you a fuller sense of what’s happening to adapt for it.”

To lay the groundwork as they are doing now, the student team delved deep into research and projects done to understand the challenge theoretically. Ihor Tuk, mechanical engineering student, says the team absorbed the processes and results of other senior projects and went online to see what other companies were doing. They took what they learned and applied it to their own work.

“Now we’re basically knocking on the door of getting sensors to communicate in real time with the simulator,” he says.

Undergraduate Team: Neal Jacquet, Eduardo Luevano, Hoang Allen Phuong, Tristen Shipman, Benjamin Taebel, Ihor Tuk
Advisor: Dr. Behnam Bahr, Dr. Tamer Omar
The experience in the program was a beautiful one. It was how I envisioned it."

—ECKART LYEW (’19, MASTER’S IN MECHANICAL ENGINEERING)

Eckart Lyew (’19, master’s in mechanical engineering) works on the path-planning logic that allows a vehicle to navigate autonomously.

**FROM A TO B**

**Graduate Team:** Eckart Lyew  
**Advisor:** Dr. Behnam Bahr

Eckart Lyew (’19, master’s in mechanical engineering) took on the project of path-planning. Essentially, his research answers the question of how to get a vehicle from point A to B autonomously. Just like the teams before him, Lyew spent time entrenched in academic papers to understand the fundamentals of path planning to build the logic for a vehicle to navigate to a desired location safely and optimally.

Lyew set forth with a novel path-planning method that employs image segmentation, occupancy grid mapping, and an optimization algorithm to decompose the vehicle’s environment into a useable map it can easily understand, allowing the vehicle to construct a feasible path for navigation. In simpler terms, if a vehicle was given sight of the environment it needed to navigate, Lyew’s method would break the image down into a binary black and white pixel map, informing a vehicle where it is allowed to travel and what is considered obstacle space (represented by the black pixels) that it must navigate around. Then, as Lyew puts it, the navigable path will be established “like magic” for the vehicle to get moving on its own.

Lyew, a mechanical design engineer for his entire working career, took on this project for his thesis to make a career change. “I’ve always been interested in robotics from a curiosity standpoint and wanted to get closer to playing with robots,” Lyew says. “The experience in the program was a beautiful one. It was how I envisioned it.”

**AUTONOMOUS VEHICLES FOR A STEAL**

**Graduate Team:** Jacob Kreeb  
**Advisor:** Dr. Behnam Bahr

The work by Jacob Kreeb (’18, master’s in mechanical engineering) looked at cost-effective solutions for inertial navigation—a type of autonomous navigation that does not rely on GPS, satellite, or other navigation data. A vehicle that relies on a constant data or GPS connection is rendered obsolete the moment it loses that network. So, Kreeb sought out a low-cost inertial navigation solution that would cost under $100—a helpful solution for students who would not have the resources to develop or purchase expensive, high-fidelity hardware.

Kreeb took off-the-shelf sensors for $50 and put them on a Barbie remote control car to infuse the data between a rotary encoder—used to gather data on how much a wheel is spun—with the sensor to have the beginnings of location tracking with exclusively low-cost inertial sensors. Kreeb took his work to the point of possible, and will need the work of others to take it to fully functional.

“It was a blast, and it was really cool having Dr. Bahr helping out and helping provide the resources I needed to see this project through,” Kreeb says. “Hopefully when I come back, I’ll see these little things roaming around Cal Poly Pomona.”
SOLUTIONS BY POMONA ENGINEERS

Across all seven departments in the college, students and faculty advisors perform research together to solve real-world problems, often with the support and guidance from industry partners or public agencies. Below are a few examples.

AEROSPACE ENGINEERING,
ELECTRICAL AND COMPUTER ENGINEERING

**Goal:** Invent a capability for UAVs (unmanned aerial vehicles) to generate power while in flight and to create a power storage solution housed on the UAV itself. If successful, the UAV could stay in flight for theoretically weeks at a time without landing.

**Sponsors:** Venture Well grant, Achieve Scholars program, Robotics Inc., the Joe and Grace Yee Endowment, and Lockheed Martin Corporation

**How:** Nearly everything is 3D printed for the UAV, including the power storage systems, the composite structure wings, and the gust and flutter vibration-induced power generation mechanisms. Eventually, the aim is to also 3D print the power generation and graphene supercapacitor power storage devices as part of the wing load-bearing structure itself. This project is a multidisciplinary effort as aspects like power generation and management, 3D additive parts manufacturing, and wind tunnel testing demand a range of skillsets.

ELECTROMECHANICAL ENGINEERING TECHNOLOGY

**Goal:** Develop a traffic light control system driven by artificial intelligence.

**How:** With traffic light control system data continuously changing for any given day or period of time, the result is not always the most efficient sequencing of traffic lights. The team tackled the issue by simulating a traffic system with the integrated use of LabVIEW and SUMO software to develop intelligent transportation systems. This system constantly adapts to any changes in its environment and determines the best traffic light sequencing.

CHEMICAL AND MATERIALS ENGINEERING

**Goal:** Develop and test materials for applications like pump components and bearings that have significant erosion and wear resistance and compressive strengths.

**Sponsors:** Chevron, NACE International Los Angeles Section, Western States Corrosion Seminar, and ASM International Los Angeles Chapter

**How:** The team fabricated a composite material made up of ceramic and a metal consisting of aluminum and magnesium. The composite couples the wear resistance of a ceramic and the high thermal stability and compressive strength of a metal. Cast in temperatures of 1,560 degrees Fahrenheit, the composite excelled in abrasion, erosion, and corrosion tests compared to aluminum and carbon steel.
CIVIL ENGINEERING

Goal: Reduce vehicle-wildlife collisions in key highway crossing areas by designing and developing a wildlife crossing system for the Interstate 15 highway in Temecula, Calif.

Sponsors: Natural Community Conservation Planning Local Assistance Grant Program, UC Davis, and The Nature Conservancy

How: A team of 16 civil engineering students and three civil engineering faculty advisors drew from research collected by the UC Davis Wildlife Health Center and The Nature Conservancy on the local populations of California mountain lions in the city, and also collaborated with CalTrans and county highway agencies. Informed by these data sets and their research, students developed three viable solutions as safe passageways for the mountain lions and other native wildlife.

INDUSTRIAL AND MANUFACTURING ENGINEERING

Goal: Assess and recommended optimizations for the operations of fiberglass production for S. Bravo Systems, Inc.

Sponsors: S. Bravo Systems, Inc.

How: The team identified the root causes of delayed shipments from the fiberglass department, the company’s most troubled area. The team developed a new scheduling method, redesigned the facility layout, balanced the workload to optimize worker utilization, and recommended traceability to combat the high defect rate. With a modest upfront investment, these recommendations will more than double the current production rate and lead to a net present value savings of $1.36 million in the span of five years.

MECHANICAL ENGINEERING

Goal: Develop a greywater treatment system for non-potable reuse in single households.

Sponsors: Craig Netwig (’71, chemical engineering; see p. 14 to learn more about Netwig) and Metropolitan Water District of Southern California

How: The DROWT (Decentralized Renewable Off-Grid Wastewater Treatment) team developed an off-grid solar-powered greywater treatment system for non-potable use, like dish and clothes washing, in single households. Water drained from bathroom sinks, laundry machines, dishwashers and showers are captured for treatment. A three-stage process treats the water through microfiltration, solar-driven reverse osmosis, and ultraviolet disinfection. The developed system is capable of reclaiming 90 to 100 gallons of water per day, equating to 60 percent of residential greywater waste, with a recovery rate of 62 percent.

62% LABORATORIES

With 116 laboratory and instructional spaces in the college, over half provide hands-on learning opportunities.
Most of us take clean drinking water for granted. Craig Netwig ('71, chemical engineering) took it as a challenge. Back when reverse osmosis (RO) was still emerging as an effective means of water purification, Netwig immersed himself in this promising technology and discovered several ways to improve it.
Reverse osmosis (RO) is a water purification process that sends "feed water" under pressure through a semi-pervious membrane to filter out unwanted materials, notably heavy metals, salts (ions), particles, bacteria, and others.

While RO revolutionized water purification in many ways, the first systems in the late 60s were far from flawless. Early RO system users found that when feed water was pressurized and salt concentration exceeded the water’s buffering capacity, ions bonded and formed scale on the membrane. This scale degraded the RO system performance and resulted in lower purified water recovery. The early RO systems were inefficient and a nightmare to maintain with primitive products and untrained technicians.

Buoyed by a chemical engineering degree from the College of Engineering, and seeing firsthand the need and value of efficient water reclamation and high purity water, Netwig dove headfirst into the water purification industry. Driven by his natural curiosity and desire to solve problems, Netwig poured over government research studies. He became engrossed in the science of the water treatment business, determined to improve the RO process. He quickly saw that scaling was the first challenge to overcome if RO were to achieve widespread commercial use.

Like Disney, Gates, and Bezos, Netwig began experimenting in a garage to develop several game-changing solutions. It didn’t take him long to make his first important discovery. He discovered that RO water purification systems needed additive chemistry to prevent scaling. Controlling scaling and scale removal were keys to optimizing clean water recovery and making RO systems cost effective to own, operate, and maintain.

At that moment, Netwig became the father of the RO membrane chemistry industry. "I've always had a passion for chemistry," he says. "After all my research, I began to see the benefits and clear need for RO water purification in a wide spectrum of manufacturing, municipal, and saltwater desalination applications, so I set out to optimize the technology, making RO system maintenance more user friendly and cost effective."

Based on his discoveries, Netwig founded King Lee Technologies in 1977. To this day, the company leads the RO chemistry industry, helping municipalities, manufacturers, and large and small desalination system users improve the efficiencies of their RO systems.

King Lee Technologies offers several product lines to make RO system maintenance easier and more effective. Their products are designed to treat specific types of feed water: silica-rich, or hard, brackish, and even seawater.

Armed with his Cal Poly Pomona engineering degree, a master’s degree in environmental science, and a reputation as an innovator and problem solver, Netwig took on new challenges. In the 1980s, Scripps Hospital in La Jolla sought Netwig’s expertise to design an ozone water purification system for their kidney dialysis department—it was used for many years. Later, he pioneered successfully the rebuilding of large RO system filter membranes to extend their useful life and reduce operating costs. Today, under his leadership, King Lee Technologies is still leading the way in developing new technology to improve the RO water purification system process. King Lee Technologies’ latest innovations are a patent pending software program that allows RO system users to remotely monitor and maintain their RO water purification system and a remotely controlled and monitored RO pilot unit.

Netwig gives much credit to his education at the College of Engineering. He recalls, “Back then, engineering students worked on senior projects individually. That put a huge responsibility on us to think creatively and solve engineering problems on our own. Also, it helped that the lab work was very practical, problem-solving oriented and hands-on, which I am happy to see remains a hallmark of the Cal Poly Pomona engineering program today.”

With a dedication to improving RO water purification technology and a strong appreciation for Cal Poly Pomona, in 2018 he provided funding to the College of Engineering for research into water re-use systems. His financial support enabled a student team, led by mechanical engineering assistant professor Dr. Reza Baghaei Lakeh and civil engineering associate professor Dr. Ali Sharbat, to build the Decentralized Renewable Off-Grid Water Treatment (DROWT) device. This innovative solar-powered RO system promises to help water-distressed communities with limited access to electricity reuse grey (non-drinkable) water for applications like dish and clothes washing. DROWT has become a multi-year, interdisciplinary and award-winning project that has garnered campus and state awards.

“American-trained engineers have always been pioneering and developing new technology to solve problems and improve the lives of people worldwide,” says Netwig. “What I’ve accomplished in the water industry resulted from realizing, soon after I graduated from Cal Poly Pomona with my chemical engineering degree, the need, opportunity, and confidence in my ability to lead the way in improving water quality worldwide. I am happy to see the pioneering technology I developed for the water purification industry is being taken to the next level by faculty and students in the Cal Poly Pomona College of Engineering.”
Perseverance, Comes From Opportunity

At her lowest, Crystal Sandoval envisioned something better.

At the age of just 24, Crystal Sandoval’s (*19, civil engineering) young life has been fraught with challenge, sending her to rock bottom. Today, she lives with purpose, overcoming the past and looking forward to what lies ahead.

'I hit the lowest point of my life.'

Sandoval’s college experience began at Cal State Fullerton in 2012, but she had a tough time in her first year of college. She lived in the dorms, was an undeclared major, and was unmotivated to do much else.

“I was taking GE classes, but didn’t enjoy anything—I didn’t really know what my career interests were,” she explains.

“Meanwhile, my parents were going through a divorce, my mom was diagnosed with breast cancer, and I was sexually assaulted on campus. I hit the lowest point of my life.”

Sandoval’s grades were so low she was academically disqualified.

“The good thing about being at your lowest point is that there’s nowhere to go but up.”

Unsure of her next move, Sandoval started working for her cousin’s construction firm—and the light went on. She really enjoyed the technical aspects of the job, and soon found herself drafting plans using computer software. She also interacted with lead engineers on job sites who encouraged her education and success. And so, she decided to go back to school.

With a new mindset and vision for her future, Sandoval enrolled at Citrus College full time to complete her general education. For the first time, she got straight A’s, and after graduation, she transferred to Cal Poly Pomona to earn a bachelor’s in civil engineering.

As a low-income female Latina pursuing a STEM career, Sandoval also connected with specific programs in the college designed to provide the guidance she needed. She joined the Maximizing Engineering Potential (MEP) program, which prepares underrepresented minorities, women, low-income and first-generation engineering students to succeed in their education and become leaders. Not only did she become a tutor and ambassador within the program, she had the opportunity to network with engineering professionals and obtain scholarships.

“Being actively involved in MEP helped me develop important soft skills essential for a career in engineering management, such as group leadership, public speaking, and problem-solving,” she says.

Sandoval also got involved with the Earthquake Engineering Research Institute and the Society of Women Engineers, and soon found herself in leadership roles there as well. She was also the vice president of the Associated General Contractors, a construction student club on campus.

“Those leadership positions definitely put me outside of my comfort zone because I’ve always been shy, but I pushed myself so that I could get those leadership skills that employers undoubtedly want,” she says.

Looking Up

After receiving eight financial scholarships, Sandoval graduated from Cal Poly Pomona with a core GPA of 3.95. She also was accepted to USC’s engineering graduate program. She’s already putting her skills to good use.

Flush with opportunity, she immediately landed a full-time paid internship within Disney’s Imagineering team, where she supports engineering project managers and is learning to further hone her skills.

When her internship ends in January 2020, she hopes to get hired permanently by The Walt Disney Company. But if not, she already has job offers from other companies willing to wait for her exceptional talent.

“Whatever company I may work for, I really want to get into management,” says Sandoval. “I also want to find a way to pay it forward and set up scholarships for students who have been through hardships and have found a way to overcome them, like me.

“I’m living proof that you only fail when you give up—and that anything is possible when you truly want it.”
SERVING OVER 1,650 ENGINEERING STUDENTS, MEP MOVES STUDENTS UPWARD IN THE SOCIOECONOMIC STRATA
Steve ('76, mechanical engineering) and Sue Hess, who earned her bachelor’s in math at UC Riverside in 1975. Their $1 million estate gift will support scholarships for students in need and educational facilities within the college.
Both retired industry professionals and donors to the college for more than three decades, husband and wife Steve (‘76, mechanical engineering) and Sue Hess, who earned her bachelor’s in math at UC Riverside in 1975, have pledged a $1 million estate gift to support scholarships for students in need, as well as educational facilities within the college.

Steve considers Cal Poly Pomona’s learn by doing philosophy the catalyst for jump-starting and propelling his engineering career. The hands-on expertise he gained as a College of Engineering student helped him earn the respect of the paper manufacturing millworkers at his first mechanical engineering job at Kimberly Clark. Earlier experience at Potlatch also inspired his senior project—the design of a paper spooling mechanism for a Manchester paper machine. In 1978, Steve transitioned to the electric industry where he spent the rest of his career at Southern California Edison, Edison Mission Energy, and the Electric Power Group, in Pasadena.

“State-funded institutions don’t have big endowments like many elite private universities but tend to serve a more diverse population,” says Sue. While not a Cal Poly Pomona alumna, she grew up in Pomona, and studied and worked in the computer science industry. “Furthermore, students that attend schools like Cal Poly Pomona are often the first in their family to graduate from college, which is great.”

For these reasons and more, Steve and Sue committed to an annual giving program with Cal Poly Pomona College of Engineering in 2018.

“I highly value the education I received at Cal Poly Pomona and strongly believe the College of Engineering is worthy of our support,” says Steve. “The college prepared me with a foundation for a successful career in the evolving electric power industry, and it also prepared me to be a valuable contributor to society in general.”

Paying it Forward

Steve and Sue had successful careers, and both were encouraged by annual giving programs at their former employers—Steve at Edison International and Sue at the Jet Propulsion Laboratory and the Capital Group. The couple gave both time and money to a variety of causes during their careers. Close and dear to both of their hearts and minds, Cal Poly Pomona was and still is a primary recipient of their charitable giving.

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—STEVE HESS, ’76, MECHANICAL ENGINEERING
“We decided to focus our resources on the College of Engineering since their mission meets many of our core values,” says Sue. “We also liked the idea of directing our giving toward a scholarship or supporting a program or facility, so we can see the immediate results of our gifts.”

The focus of their first estate gift was to sponsor an engineering student scholarship. “Our objective was to identify a student in financial need who was at risk of not completing their undergraduate degree absent of our financial support,” says Steve.

In 2019, the couple chose to support the College of Engineering Femineer® Program. Created by the college in 2013, this program for K-12 students aims to inspire females to pursue STEM (Science, Technology, Engineering, and Math) in their education and career.

“I am hoping our support of programs like the Femineer® Program will encourage young girls to pursue these fields, since the middle and high school years are often crucial times in forming their opinions of what they can or cannot do,” says Sue. “I am also looking forward to providing scholarships for women in engineering fields in the future.”

Generating Opportunity

Both Steve and Sue came from middle class families that valued education, saved for college, and encouraged them to attend. Yet, even with their challenging academic schedules, they worked throughout high school and college to contribute to expenses.

“So many families today struggle to provide similar opportunities for their children,” says Sue. “We want to help level the playing field for students that have the skills and desire to work hard at their education but may be lacking crucial financial support.”

“I believe the dividends are high as beneficiaries become productive members of society and hopefully become role models themselves for others to follow,” Sue continues. “Our scholarship recipient in 2018 so much as stated he expected to pay it forward when able.

“What a testament to the value of supporting individuals in need, who are willing to work at their education and the programs at Cal Poly Pomona,” says Sue.
GIVING IMPACT
HOW COLLEGE OF ENGINEERING BENEFACtors HAVE IMPACTED STUDENT LIVES

$14,819,997
GIVEN FROM FY15-16 THROUGH FY18-19

Financial aid, research, facility enhancement, and student enrichment are among the many areas gifts have been directed towards, changing lives and supporting student success.

3,354
Supporters, Believers, Philanthropists

Our donors are diverse and stand united in the belief that student success is a collective effort.

GIVING OPPORTUNITIES

Scholarships, research projects, technology needs, and financial aid give opportunities for our students to go on to elevate themselves, their families, and their communities.

$1,829
Average Scholarship Amount

$11,195
Average Student Financial Aid

“I am forever grateful for the support of the various donors who inspired me to dive deeper into my studies and my research. Their faith in my abilities as an engineer allowed me to become more confident in my own skills.”

– Holly Everson (‘19, aerospace engineering)
Dr. Giuseppe Lomiento
Assistant Professor
Civil Engineering

Excellence in Teaching Award—Northrop Grumman Corporation

Among Dr. Lomiento’s achievements, he was awarded the American Society of Civil Engineers (ASCE) Student Chapter Club Advisor of the Year Award in both 2016 and 2017 and the ASCE Professor of the Year award in 2018. His work on interdisciplinary projects earned him the Best Paper award from the American Society for Engineering Education (ASEE) Multidisciplinary Engineering Division in 2018. Dr. Lomiento also created a summer study abroad program for the college that he directs and co-teaches. The program takes place in Germany, and is the only study abroad program for College of Engineering students.

Dr. Monica Palomo
Professor
Civil Engineering

Educator of the Year for Higher Education STAR Award—Society of Hispanic Professional Engineers

Dr. Palomo was the co-principal investigator of a National Science Foundation International Research Experiences for Students program that focused on sustainable sanitation and provided an opportunity for Hispanic and first-generation undergraduates to study water recovery in South Africa. Dr. Palomo also spearheaded collaborative sustainability projects between the Cal Poly Pomona civil engineering department and Pasadena City College (PCC), resulting in an increase in PCC students transferring to Cal Poly Pomona and continuing to work on STEM research projects.

Dr. Ali Sharbat
Associate Professor
Civil Engineering

James Robbins Excellence in Teaching Award—Chi Epsilon Civil Engineering

Advisor for the Cal Poly Pomona chapter of Chi Epsilon for the past three years, Dr. Sharbat’s teaching methods are consistently recognized as effective by students, and they often communicate their positive experiences with the civil engineering department. His research emphasis is in water quality and desalinization, and has brought in nearly $1 million in grants. Dr. Sharbat always involves his students in his research, and tasks his classes with replicating aspects of his research work to further prepare students with the transition to the workforce.
Dr. Mohamed Aly, electrical and computer engineering assistant professor, has guided his students in over a dozen research papers in 2019, providing support for their poster and oral presentations in conferences across California. In 2018, Dr. Aly's research on hardware acceleration dramatically improving the processing of genome data was published in the top international computer engineering journal IEEE Transactions on Computers.

Dr. Kevin Anderson, mechanical engineering professor, is guest associate editor for the ASME (American Society of Mechanical Engineers) Journal of Fluids Engineering. Dr. Anderson is involved in maintaining the excellence and integrity of this research publication.

Dr. Ghada Gad, civil engineering associate professor, serves as a handling editor for the Transportation Research Record journal, evaluating journal articles and reviews to help determine publication worthiness. In 2018, Dr. Gad was selected as an Outstanding Reviewer by the ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering for the quality and timeliness of her reviews.

Dr. Xudong Jia, civil engineering chair and professor, is an associate editor for the IEEE (Institute of Electrical and Electronics Engineers) T-ITS (Transaction of Intelligent Transportation Systems), one of the top international journals on ITS. Dr. Jia organizes and manages the review process of the manuscripts submitted to the journal and makes recommendations to the editor-in-chief for manuscripts.

Dr. Thomas Ketseoglou, electrical and computer engineering professor, is now part of the editorial board for IEEE (Institute of Electrical and Electronics Engineers) Transactions on Green Communications and Networking. Among his responsibilities, Dr. Ketseoglou provides expertise and leadership in identifying new directions in research, in optimizing the review process, and in selecting and editing submitted papers for the publication.

Dr. Shokoufeh Mirzaei, industrial and manufacturing engineering associate professor, was awarded a research grant from the Strategic Interdisciplinary Research Grant Program for investigating the effectiveness of an angle of attack (AOA) indicator in preventing in-flight loss of control. With her team, Dr. Mirzaei designed and conducted a set of flight experiments where pilots performed the experiments once with and once without an AOA indicator. The team has collected data on several flight variables—bank angle, vertical speed, indicated airspeed, pitch and runway alignment—and is analyzing them to determine an AOA indicator’s effectiveness.

Dr. Paul Nissenson, mechanical engineering associate professor, was featured in the Chronicle of Higher Education’s Teaching newsletter. Distressed by high failure rates in his upper-division course where a third of his class got D’s, failed or withdrew, he worked with Cal Poly Pomona psychology and sociology professors to assess why his class had high failure rates. Informed by his data, he “flipped” his classroom by having students watch video lectures out of class and spend the class time on hands-on activities that reflected the material in the video lectures. As a result, failure rates dropped from a third to 11 percent.

Read the full story: bit.ly/coe_chronicles

NEW FACULTY
Six new assistant professors joined the college’s tenure-track faculty ranks in the 2019-20 academic year.

Aerospace Engineering
Dr. Han Van Nguyen
Ph.D., Purdue University

Civil Engineering
Dr. Simeng Li
Ph.D., Florida State University
Dr. Jeyoung Woo
Ph.D., The University of Texas at Austin

Industrial & Manufacturing Engineering
Dr. Javad Seif
Ph.D., The University of Tennessee, Knoxville

Mechanical Engineering
Dr. Yizhe Chang
Ph.D., Stevens Institute of Technology
Dr. Brian Ramirez
Ph.D., University of California, Los Angeles
THE COLLEGE OF
ENGINEERING
IN 2025
The seven-year plan to take the college from where it is now to where it must be.

“Greatness through excellence, one student at a time.”
—DR. JOSEPH RENCIS, DEAN OF THE COLLEGE OF ENGINEERING

With this defining principle, the college launched its Strategic Planning initiative in fall 2017 to envision the future the college will move toward. Since its launch, the college has conducted 12 focus groups, over a dozen one-on-one interviews, several culture surveys with a total of 833 participants (of which 725 were students), and collected 184 comments and project ideas via online surveys.

The results of this exhaustive snapshot of the college serves as the backbone of the strategic plan. The plan assembles a familiar but new vision and mission with a clear set of core values.

The first year of its implementation also resulted in several strategic initiatives where faculty and staff volunteers assembled into working groups to complete projects to steer the college toward its seven-year plan. Read about all of these outcomes on the next page.

“Everything we do must answer yes to the following questions: ‘Will it have a positive impact on students?’ and ‘Will it enhance the capabilities and reputation of the college and institution?’” says Dr. Joseph Rencis, dean of the College of Engineering. “We meet these goals today, and the college’s strategic plan guides us collectively to meet them tomorrow.”

72 Hours of Strategic Planning. In April 2019, the college undertook a critical phase of the strategic planning activities—the analysis and determination of key elements of the plan. Faculty and staff from all disciplines and years of service to the college undertook the three-day effort of absorbing the hundreds of items of feedback from throughout the college. The result was the college’s vision, mission, core values and strategic initiatives that aligns with the university’s strategic plan.
In fall 2017, the College of Engineering launched its Strategic Planning initiative to build a path forward for the college to best serve its students. The initiative produced the college’s new vision, mission, core values, and strategic initiatives.

Our Vision
The Cal Poly Pomona College of Engineering’s Learn by Doing education prepares engineers to transform imagination into reality.

Our Mission
Prepare students for industry and advanced studies by implementing an inclusive polytechnic philosophy through collaborative teamwork, innovation, entrepreneurship and professional integrity.

Our Core Values
These principles guide our internal conduct and external relationships to ensure we stay true to our mission.

- **People-Centered**
  We invest in people and celebrate success.

- **Collaborative**
  We create an environment of collegiality, ownership and engagement.

- **Forward-Thinking**
  We strive to be proactive, creative and innovative.

- **Transparent**
  We are committed to maintaining an environment of open, honest and inclusive communication.

- **Bold**
  We value grit, risk-taking and learning from challenges.

2018-19: YEAR 1
STRATEGIC INITIATIVES
Faculty and staff volunteers implemented short-term, college-wide strategic projects. Teams moved quickly into action, focusing on the vision and desired end goal.

- **The Advising Project**
  Enhanced student advising by centralizing advising resources onto a single web page.

- **The Clearinghouse Project**
  Designed a website that provides a partnership space for students, faculty, and industry to collaborate on research and design projects.

- **The Co-Curricular Project**
  Created a business and industry recruitment plan and brochure to support Cal Poly Pomona and provide more project opportunities to students.

- **The Culture Project**
  Prioritized a series of leadership development programs for faculty and staff which began with an American Society of Engineering Education webinar on professionalism and ethics.

- **The Staff Communication Project**
  Held a series of staff town halls to address staff feedback and launched a monthly staff newsletter to apprise staff of their personal and professional updates and achievements from their peers.
A PROGRAM STANDS OUT NATIONALLY
The college’s female outreach and retention program, Cal Poly Pomona Women in Engineering (CPP WE), earns two national awards, the CoNECD 2019 Program of the Year award and the 2019 WEPAN Women in Engineering Initiative award for being a proven initiative in increasing the recruitment and retention of girls and women in engineering. Over 7,000 students have benefited from CPP WE, and engineering first-time freshman female enrollment has grown to 21 percent overall.

Cal Poly Pomona Women in Engineering hosts several outreach events. Here, an engineering student provides instruction to middle school girls at Introduce a Girl to Engineering Day at Cal Poly Pomona. On average, 150 middle school girls attend this annual event.

A WORD FROM JOAN
There is no better time to be in engineering. Your generation will create its moment that will bring the world together, and it’s likely you’ll go back to the moon and you’ll definitely go to Mars—powered by a Boeing rocket. Just saying.

Strong words from Joan Robinson-Berry ('82, engineering technology) at the college’s 2019 commencement ceremony upon receiving her honorary Doctor of Science degree from Cal Poly Pomona. Robinson-Berry is the vice president of engineering, modifications and maintenance for Boeing Global Services.

HONORING THE PAST, INSPIRING THEIR FUTURE
Nine new engineers and engineering technologists were inducted into the College of Engineering Hall of Fame in 2019. This diverse group of leaders joins a Hall of Fame body of 49. Among them is the college’s first non-alumni inductee, Dr. Edward C. Hohmann, a former dean of the college, who joins the Hall of Fame posthumously. Launched in 2014, the Hall of Fame recognizes and preserves the outstanding accomplishments of distinguished engineers and engineering technologists to inspire current and future students and enhance partnerships with industry and the community.

DEAN EARN National Award
Dr. Joseph Rencis, dean for the College of Engineering, receives the 2019 Isadore T. Davis Award for Excellence in Collaboration of Engineering Education and Industry from the American Society for Engineering Education (ASEE). Selected for Dr. Rencis’ history of leadership in engineering and engineering technology education, he currently serves as ASEE’s Engineering Deans Council Executive Board director, and has served as the 2015-16 ASEE president and in many more roles in the national organization.

The Hall of Fame 2019 class. To learn about all of the latest Hall of Fame members, visit bit.ly/hof_2019_class.
Ganpat “Pat” Patel (‘70, electrical engineering), earns the Padma Shri award from the Republic of India. One of the most prestigious civilian honors to be conferred by the country, Patel earned the award for his contributions in literature and education. Currently the president of Ganpat University, Patel founded the institution in his home state of Gujarat, India. The private university enrolls over 13,600 students. Other philanthropic activities include a $1 million endowment to the College of Engineering for the Ganpat and Manju Patel Distinguished Lecture Series and the Student Projects Lab. In 2015, Pat was inducted into the college’s Hall of Fame and in 2018 was a Cal Poly Pomona Distinguished Alumni. 

FROM ONE LEADER TO ANOTHER
Clark Rucker (‘83, engineering technology), director of Phantom Works Quality at The Boeing Company, now leads the college’s Dean’s Leadership Board (DLB) as its chair. The DLB is an advisory board of high-level executives that bring their expertise and knowledge in their respective engineering fields to secure resources for the college and to help define its strategies and goals. A member of the 2019 Engineering Hall of Fame class, Rucker says, “I am humbled by this honor and elated that I can continue to work with the college to make a difference in our students’ lives.” The DLB’s previous chair, Brian Jaramillo (‘87, engineering technology), president of Tilden-Coil Constructors, Inc., stepped down from the role and continues his involvement as a board member.

POMONA’S AMERICAN NINJA WARRIOR
Aerospace engineering student Brian Burke ascended to the American Ninja Warrior Las Vegas National Finals in his 2019 rookie year. “I am really happy to be here at Cal Poly Pomona, and it is great to be able to take all my classes, be a part of the student community here at Cal Poly Pomona, workout at the BRIC [the campus gym], and train at a nearby ninja gym in San Dimas,” says Burke, who has high-functioning autism.

“You don’t expect an autistic child to be able to reach out to a crowd,” Pamela Burk, Brian’s mom, says to Pasadena Now. “He has never done that and has never interacted with people. That’s the first time he’s ever done that.”

Patricia Wagner (‘84, chemical engineering), former group president of U.S. utilities for Sempra Energy, is the college’s latest recipient of the university’s Distinguished Alumni award. Wagner oversaw several energy companies that deliver energy to more than 35 million customers across the states of California and Texas. “Cal Poly Pomona really provided me with such a great foundation to build a career and to support my family,” says Wagner. She was inducted into the college’s Hall of Fame in 2018.

PHILANTHROPY PERSONIFIED, RECOGNIZED
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A perennial advocate and ambassador for the college, Clark Rucker (‘83, engineering technology) (right) speaks to students at a 2019 graduation reception.

Aerospace engineering student Brian Burke poses after one of his victorious American Ninja Warrior runs.

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College of Engineering Facts

5,858 Enrolled Students

1,409 Degrees Awarded

- 605 Aerospace Engineering
- 427 Chemical and Materials Engineering
- 1,275 Civil Engineering
- 1,019 Electrical and Computer Engineering
- 496 Electromechanical Engineering Technology
- 515 Industrial and Manufacturing Engineering
- 1,237 Mechanical Engineering

1,272 Bachelor's Degrees
284 Master of Science
137 Master's Degrees

Diversity & Social Mobility

- 42% Underrepresented Minority Students
- 53% First Generation Students
- 41% Low Income Students

Highest SAT and GPA averages in the university

- 1124 Average Admit SAT
- 3.74 Average Admit GPA

National Rankings*

5th Nationally
Best public undergraduate engineering program

5th Nationally
Best computer engineering program

11th Nationally
Best electrical engineering program

12th Nationally
Best mechanical engineering program

*U.S. News & World Report 2019, among universities where doctorate is not offered