

CAL POLY
College of Engineering

Doing

2012-2013 ANNUAL REPORT



Learn by Doing, Lead with Innovation

Message from

Dean **Debra Larson**

AS THE DUST SETTLES AFTER A busy year, it's time to take stock of our activities, measure our achievements and commence with plans for the future.

The College of Engineering made significant strides in all areas of our 2012-13 strategic plan: learning environments, partnerships, and operations and practices.

We enhanced learning environments by growing the multidisciplinary senior project course, adding options for team-based senior experiences, and appointing a director of interdisciplinary projects for the coming year, Dr. Lily Laiho. A highly successful Project Expo gave all our seniors the



chance to showcase their innovations to industry representatives, alumni and parents. Mark your calendar for next year's Expo on May 29, 2014.

We are investing in learning environments for the future by hiring new tenure track positions in strategic areas. These include cybersecurity; clean water technologies; biomedical engineering; and heating, ventilation, air conditioning and refrigeration. We've also received approval for a concentration in manufacturing for mechanical engineers, graduate certificates in systems integration engineering and space system technology, and a joint bachelor's program in liberal arts and engineering studies.

A strong Advancement team expanded external partnerships, and we made it easier for corporations and friends to collaborate with us by expanding CP Connect, our program that fosters interdisciplinary projects. A project portal makes it simple for anyone outside the university to suggest projects: ceng.calpoly.edu/partners/submit-a-project/.

To develop more shared activities with our "sister" polytechnic, we hosted a delegation of Cal Poly Pomona

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CAL POLY

College of Engineering

Learn by Doing, Lead with Innovation

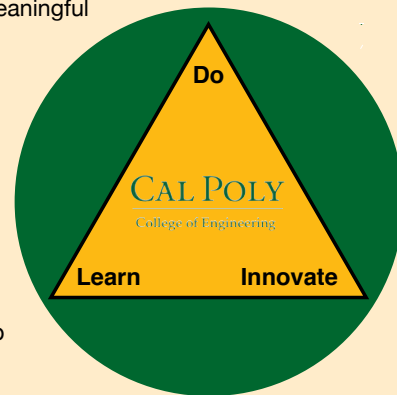
Our Vision: As a national leader in engineering education, the College of Engineering transforms students into world class, innovative and collaborative engineers to meet the challenges of the 21st century.

Our Mission: The College of Engineering provides an excellent Learn by Doing education and graduates in-demand, Day One-ready professionals.

STRATEGIC DIRECTIONS AND 2013-2014 ACTIONS

PARTNERSHIPS

- Strengthen relationships with alumni, parents, friends and industry partners by engaging them in meaningful activities and collaborations.
- Launch College of Engineering initiatives:
 - Projects Workshop
 - Applications in Autonomous Flight
 - Cybersecurity
 - Sustainable Infrastructure and Energy
 - CubeSats
 - Innovations in Engineering Education
- Collaborate on cross-college initiatives:
 - Center for Innovation and Entrepreneurship
 - Expressive Technologies
 - Big Data



LEARNING ENVIRONMENTS

- Participate in continuous improvement processes to enable a successful ABET review.
- Strengthen efforts to attract and graduate a more diverse student body.
- Foster a culture of safety supported by well-maintained work areas.

OPERATIONS AND PRACTICES

- Grow revenue from mission-compatible activities such as: self-supported education programs; funded student projects, theses and project expo; and deliberate corporate partnering.
- Collaborate and share to create more effective and efficient operational and curricula practices.
- Refine faculty personnel processes; create time for teacher-scholar activities; and foster healthy working and learning environments.

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engineering administrators. Between the two schools, we account for more than 10,000 engineering students! Similarly, I am getting to know my fellow engineering deans in visits across California because I believe in cooperation over competition.

With support from President Jeffrey D. Armstrong, we launched the Cal Poly Scholars program, which strengthens our ability to attract high-achieving students from low-income families. We also expanded our engineering summer camp, EPIC, to three week-long sessions.

Finally, we have refreshed internal policies and procedures to make sure that we're smarter about what we do.

It's been a productive year; but, as always, it's our students who inspire us — we measure our achievements by their success. I look forward to hearing how our new graduates make their mark as industry professionals and innovators.



CAL POLY'S LEARN BY DOING MEETS JPL'S DARE TO DO MIGHTY THINGS: More than 30 Cal Poly Engineering alums worked on the Mars rover Curiosity at NASA's Jet Propulsion Laboratory in Pasadena (photo courtesy JPL).

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CAL POLY ENGINEERING

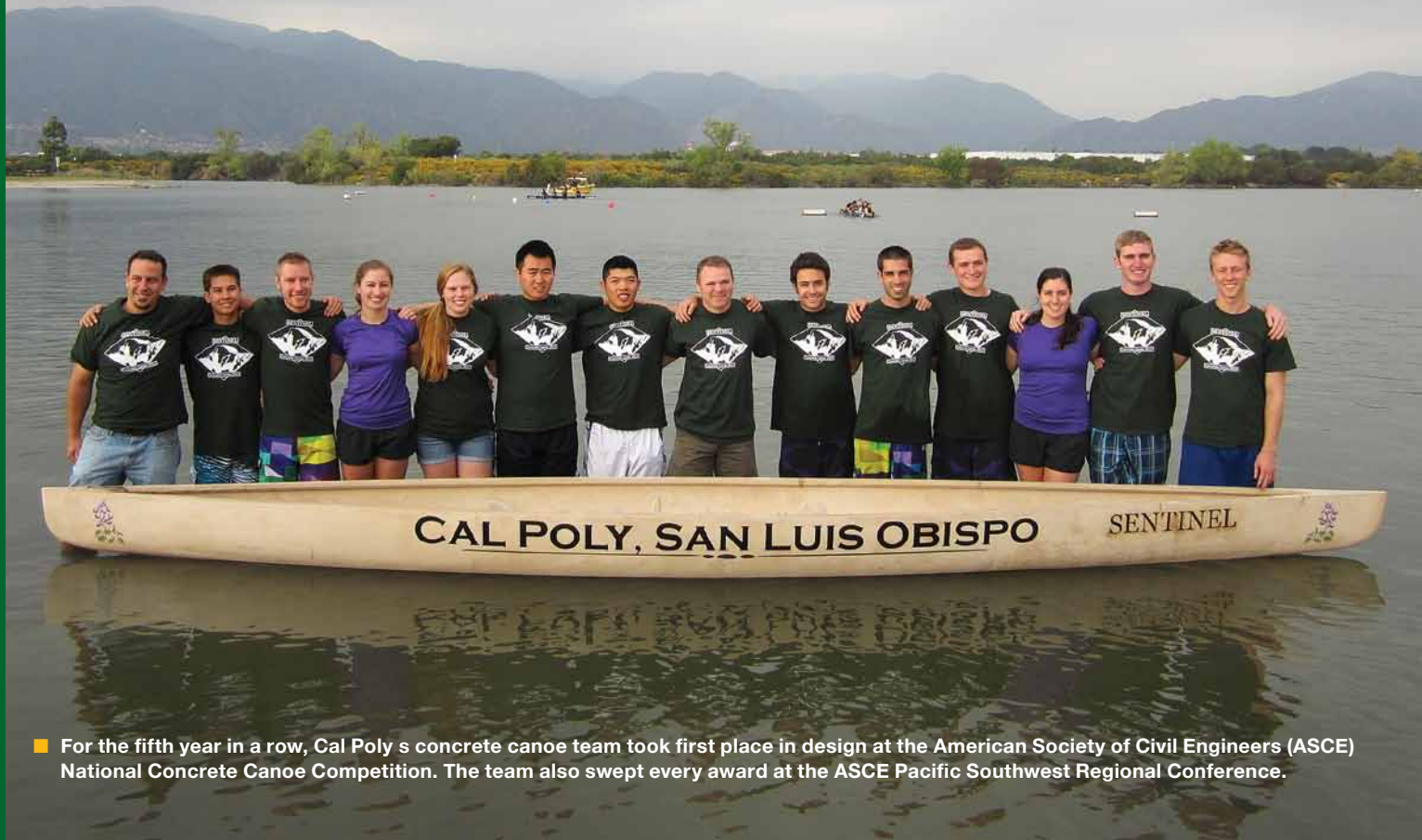
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COVER / BACK

Cover: Mechanical engineering senior Katie Ruhm works as a lab tech in the Mustang '60 Shop (photo: Brittany App).
Back: Some of the more than 100 senior projects displayed at the Projects Expo in May (photos: Larry Coolidge and Dennis Steers).



■ For the fifth year in a row, Cal Poly's concrete canoe team took first place in design at the American Society of Civil Engineers (ASCE) National Concrete Canoe Competition. The team also swept every award at the ASCE Pacific Southwest Regional Conference.

Team Highlights

■ For the second year in a row – and the ninth time since 2002 – Cal Poly Society of Women Engineers (SWE) received the Gold Award as the nation's Outstanding Collegiate Section. Cal Poly SWE also won the Outreach Award and placed third in the Team Tech competition.

■ Collision-avoidance technology created by a team of Cal Poly mechanical engineering students took first place at the Enhanced Safety of Vehicles (ESV) International Collegiate Student Safety Technology Design Competition held in Seoul, Korea.

■ Cal Poly took second at the Human Powered Vehicle Challenge West for an innovative leaning-trike design. The team finished fourth overall at the regional competition.

■ Cal Poly's concrete canoe took first place in design for the fifth year in a row at the National Concrete Canoe Competition. The team also won the slalom and endurance races, finishing fourth overall at the contest.

■ Cal Poly environmental engineering students won first place at the international Environmental Design Contest with a solar desalination unit for low-income communities that have limited access to electricity.

■ Cal Poly's gleaming Lamina II won first place for innovative design at the 2013 Shell Eco-marathon Americas, and achieved 1,210 miles per gallon, placing seventh in the super-mileage challenge.

■ Continuing a decade of remarkable finishes, Cal Poly aerospace seniors swept first, second and third place in

the American Institute of Aeronautics and Astronautics Foundation (AIAA) Undergraduate Team Aircraft Design competition.

■ The Rose Parade float built by students from Cal Poly with their peers at Cal Poly Pomona captured the Bob Hope Humor Award for most comical and amusing entry.

■ Cal Poly collected every award at the concrete canoe and steel bridge events at the American Society of Civil Engineers (ASCE) Pacific Southwest Regional Conference. The 17 first-place finishes were a record for the chapter.

■ The Cal Poly chapter of the Society of Hispanic Engineers (SHPE) was named Region I Chapter of the Year, besting Stanford, UC Berkeley, Oregon, Nevada, Washington and other universities in the western region. ■

THE GOLD IN 2012-2013



- Clockwise from top left: Cal Poly's Lamina II won first place for innovative design at the 2013 Shell Eco-marathon Americas.
- Cal Poly Society of Hispanic Engineers was named Region I Chapter of the Year.
- Cal Poly engineers pedaled to second place at the Human Powered Vehicle Challenge West.
- The Cal Poly collision-avoidance team took first place at the Enhanced Safety of Vehicles Intercollegiate Student Safety Technology Design Competition in Seoul, Korea.
- Cal Poly's Steel Bridge team finished first at the American Society of Civil Engineers (ASCE) Pacific Southwest Regional Conference.
- Cal Poly Society of Women Engineers received the Gold Award as the nation's Outstanding Student Section.
- Cal Poly's Rose Parade float won the Bob Hope Humor Award at the 2013 Rose Parade.

Chair, Dean's Advisory Council **Kraig Scheyer**

“PARTNERSHIPS” IS THE FIRST ACTION AREA DESIGNATED in the College of Engineering strategic plan (see page 2) — and partnerships are what the Dean's Advisory Council (DAC) is all about.

Our goal is to open doors to partnerships that support the college and help guarantee the excellence of Cal Poly. For those of us who benefited professionally as graduates, we take great pride in this institution, and we have a vested interest in ensuring that Cal Poly continues as one of the nation's premier engineering colleges.

As industry representatives, we want to make sure that the college continues to produce Day One-ready professionals who can serve current and evolving industry needs. That's why the DAC is excited to help define new initiatives that move the college into the future.

As President Jeffrey D. Armstrong says, “Learn by Doing is wired into Cal Poly's DNA,” but to meet the needs of students and industry, the university must also succeed in new, strategic fields. As a result of a highly transparent and collaborative process, these strategic initiatives have been identified as follows:

- Applications in Autonomous Flight
- Cybersecurity
- Sustainable Infrastructure and Energy
- CubeSats
- Innovations in Engineering Education

Each of these initiatives builds on existing areas of expertise and success — they represent niches in which Cal Poly is becoming a recognized leader serving the nation and our economy.

An additional college focus is building a new projects workshop. No other building encapsulates Learn by Doing like the Aero Hangar shop, but that facility is woefully antiquated and straining to meet the increased demand of students from across campus. We can all agree that it's time for a state-of-the-art shop where students can bring their 21st century innovations to life.

Returning to the theme of partnering, I believe strongly that all alumni should find ways to support Cal Poly and partner with it, whether through annual giving or engaging with students and projects.

Personally, I have found tremendous satisfaction in partnering with the college as a member of the Dean's Advisory Council. After four years as president, it's time I

step down from that role, but I'm continuing to volunteer as a member of the DAC Advancement Committee and as the College of Engineering representative on the board of the Alumni Association. In these capacities, I hope to provide more opportunities for all alumni to engage with Cal Poly. Please don't hesitate to contact me, the dean or any representative of the college with suggestions about how the college can better partner with you! ■



Donors

	2008	2009	2010	2011	2012	2013
# Donors	2,461	2,421	2,519	2,445	2,537	2,280
# Gifts	3,486	3,418	3,502	3,466	3,542	3,212
Gift Total*	\$4,232,836	\$5,865,899	\$5,170,616	\$4,687,577	\$8,845,483	\$6,025,603

*Gift total included cash, in-kind gifts, bequests and pledges.

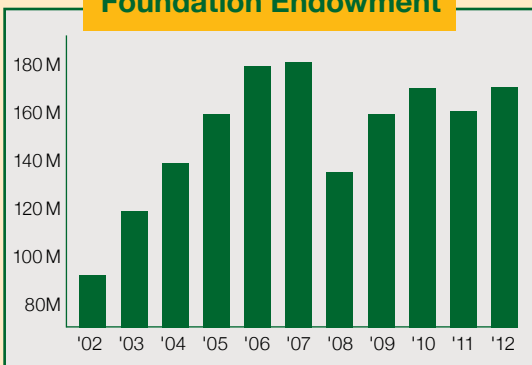
Summary of Revenue for the College of Engineering



■ = State Support Dollars ■ = Cal Poly Plan Fee*
■ = College Based Fee* ■ = Lottery Funds
*Student funded

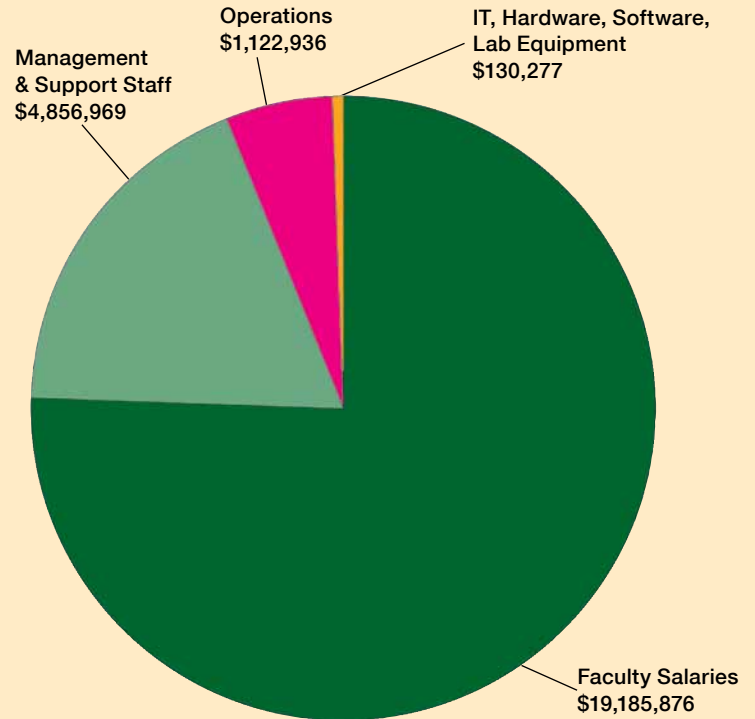
While tuition goes up, Cal Poly is doing everything it can to hold costs down, realize efficiencies and diversify revenue sources. This chart shows how state and tuition dollars have been supplemented with lottery funds, the Cal Poly Plan Fees and College Based Fees. State support to Cal Poly via the CSU does not distinguish between tuition revenue and funds allocated from the state budget. The College Based Fee was instituted in 2002 after a vote of approval by the student body. Students voted again in 2012 to raise their fees. Despite the additional revenue provided by the students, the revenue base for the university is shrinking.

Cal Poly Foundation Endowment



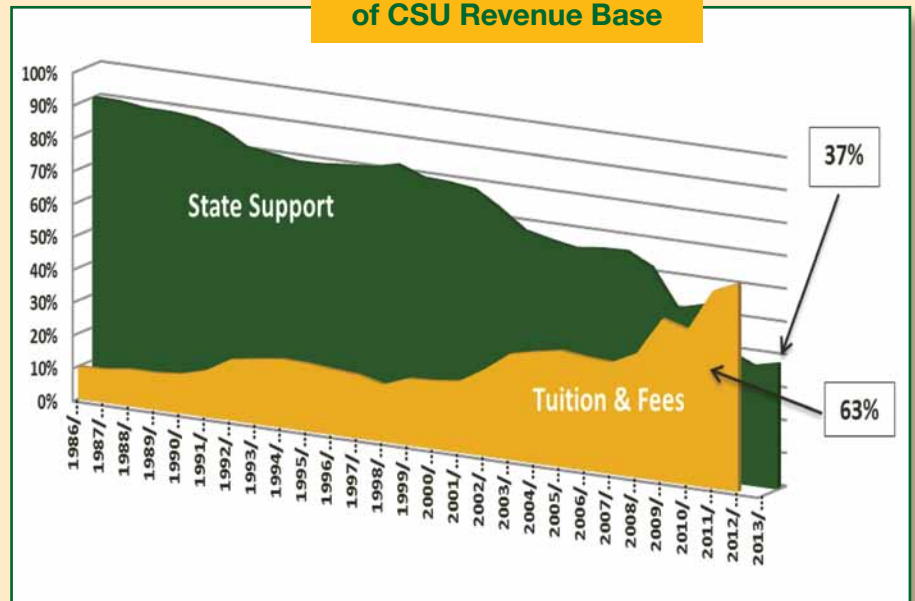
Cal Poly's endowment grew to \$173.3 million – an investment return of 14.8 percent in 2012. With a 4.25 percent spending rate for distributions, the endowments in the College of Engineering will provide \$1.5 million in payout to support students, faculty and programs this academic year.

Total Expenditures for the College of Engineering 2012-2013



College expenditures are dominated by fixed salary and benefits costs.

Changing Components of CSU Revenue Base



Over the last two decades, support of the 23-campus state university system by the state of California has eroded significantly. In 1987, the state contributed more than 80 percent of the cost of attending; today, that portion is 40 percent and dropping.

2012-2013 HIGHLIGHTS

COLLEGE OF ENGINEERING NEWS

■ Cal Poly College of Engineering was named the nation's top state-funded undergraduate engineering program by U.S. News & World Report. The only public institutions listed ahead of Cal Poly were the federally funded service academies.

■ The Cal Poly computer, electrical and mechanical engineering programs were ranked the top programs at a public university, and the civil, environmental and aerospace engineering programs were ranked second.

■ For 20 years, Cal Poly as a whole has been rated the best public-master's university in the West.

■ The college welcomed 1,143 new freshmen, who presented an average high school GPA of 3.99 and average SAT's of 681 (math) and 618 (reading).

■ Aviation Week named Cal Poly the nation's top preferred, go-to school for hiring quality grads for the second consecutive year.

■ Cal Poly received a NASA Group Achievement Award for outstanding teamwork during the Educational Launch of Nanosatellites III mission process and launch.

■ Cal Poly joined a two-year program launched by the National Center for Women & Information Technology (NCWIT) that seeks to radically increase the number of women in technology and computing.

■ The Cal Poly Scholars program was established in the College of Engineering to support high-achieving students from low-income and first-generation families.

■ The Cal Poly Global Waste Research Institute received a \$375,000 National Science Foundation grant to host the Research Experiences for Undergraduates Program, involving 10 undergraduates from around the nation to work on sustainable management of wastes, including nanowastes.

STUDENT SUCCESS

■ Engineers Without Borders (EWB)-Cal Poly was named Premier West Coast Chapter. The group also founded new initiatives, including a fourth international project in Malawi

and a campuswide lecture series called Leaders in Global Innovation.

■ Joshua W. Elvove, a graduate student in Cal Poly's Fire Protection Engineering Program, was elected president of the Society of Fire Protection Engineers (SFPE). Elvove has more than 32 years of fire protection and life safety experience.

■ EWB President Aaron Opdyke received the 2013 Student Founders' Award from EWB-USA.

■ CP5 was among 11 CubeSats launched aboard an Atlas V rocket from Vandenberg Air Force Base using the PolySat deployer built by Cal Poly students.

■ Computer science major Glen Beebe was named Student Employee of the Year by the Western Association of Student Employment Administrators (WASEA) for enhancing users' digital experience of Robert E. Kennedy Library.

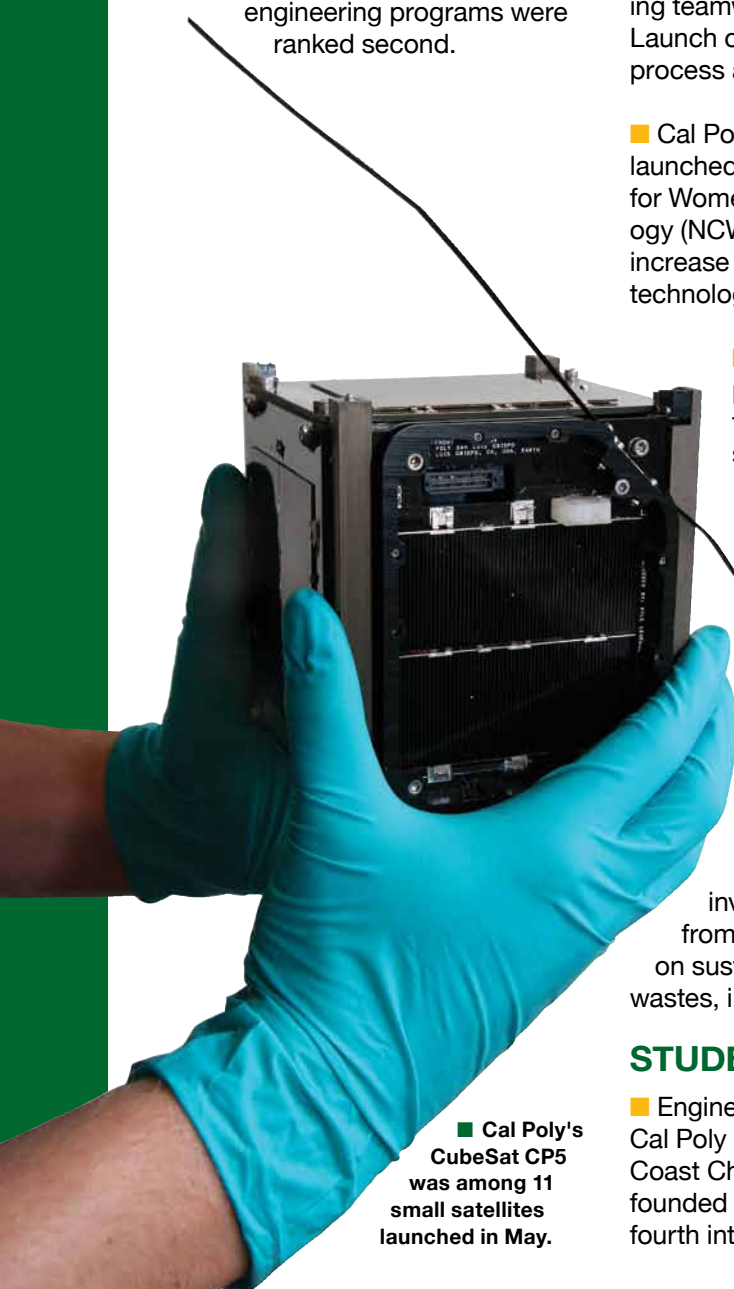
■ Eight Cal Poly students traveled to Malta to launch underwater robots and explore ancient water systems as part of the International Computing Engineering Exchange (ICEX) program.

■ As a guard on Cal Poly's women's basketball team, mechanical engineering student Caroline Reeves recorded 6.7 points and 2.1 assists per game to help take the Mustangs to their first-ever NCAA Championship Tournament appearance.

■ Rachel Gohres, a biomedical engineering graduate student, took second place in the Graduate Health, Nutrition and Clinical Sciences category at the California State University Student Research Competition.

FACULTY ACHIEVEMENTS

■ Led by professors Tryg Lundquist (Civil and Environmental Engineering) and Corinne Lehr (Chemistry), the Cal Poly Algae Technology Group was awarded \$1.3 million by the U.S.



■ Cal Poly's CubeSat CP5 was among 11 small satellites launched in May.

Department of Energy to develop efficient recycling of water and nutrients in algal biofuels production.

■ Biomedical and General Engineering Professor Lanny Griffin received the university's Distinguished Scholarship Award.

■ Bob Crockett, director of General Engineering, was named a Coleman Foundation Faculty Entrepreneurship Fellow.

■ Associate Dean Rakesh Goel was named a Fellow of the Structural Engineering Institute of the American Society of Civil Engineering.

■ Civil and Environmental Engineering Professor Gregg Fiegel won the Raytheon Excellence in Teaching and Applied Research Award.

■ Richard Savage, chair of Materials Engineering, was named Cal Poly's director of graduate education.

■ Mechanical Engineering Professor Russ Westphal received the Lockheed Martin Endowed Professorship.

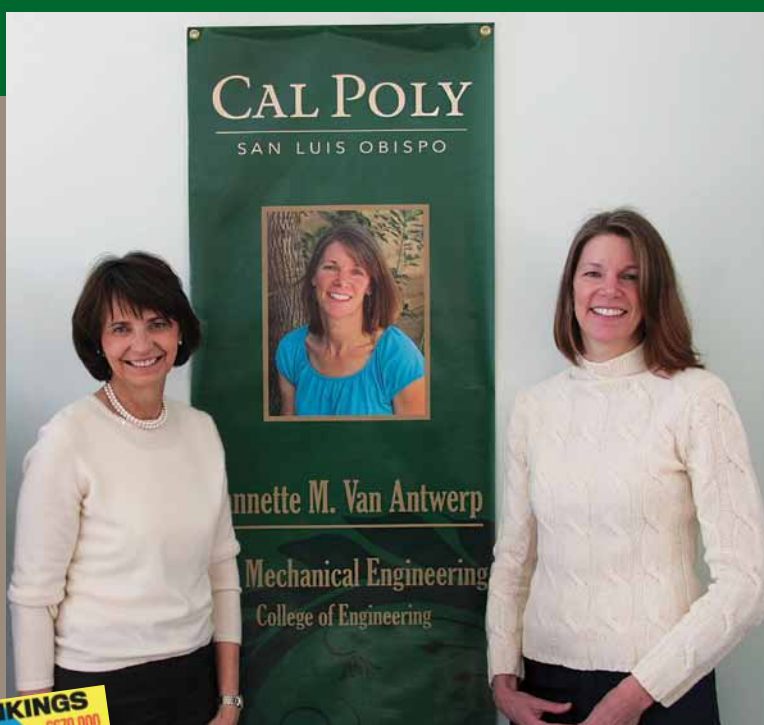
ALUMNI SUCCESS

■ At least 30 Cal Poly Engineering alumni at NASA's Jet Propulsion Laboratory helped engineer the Mars rover. The SUV-sized rover Curiosity landed on Mars in August of 2012 and will explore the Martian landscape for two years.

■ Nannette Van Antwerp (B.S., Mechanical Engineering, 1989) was named Honored Alum for the College of Engineering. During the course of her career, Van Antwerp received 24 patents on glucose sensor products that help diabetics. She is now an award-winning underwater filmmaker.

■ Hans Mayer (B.S., Mechanical Engineering, 2003) and UC Santa Barbara professor Rouslan Krechetnikov won an Ig[®] Nobel Prize, the Harvard award presented to

■ Honored Alum Nannette Van Antwerp, right, met with Dean Deb Larson during a tech talk in the Advanced Technical Lab. Van Antwerp, a 1989 mechanical engineering graduate, is an accomplished underwater photographer.



■ Cal Poly was ranked No.1 among the nation's state-funded undergraduate engineering programs by U.S. News & World Report.

■ Below: Mechanical engineering senior Michael Haworth met 1949 ME grad Jack Spaulding at Open House. Haworth is the president of Engineering Ambassadors.



imaginative achievements in science, medicine and technology, for their research "Walking With Coffee: Why Does It Spill?"

■ Lt. Commander Victor Glover (B.S., General Engineering, 1999) was named as one of eight individuals selected as NASA's 21st astronaut candidate class.

■ Thomas Fraser (B.S., Mechanical Engineering, 1973) received the GE Edison Award for his contributions throughout his 40-year career providing equipment and services for oil drilling and production.

■ Jack Dawson (B.S., Mechanical Engineering, 1953) and his wife Barbara

founded an endowment to support the Student Fabrication Labs run by the Mechanical Engineering Department.

■ Tom Lebens (B.S., Electronic Engineering, 1989) served as the president of the Cal Poly Alumni Association.

■ Boeing honored Michael D. Bowman (B.S., Mechanical Engineering, 1979) with the Special Invention Award for his work on the electrical architecture of the Dreamliner 787.

■ Four-time commander on the space shuttle, Robert L. "Hoot" Gibson (B.S., Aerospace Engineering, 1969), was enshrined in the National Aviation Hall of Fame (NAHF). ■

MENTORS SPEED UP THE LEARNING PROCESS FOR STUDENTS ENGINEERING HPVs

GEORGE AND CAROLE LEONE ARE LEGENDARY IN THE world of streamlined bicycles known as human powered vehicles. George began volunteering with the Cal Poly Human Powered Vehicle (HPV) team in the 1980; Carole started to provide support in 1994. (“She’s the brains of the outfit,” says Leone of his wife of 40 years.)

Leone figures he’s had a hand in building at least 50 bicycles, and he and Carole have mentored as many as 1,000 students at Cal Poly and other schools that have fielded HPV teams.

“When George received the Spirit Award last year at the World Human Powered Speed Challenge, I asked everyone who has received help from him to stand,” said Carole. “Two-thirds of the audience rose.”

Quite a few Cal Poly students have even worked in the Leone’s barn.

“Cal Poly has always been a major player in HPV,” said Leone, “but when we first started building vehicles with the team, the university didn’t have a composites fabrication facility, so we were glad to have the students come to our place. During crunch time before a race, they often worked through the night — we’d come down in the morning and count the bodies sleeping on the floor.”

In 2000, Leone joined the Mechanical Engineering Department as supervisor of the Aero Hangar Shop, where students build the HPV and other competition vehicles, including the Formula One, Mini Baja and Supermileage vehicles.

In addition to all the time that George and Carole give as volunteers and mentors, they’ve also provided gifts that will help Cal Poly students maintain their edge in project competitions. In the past several years, they’ve supported the student shop technicians via a donation to the Howard Caccia Student Technician Endowment Fund and donated equipment such as solar instruments, 12-volt batteries,

electric bicycle motors, a resin pump and a vacuum-form machine.

“We were able to provide much of this equipment from the estate of Fred and Dorothy Culver,” explained Carole. “He was a gifted machinist and when he passed, he left most of his tools to us with instructions that we use it to aid students.”

“We sold the equipment and have used the money to purchase items that will help students year after year,” said Leone.

Even though Leone receives a Cal Poly paycheck, his and Carole’s work with students is more than a job. “We love being part of the team, being around people with ideas and enthusiasm,” said Carole.

“Very simply, working with the students brings me joy,” said Leone. ■



■ Carole and George Leone pose with Cal Poly's 2013 HPV.

“
We were able to provide much of this equipment from the estate of Fred and Dorothy Culver. He was a gifted machinist and when he passed, he left most of his tools to us with instructions that we use it to aid students.
”

RECENT GRADUATE GOES FULL CIRCLE BY MAKING DONATION TO ME DEPARTMENT

WITH HER FIRST PAYCHECK, SYLVIA AGUILAR made a return on the investment made in her success by her Cal Poly professors and mentors. She donated her earnings, \$112.63, to the Mechanical Engineering Department.

The gift represents Aguilar's journey as an undocumented student who migrated to the U.S. from Mexico at the age of six to a fully contributing member of society.

After graduating from a California high school, she was able under California law to attend Cal Poly with in-state tuition, even though she was undocumented. She could not, however, receive state or federal financial aid. Nor could she obtain official U.S. identification, which meant that she could not be legally employed.

Besides limiting her financial resources, the lack of identification as well as her restricted air travel affected Aguilar's educational opportunities in other ways. Unlike so many Cal Poly engineering students who gain valuable industry exposure, she could not be hired as an intern at engineering companies.

Despite financial challenges and uncertainty, Aguilar made the Dean's List six times, and she participated in many activities that developed her leadership skills. She volunteered as an Engineering Ambassador and served as an elected member of the Associated Students Inc. board of directors, the Student Community Liaison Committee and the Engineering Student Council.

Aguilar was chosen as one of six recipients of the 2013 Outstanding Women in Engineering Award by the Society of Women Engineers. The award recognized her contributions, including work on notable student projects, such as an assistive device to help amputees climb stairs. The project won Team Tech, a prestigious national collegiate design competition.

With her acceptance into President Obama's two-year deferral program last December, Aguilar obtained a Social Security number, a driver's license and a job working in Student Academic Services — a job that enabled her to give back as a donor.

"I am proud to fully assimilate into this country, but I think that my biggest accomplishment is yet to come," said Aguilar.

"I eventually want to share both my B.S. and Ph.D. diplomas with my grandmother and mother, who were denied the privilege of an education. The Aguilars will become a family of college graduates, and I am determined that our new family history begins with me." ■



“ I am proud to fully assimilate into this country, but I think that my biggest accomplishment is yet to come. ”

■ Learning to weld proved valuable when Sylvia Aguilar worked on her senior project last spring.

HONOR ROLL

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Maxim Integrated Products Inc. ▶

FOR THIS IME ALUM, IT'S LIGHTS! CAMERA! SCHOLARSHIP!

MARY ANN BEYSTER (B.S., INDUSTRIAL ENGINEERING, 1987) is a systems thinker. In her perspective, resource consumption and use by companies is interconnected and interdependent. Companies carry footprints that affect individuals, society and the environment.

Beyster's passion for the environment, belief in Cal Poly's

Learn by Doing engineering education and philanthropic conviction has led her to establish the Beyster Sustainability Scholarship, a merit-based award for industrial and manufacturing engineering students with demonstrated interest in clean technology and sustainability, including water management, pollution prevention and energy efficiency.

"I believe in the power of teaching at the undergraduate level," she stated. "This scholarship is a way to implement environmental practices into the future."

Her own education at Cal Poly, followed by a master's degree from the Sloan School of Management at M.I.T., fed Beyster's analytical mind. "I loved the Cal Poly industrial engineering program," she said. "I was exposed to all different types of engineering, and I also learned how to lathe, weld, operate a mill, program computer-aided machinery and develop a production schedule.

"I also got great industry experience. Every summer I had an internship for which I did real engineering on cutting-edge products. I felt like I was part of the team."

Following her education, Beyster held management and business development positions at SAIC, CH2MHill and SRI International, working in fields including energy, environment, water, life sciences and national security. For the past eight years, she has served as president of the Foundation for Enterprise Development. "We help companies with emerging technologies and environmental applications, and we also fund research and education that addresses how

companies can be innovative and profitable with fair labor and environmental practices," she explained.

Beyster recently served as the executive producer for "We the Owners," a documentary that examines employee ownership as an alternative and sustainable business model. "We hope to inspire employees, small business



■ Mary Ann Beyster, right, shows scholarship recipient Michallynn Hoffmann the poster for a screening of the documentary "We the Owners." Beyster served as executive producer for the film.

"I believe in the power of teaching at the undergraduate level. This scholarship is a way to implement environmental practices into the future."

owners, executives and board members to question conventional practice and lead modern organization change that advances both human and economic potential," she said.

The Beyster Sustainability Scholarship, meanwhile, advances the potential of high-achieving Cal Poly industrial and manufacturing engineering students to make an impact.

"These future engineers can have a significant role in sustainability — I know that they will be visionary and practical about resources, funding and environmental and human capital trade-offs," said Beyster. ■

WITH SCHOLARSHIP SUPPORT, AERO STUDENT SEES DREAMS TAKE FLIGHT



■ Wind tunnel experience is part of the curriculum for aerospace engineering student Ivan Lucatero.

“ I am so grateful for the scholarships and opportunities I’ve had. The people behind these gifts are amazing and are the reason I am able to pursue my dreams. ”

WHEN IVAN LUCATERO WATCHED A “MYTHBUSTERS” show on flow visualization in high school, he couldn’t imagine that he’d later meet the NASA wind tunnel engineer featured on the program.

Born in Colima, Mexico, Lucatero grew up in tiny Cuyama, Calif., where his father works mining gravel. “My dad is extremely intelligent, but he never had the opportunity to get an education,” said Lucatero. “My parents expected my sisters and me to do well, and we’re the first in our extended family to go to college. One sister got a degree in physiology at UCLA.

“I took courses at Allan Hancock College during high school, and graduated as my high school valedictorian.”

After transitioning to college, Lucatero has thrived at Cal Poly. He became involved in the Society of Hispanic Professional Engineers (SHPE), serving as president in 2012-2013. Under his leadership, the club initiated a program to install solar panels on low-income homes and established a SHPE Jr. chapter at Pioneer Valley High School. SHPE was named Cal Poly Club of the Year, while Lucatero won SHPE Officer of the Year along with the David Cantu MEP Scholarship in recognition of his service.

Lucatero has also realized his dream of working at NASA.

“I was chosen to participate in the NASA Aeronautics Academy, a very prestigious internship program, which gave me a global view of the agency and a chance to work with leading experts, like the guy I saw on TV. I even gave a presentation at NASA Headquarters in Washington, D.C. to the Associative Administrator for the Aeronautics Research

Mission Directorate, Dr. Jaiwon Shin, and NASA Director, Charles Bolden,” he said.

“When my parents came for a tour of NASA in Mountain View, my dad got to see so many cool things. He was the one who taught me how to weld — he’s really glad I’m pursuing engineering, and he’s proud that I’m designing things he can only imagine.”

One of the unimaginable things that Lucatero was building as an intern at NASA Ames is an International Space Station (ISS) habitat for fruit flies. “My job was to optimize and centrifuge test the modules up to 5Gs — it was great to work on something that will actually go to the ISS!

“My parents have taught me to always work hard for what I want,” noted Lucatero. “I am so grateful for the scholarships and opportunities I’ve had. The people behind these gifts are amazing and are the reason I am able to pursue my dreams.” ■

Ivan Lucatero

Aerospace Engineering senior

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■ Computer engineering students Michael Chamoures, Drew Bentz and Will Budney display the “quadrotor” helicopters they were working with during a CPE capstone course. With funding from CP Connect and the CPE Capstone Fund, the students wrote the flight software and built the hardware for the autonomous flying robots.

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STUDENT TECH HAS A DIFFERENT SHOPPING EXPERIENCE



■ Mechanical engineering student Jessica Caine works as a shop tech in the Mustang '60 Project Shop.

“ I assist 10 to 15 students every day, who come in with projects — many students I see have never used machines before! ”

SENIOR MECHANICAL ENGINEERING STUDENT Jessica Caine grew up “taking things apart.” Now she applies her hands-on know-how every day as a paid technician in the Mustang '60 Project Shop.

Caine is part of the Earn by Doing program in which student shop technicians are sponsored by individual and company donors. The year-long, paid positions provide on-campus jobs that hone new skill sets while also adding capacity to the student fabrication labs.

“Student techs like Jessica are the epitome of the Cal Poly Learn by Doing tradition,” said Andrew Davol, chair of the Mechanical Engineering Department.

For Caine, the Earn by Doing job is a perfect extension of her engineering education. “I’m able to schedule my hours around classes and earn money for school, which is very helpful,” she said. “But all the hands-on work I do in the shop also underscores the theory I’m learning in class. The job makes me understand more clearly how to design efficiently for manufacturing.”

The shop technicians start off as rookies who primarily provide facility support. As they pass through a series of requirements, they advance to junior- and senior-level positions. Caine is one of the senior technicians in the program, which means that she spends all her time working directly with students.

“I assist 10 to 15 students every day, who come in with projects — many students I see have never used machines before!” she explained.

The shop tech positions are open to students with sophomore standing or higher from any major on campus. Currently, the program supports 27 student techs.

“The program helps us ensure safe working environments in our student fabrication labs,” said Davol. “Growing the Earn by Doing program and increasing the number of tech positions has allowed us to expand project opportunities for students from all across campus.”

Caine has already used her shop tech experience to land an internship. “I’m concentrating in heating, ventilation and air conditioning. My project management experience as the lead tech in Mustang '60 really helped me get an internship at ACCO, a leading company in the field.”

“Being able to get this shop tech experience as an undergraduate is so unique,” noted Caine. “It’s just so cool that I get to work in a machine shop!” ■

Jessica Caine
Mechanical Engineering senior

Fluor Shop Technician

BROTHERS' EDUCATION BUILT ON A SOLID FOUNDATION

THE BOND THAT EXISTS BETWEEN THE SANCHEZ BROTHERS IS UNSHAKEABLE. IT'S a powerful force that assumed new magnitude in their post-graduate work: making the built environment more quake-resistant.

The civil engineering graduate students were part of Cal Poly Engineering's collaboration with Case Western Reserve University in Cleveland, Ohio, and the University at Buffalo in Buffalo, N.Y., to improve the seismic performance of existing buildings. The research effort was funded through a \$612,000 National Science Foundation grant.

"Because of the caliber of Juan and Francisco's work, Cal Poly has made significant contributions to this project," said Assistant Professor Bing Qu, their faculty advisor. "It's a strong example of the student/scholar model."

The brothers became involved with the seismic retrofitting project last year as undergraduates, and it was that experience that inspired them to pursue master's degrees.

The first-generation college students have thrived on a friendly competition starting from grade school, when their family moved from Mexico to Visalia, Calif. By high school, the duo was achieving 4.0 grade point averages, and they completed their undergraduate civil engineering degrees in three years.

Reinforcing the brothers' structural engineering studies throughout their college career were numerous scholarships, foremost among them the Dale L. Nix scholarship. Both brothers received \$4,000 annually for four years.

"The scholarship was awarded to freshmen with high grades, and was renewed each year — but only if you maintained high grades," said Francisco. "Otherwise, you would lose it."

In addition, Francisco received a \$3,000 Lee P. and Ynez Joyce Scholarship and a \$1,500 Boeing scholarship; Juan was the recipient of \$1,200 from the Benton Memorial Scholarship; and both brothers benefited from \$500 Xerox scholarships from the Multicultural Engineering Program (MEP).

Francisco and Juan were also involved in Cal Poly's Society for Hispanic Professional Engineers, as well as the MEP, where they tutored other students.

After graduation in June 2013, the brothers went their separate ways for the first time — Francisco working in San Francisco as a structural engineer for PG&E; Juan heading for Bremerton, Wash., where he will apply his programming skills to the U.S. Navy's nuclear reactor program. ■

■ Francisco and Juan Sanchez check out the seismic resistance features of Engineering IV.



“Because of the caliber of Juan and Francisco's work, Cal Poly has made significant contributions to this project. It's a strong example of the student/scholar model.”

Francisco & Juan Sanchez
Civil Engineering graduate students

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PROJECT EXPO

The human powered helicopter was one of more than 200 senior projects on display during the second annual CENG Project Expo in May.

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EXPLORING THE FUTURE OF TECHNOLOGY

BRANDON OKUMURA HAS A PASSION FOR COMPUTER ENGINEERING and a heart to lead. He started Cal Poly as one of the first Cal Poly Scholars, a program initiated by President Jeffrey D. Armstrong aimed at high-achieving, low-income students. The program kicked off in 2012 with 14 engineering freshmen, who received iPads and a \$3,000 housing grant renewable for up to four years.

The award brought peace of mind to Okumura because his father, a mechanic, was recently diagnosed with a terminal neurological disorder and is now on permanent disability. His mother provides full-time care. Despite financial hardship, the Okumuras encouraged Brandon and his twin sister, Victoria, a Cal Poly biology major, to excel in school and contribute to the community.

“They motivated us to become who we are now — I wouldn’t be as outgoing or try as hard without them,” said Okumura.

In high school, Okumura participated in team and club badminton, provided more than 600 hours of community service for various organizations and started the school robotics club.

“We only had eight members at first without supplies or a budget, but our advisor said that if we want to succeed, we needed to create something,” recalled Okumura. “So, we used solder and double-A batteries to make iPhone chargers.

“This was my first foray into leadership, and I learned that you have to push people to go beyond what they’d do on their own.”

Although he’s only completed his first year at Cal Poly, Okumura is already excited about his major and what he can accomplish in the future. “At Cal Poly, we have the opportunity to fail and learn from our mistakes,” he said. “I’ve learned that computer programming is like a puzzle — you find out how everything is pieced together.

“I’m excited about innovations in technology to improve human-computer interaction using electroencephalography (EEG) to map what people think and creating algorithms from the information. Eventually, I hope to use this kind of technology to create industry solutions and efficiencies.

“Because of my family’s limited resources, the grant from the Cal Poly Scholars program helped assure me that I’ll be able to continue in school. Not only does the scholarship back up my future, it advances the future of technology through the students it helps.” ■

■ Brandon Okumura plans to study human-computer interaction.



“
At Cal Poly, we have the opportunity to fail and learn from our mistakes. I’ve learned that computer programming is like a puzzle — you find out how everything is pieced together.
”

Brandon Okumura
Computer Engineering freshman

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HELPING CAL POLY BOOT UP CYBERSECURITY EDUCATION

NORTHROP GRUMMAN BEGAN BUILDING A COLLABORATIVE relationship with Cal Poly in the mid-1980s — a natural alignment because of the company’s business areas in aerospace, electronics, information systems and technical services. Today, the partnership has blossomed, with the company providing wide-ranging support for scholarships, engineering student clubs and projects, and curricular programs.

The partnership took another step forward this year. Northrop Grumman not only helped Cal Poly collaborate with its sister polytechnic, Cal Poly Pomona, on the second year of a sophisticated multidisciplinary autonomous flight project, but it also provided more than \$150,000 to help launch a major new lab and program initiative in cybersecurity.

Cal Poly alumnus Ron Smith (B.S., Electrical Engineering, 1983) and Dean’s Advisory Council member Charles Volk have been two of the individuals who have nurtured the company-campus connection.

“Doc’ Ray Haynes, former Northrop Grumman director of University Alliance and Development, found ways to support Cal Poly, such as gifts to support the CubeSat lab,” said Smith, sector vice president for programs and engineering. “And Dick Croxall, a now-retired vice president and chief engineer and Cal Poly parent, was another strong internal advocate.

“This long and prosperous relationship was passed down to me when I became a vice president in 2004. It’s a very personal relationship for me, but it’s extremely important for Northrop Grumman as well.”

A collaborative student project on autonomous flight and geolocation, facilitated with the help of Volk, is one example of the mutually beneficial partnership. Approximately 50 students from Cal Poly and Cal Poly Pomona collaborated remotely on the project, which leveraged three Northrop Grumman core capabilities: unmanned vehicles, sensors and geolocation, and distributed systems. Northrop Grumman provided supplies and designed the program’s curriculum. Additionally, Northrop Grumman employee volunteers served as mentors.

“This project provides excellent preparation for the future workforce,” said Charles Volk, vice president of Northrop Grumman’s Advanced Navigation Systems business unit.

A key focus of Northrop Grumman’s has been cybersecurity. The company’s collaboration with Cal Poly serves

to broaden its commitment in this domain.

“We have a larger footprint in the computer science area, and so I and other company principals got excited about the fact that cybersecurity is an up- and-coming initiative at Cal Poly,” Smith noted. “Supporting the development of a cyber



Supporting the development of a cyber lab puts us on the ground floor of that effort — and the facility will put Cal Poly on the map in cybersecurity education.

lab puts us on the ground floor of that effort — and the facility will put Cal Poly on the map in cybersecurity education.”

Set to open in fall 2013, the cyber lab is the first that Northrop Grumman has helped found at a university. The company has not only provided a gift to equip the lab, but has also agreed to provide access via a network connection to the Northrop Grumman Virtual Cyber Lab, thereby expanding research capabilities for Cal Poly faculty and students.

“It’s a win-win,” said Smith. “We’ll get more students excited about what Northrop Grumman does, help develop a cybersecurity curriculum, and design a facility that reflects the real world of industry.

This hands-on, Learn by Doing lab will foster a pipeline of engineers who can make an immediate impact in the commercial and defense sectors as well as make significant contributions to our nation’s security.” ■

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Mechanical engineering senior Andrew Nahab from Riverside, Calif., was recognized as the College of Engineering's topmost graduating senior for academic excellence. Nahab earned a 3.978 GPA and a place on the Dean's List and President's List every quarter from 2009-12. As an undergraduate, Nahab interned at Phillips 66, Woodward HRT and Abraxas Energy. He was the recipient of numerous scholarships, including the Donald Chivens Scholarship, Manjit K. Bain Mechanical Engineering Scholarship, Adele and Aldo Alessio Scholarship, and the Robert Byrd Scholarship.



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POLY'S SOLAR "STILL" SHINES



Cal Poly students' design for a solar desalination unit won first place at the international Environmental Design Contest at New Mexico State University (NMSU) in Las Cruces, N.M. Led by Kyle Lee, team members included Yakov Suvorov, Shasta Billings, Cherie Du, Brian Kane, Chris Pittner, Carter Reiff, Tiffany Racz and Maddie Bouvier. A \$2,500 prize was awarded with the first place finish.

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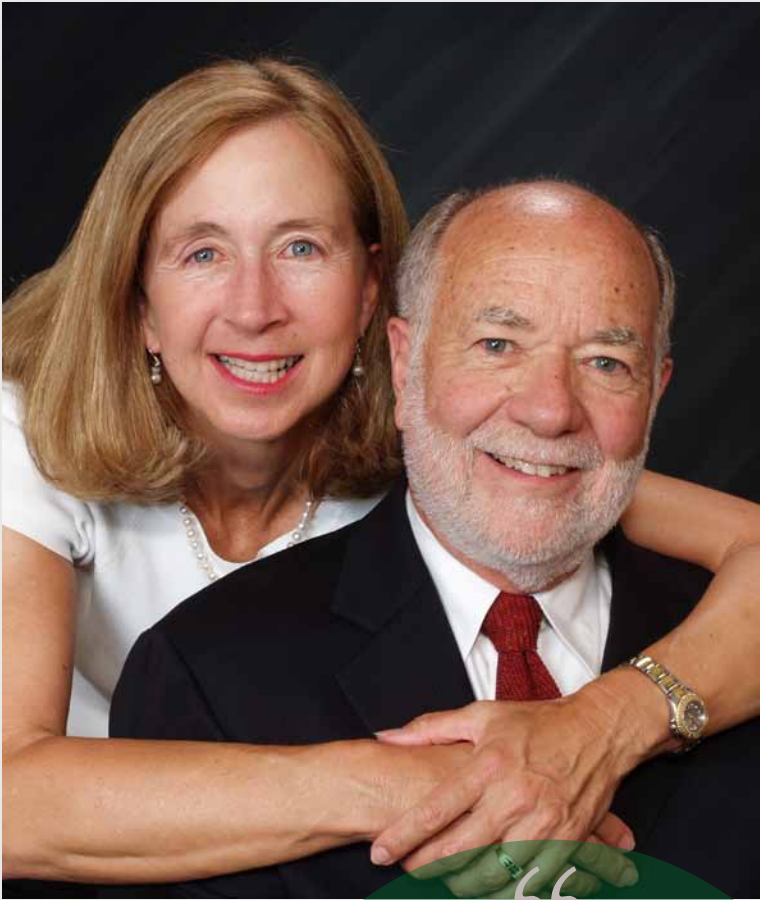
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CHANGED BY CAL POLY EXPERIENCE, AERO ALUM SUPPORTS NEW GENERATION



■ Paula and Don Heye have supported 15 Cal Poly students with scholarships.

“ I got the best education of any engineer that I’ve ever met. The Cal Poly Learn by Doing philosophy of education remains the same today as when I was a student; moreover, the school has built a great reputation and employers speak very highly of the graduates they hire. ”

IN 2007, DON AND PAULA HEYE ESTABLISHED THE Marvin Arnold & Irene Jaquetta Heye Scholarship administered by the San Diego Foundation. Since then, Heye, a 1958 Cal Poly aeronautical engineering alumnus, has personally overseen the selection of 15 student recipients and approval for annual renewal of the scholarship awards.

“I keep close tabs on the students, and we keep in touch even after they’ve graduated,” he said. “The first recipient, Sally Hermansen, graduated in 2011. She’s now working as an aerospace engineer with Space Systems/Loral. She emailed me recently that she traveled to French Guiana to participate in a launch — she’s very pleased with her career.”

This year, the Heyes added an endowment to their philanthropic support of Cal Poly: the Don and Paula Heye Endowment for Sustaining and Advancing the College of Engineering.

“Our intent is to provide discretionary funds,” explained Heye. “In my day, the most pressing need may have been a transistor lab, but, of course, technology has changed since then. I believe that the College of Engineering requires funds that provide flexibility to meet changing needs, even while it continues to embrace its Learn by Doing values.”

Having grown up during the World War II years, Heye has personally witnessed dramatic changes in engineering and technology, but he has found that the hands-on education he received at Cal Poly has served him throughout his career.

In his first job at Ryan Aeronautical, Heye performed early testing for short take-off and vertical take-off launches and unmanned aircraft. At two other companies, Heye contributed to the development of gas turbines, components for the Saturn rocket engines and lunar landing module, and other systems for air and space vehicles. In 1968, he founded Hispan Precision Products, which manufactures metal products for nearly every industry.

“I got the best education of any engineer that I’ve ever met,” stated Heye. “The Cal Poly Learn by Doing philosophy of education remains the same today as when I was a student; moreover, the school has built a great reputation and employers speak very highly of the graduates they hire.

“Cal Poly changed my own life for the better. Education is very expensive today, so Paula and I feel that it’s something everyone should support according to their means.” ■

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STRONG WORK ETHIC PAYS OFF FOR BME STUDENT

PAUL PILLER KNEW LITTLE ENGLISH WHEN HE ARRIVED IN THE UNITED States, and yet he succeeded academically because of perseverance and encouragement.

Piller spoke Russian when he joined his Russian father and Armenian mother in Ohio at the age of 10. The family later moved to Southern California.

“My parents came to the U.S. because of the American Dream,” said Piller. “Now I want to make them proud.”

In high school, Piller focused on his studies and the swim team, doing very well in his AP science classes. He applied to Cal Poly because it was affordable, located close to his family and had an excellent reputation. “A friend’s mother helped me with the application process because I had no idea how to go about it,” he explained.

Piller chose to major in biomedical engineering because of his grandmother. “I lived with her in Estonia for two years when my parents first came to the United States,” he said. “She’s one of the hardest-working persons I’ve ever known, despite having terrible knees. Without biomedical technology — knee replacements — she’d be much worse off.”

Piller thrived at Cal Poly. He found excellent professors, a good support system and a community of friends. “I realized I was in the right major when I took Biomaterials Design with Dr. Kristen Cardinal,” he noted. “I really enjoyed the research and the group dynamic of the three-person lab teams. We got very close.

“I also work in the Financial Aid Office. Everyone in there seems wise and very supportive. I can turn to them for advice.”

Piller’s hard work has paid off. He has had a recurring summer internship at Applied Medical, where he assists with process manufacturing and research, and development of minimally invasive devices — and he received the Martini Scholarship established by donor Donald Heikkinen, parent and grandparent of Cal Poly graduates.

Heikkinen named the scholarship in honor of his daughter, Karen Martini (B.S., Nutritional Science, 1977), and directed that it be awarded annually to an engineering student. “My grandson, Scott Martini, graduated with a degree in civil engineering,” said Heikkinen. “I believe everyone should do something for charity. I chose education because it’s so productive, and engineering is an area that is highly valuable to society.”

For Piller, the scholarship provides a huge financial relief. “My parents were shocked when they heard about the scholarship,” he said. “But the award also represents validation — it helped build confidence for us all.” ■



■ Paul Piller hopes to concentrate on the development of biomedical technology like prosthetics.

“
My parents came to the U.S. because of the American Dream. Now I want to make them proud.
”

Paul Piller

Biomedical Engineering senior

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Computer engineering student Aaron Gragg, left, plays tuba in the brass section of the Cal Poly Mustang during Open House.

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MAKE A DIFFERENCE

BUILD A LEGACY



After flying 83 missions with the Army Air Corps in Europe, Martin Engler (B.S., Mechanical Engineering, 1950) returned to civilian life and realized he needed an education that would lead to a career. At Cal Poly, Engler learned “how to build things,” knowledge he put to use in the liquefied natural gas industry. Starting as a laborer but retiring as an executive vice president, Engler has included Cal Poly in his will in addition to making an annual gift because, as he says, “Cal Poly gave me so much.”



Please contact Assistant Dean Richard LeRoy at rleroy@calpoly.edu or (805) 756-7108.

