



## Berry Efficient

*Picking raspberries, engineering-style*

Cal Poly Engineering students Steven Yatco, Jeffrey Cabanez and Tricia Santamaria talk raspberries with alum Abraham Ramirez and field supervisor Luis Cordoba.

Wearing short sleeves and flats, **Tricia Santamaria** was dressed all wrong when she first stepped into a raspberry field to learn the methodology of picking. But armed with an engineering mind-set, the Cal Poly sophomore and her teammates, **Steven Yatco** and **Jeffrey Cabanez**, brought the skills needed to potentially revolutionize the berry-picking industry.

The students came to the field in Santa Maria, Calif., to undertake

a project for Process Improvement Fundamentals, an industrial engineering class taught by **Karen Bangs**. The project focused on how to improve picking efficiencies – an idea that had been proposed by agriculture consultant and Cal Poly alumnus **Abraham Ramirez** (B.S., Crop Science, 2004; B.S., Mathematics, 2004).

“While growers would like to add raspberry acreage, they also

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## College of Engineering Sees New Opportunities in Strawberry Partnership

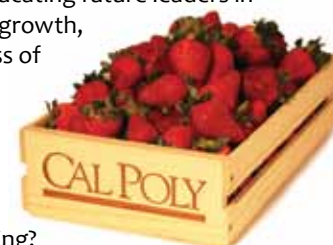
In February, Cal Poly announced that a \$1 million dollar gift from the California Strawberry Commission will create the new multidisciplinary Cal Poly Strawberry Sustainability Research and Education Center focused on educating future leaders in sustainability, growth, and the success of the California strawberry industry.

So, what’s that got to do with engineering?

“This partnership is an important step forward in our desire to strengthen ties with key California industries so that our students can learn, do and succeed,” said Cal Poly President **Jeffrey D. Armstrong** at a signing event in Sacramento Feb. 19. “Faculty and undergraduate students from every corner of campus, including engineers, hydrologists, entomologists, plant scientists, packaging scientists and marketers, to name a few, will each have a hand in this important work for one of the nation’s leading industries.”

The new center will provide opportunities for students in the College of Engineering to apply engineering principles to solve problems related to sustainable agricultural production, the environmental impacts of

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- IME class takes theories out to the raspberry fields

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- CENG students help explore underwater secrets of Malta

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- Cal Poly Society of Hispanic Engineers shines at convention
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- Goel named Structural Engineering Institute fellow
- Fiegel secures NSF grant to study garbage waste

### Alumni News

- Michael D. Bowman (ME '79) honored for work on 787
- Recent BME grads develop tissue engineering company
- Gibson (AERO '69) named to the Aviation Hall of Fame





Equipped by a grant from mechanical engineering alum John Neilsen, the Mustang '60 Lab is a busy place with students working on a myriad of projects.

## ENGINEERING *Advantage*

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Civil and environmental engineering students Matt Rodrigues and Elliott Ripley utilize the department's new truck at the Cal Poly Algae Field Station.

## John Gregg Goes the Extra Mile for Learn by Doing

When the Civil and Environmental Engineering Department's aging pickup was losing its "git-up" and could no longer keep up with the rugged demands of students actively involved in field projects, **John Gregg**, a member of the department's Industrial Advisory Board and owner of Gregg Drilling & Testing, donated a new Ford F-250 XL Super-Duty Crew Cab pickup truck.

"I have been fortunate enough to have made a living in this

state for the last 30 years, and I credit my success to my co-workers and clients," said Gregg. "These generous, experienced, thoughtful people are just the type of professionals that Cal Poly produces, so it seemed fair to help where I could.

"A pickup is sort of a gritty symbol of Learn by Doing," he added. "I think it represents the ethic of the students and faculty here. They have work to do!" ■



## Introducing the A Team

Whether they're meeting alumni around the state, organizing campus events, facilitating partnerships with industry, or directing all the efforts to advance the college, the College of Engineering A Team is busy building connections between the college and its supporters.

Team members include Assistant Dean **Richard LeRoy**, Director of Development **Amanda Oeser**, Corporate Partnerships Coordinator **Casey Haggerty** and Administrative Coordinator **Brenda Flood**.

LeRoy has degrees in political science and Spanish from Louisiana State University. After serving in the Peace Corps, he joined Cal Poly as a graduate student, earning an M.A. in education. He spent eight years working for Cal Poly Study Abroad before moving into advancement as a regional development director. He's been leading advancement efforts in the College of Engineering for more than a year.

"I work with a great team," said LeRoy. "They are so enthusiastic about connecting with the alumni and friends of the college – it makes it fun to come to work every day."

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Left to right: Casey Haggerty, Richard LeRoy, Amanda Oeser and Brenda Flood lend a hand at the site of the upcoming A Team headquarters adjacent to the Dean's Office.



# CENG ONLINE

## COLLEGE OF ENGINEERING WEBSITE

[www.ceng.calpoly.edu/](http://www.ceng.calpoly.edu/)

Cal Poly Engineering alumni are making news — and we are posting and updating their stories daily. Stay in touch by logging on at:

## ALUMNI IN THE NEWS

[www.ceng.calpoly.edu/alumni/in-the-news/](http://www.ceng.calpoly.edu/alumni/in-the-news/)

## CALENDAR OF EVENTS

[www.ceng.calpoly.edu/event-calendar](http://www.ceng.calpoly.edu/event-calendar)

## GIVING TO THE COLLEGE

[www.ceng.calpoly.edu/givingback/](http://www.ceng.calpoly.edu/givingback/)

## CENG ON FACEBOOK

[www.facebook.com/CalPolySLOEngineering](http://www.facebook.com/CalPolySLOEngineering)

## Cal Poly's School of Rock



## ENGINEERING STUDENTS CLIMB NEW HEIGHTS

The new rock wall at the Cal Poly Recreation Center's Poly Escapes outdoor climbing park has proved to be a magnet for engineering students. Among the regulars scaling the 42 foot- high wall are, from left to right, engineering students Rich Hayes, mechanical engineering; Jason Morgan, mechanical engineering; Scott Farr, civil engineering; and Dakota Schwartz, mechanical engineering. At far right, aerospace engineering student Geoff Leutgens descends in the afternoon light. For more info on the Poly Escapes outdoor climbing park, see [www.asi.calpoly.edu/poly\\_escapes](http://www.asi.calpoly.edu/poly_escapes).



## Advancement

From Page 2

Oeser previously served as the donor relations coordinator for the university's central advancement division (UA). In a former position, she also led the telefund program at Gonzaga University to a record-breaking year. An Engineering A Team member for just a month, Oeser has already hit the road to meet alumni in their homes and at regional events.

"What I like best is hearing all the stories from alumni," Oeser noted. "I am inspired by their passion for Cal Poly."

Both Haggerty and Flood are Cal Poly grads. Haggerty earned a degree in animal science and a teaching credential; Flood's degree is in history. Haggerty honed her skills in stewardship and relationship building through work in education, business and nonprofits. When she joined Cal Poly UA as

*"What I like best is hearing all the stories from alumni. I am inspired by their passion for Cal Poly."*

**Amanda Oeser**  
Director of Development

corporate partnership coordinator, she found her advancement niche. As of October, she became devoted solely to nurturing corporate partnerships in the College of Engineering.

"I have a huge playing field because the college has established so many successful partnerships," she said. "The opportunities to expand those partnerships are limitless."

Flood developed a wide array of advancement skills as marketing coordinator for a public relations firm and as administrative coordinator for Cal Poly Food Science and Nutrition, where she was responsible for organizing events, launching publications and social networking, and coordinating a community outreach effort. Flood is often the first point of contact that alumni and parents have with the college.

"A special part of my job is interacting with alumni, students and parents at events or setting up tours," said Flood. "I particularly love working with the Engineering Ambassadors – they are incredible representatives of the college."

If you have questions or ideas about engaging with the College of Engineering, contact the A Team at (805) 756-5374 or [bflood@calpoly.edu](mailto:bflood@calpoly.edu). ■

Nazli Yesiller of the Global Waste Research Institute and environmental engineering graduate Derek Manheim work on Cal Poly's new optical interferometer in a materials engineering lab.

## Beyond the Surface

*Optical interferometer allows for 3-D determination of surface characteristics of materials*

Peering at the surface of materials through an optical interferometer is like looking at a mountainous, colorful dreamscape.

Funded by a National Science Foundation grant, Cal Poly Engineering faculty and students are beginning to use the powerful microscope-like device to visit this different world under a project titled: "Major Research Instrumentation – Acquisition of Optical Interferometry System for Multi-Scale Analysis of Surface Characteristics for Civil Engineering Applications."

"The optical interferometer adds signifi-

cant research capabilities to Cal Poly and the GWRI (Global Waste Research Institute) for surface texture characterization, which is a novel application for civil engineering," said Environmental Engineering Professor **Jim Hanson**, one of the project's principal investigators along with **Nazli Yesiller** (GWRI) and **Garrett Hall**, professor in Civil Engineering and Environmental Engineering (CE/ENVE). "It's an advanced instrument that allows for 3-D determination of surface texture characteristics of materials."

The device, valued at approximately \$300,000, is operated by **Derek Manheim**

(B.S., Environmental Engineering, 2012; M.S., Civil and Environmental Engineering, 2012). Participating faculty include **Ashraf Rahim**, **Tryg Lundquist**, **Daniel Jansen** and **Shikha Rahman** (CE/ENVE); **Patrick Lemieux** (Mechanical Engineering); **Richard Savage** and **Trevor Harding** (Materials Engineering); and **Jay Singh** (Industrial Technology).

Hanson said the equipment will allow for intra- and interdisciplinary interactions across the campus. "An advanced optical interferometer of this caliber is not common," he said. "Similar devices are available at research institutions in limited numbers." ■

## Gene Haas Lab Abloom with New Equipment for Manufacturing Engineers

When students entered the Gene Haas Laboratory for Robotics and Automation this spring, they found it abloom with an array of new equipment for a next-generation workforce of manufacturing engineers.

The new lab opened last year as the result of a \$50,000 donation from the Gene Haas Foundation. That gift, in turn, inspired donations from industry leaders Yaskawa America, Rockwell Automation, Keyence and Trust Automation to outfit the lab with state-of-the-art technology.

But much of the lab's completed landscape was due to the work of Industrial and Manufacturing Engineering Department technician and lecturer **Nick Sweeney** and manufacturing senior **Sam Kaplan** who were largely responsible for installing the equipment.



**Sam Kaplan and Dominique Paradela, manufacturing engineering seniors, working on equipment installation in the new Gene Haas Laboratory for Robotics and Automation.**

Said **Jose Macedo**, department chair: "This was a significant endeavor for a student to take on. Sam's initiative, persever-

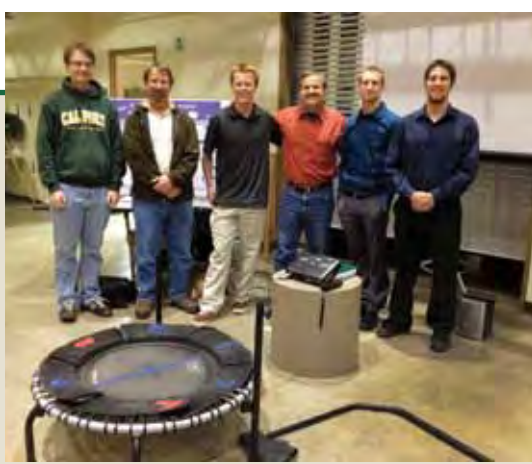
ance and skills have been instrumental in putting everything together."

"In effect, Sam was responsible for the 'manufacture' of our instructional lab stations," added Sweeney. "Each station included a Yaskawa controller, two axis drivers, two servo motors, and a control panel with inputs and outputs for testing and running the system. It entails not only physical assembly, including wiring and soldering, but design and machining of the control panel and final testing."

"I enjoy making things," said Kaplan, who, as a student assistant, has been working on the task since last summer. "The majority of time was spent fabricating custom control panels that are now wired to the new equipment. I machined the panels and fixtures from raw materials in the machine shop." ■



Mark Publicover (in the red shirt) with the 2010 Cal Poly JumpSport team. "The goal of this project was to design and engineer a video game control system that could be integrated into JumpSport's fitness trampoline," explained Publicover.



## Jumping Into Senior Projects

**M**ark Publicover first learned of the mechanical engineering senior design course, ME 428, in 2010 when his son **Jacob** (B.S., Mechanical Engineering, 2011) took the class. Jacob's project involved testing and analyzing different wheel sizes for Specialized Bicycle Components. Meanwhile, his dad, CEO of JumpSport, realized the class provided research and development opportunities for his company.

Since then, JumpSport, a provider of safety-engineered trampolines and nets based in Morgan Hills, Calif., has sponsored five ME 428 projects with grants of \$2,500 per project. During winter quarter, students **Andrew Brock**, **Chris D'Elia** and **Ryan Murphy** started work on a JumpSport project called "Spring & Bungee Cycle Test Machine."

"At JumpSport, we're never empty of ideas, but it takes a long time to test and perfect them," said Publicover. "Cal Poly students do a lot of great analysis, which saves us time. This year's project is a test machine, but last year, the students built a nice prototype of a product we plan to introduce in the market next year."

"Our ME 428 students find it exciting to work with a product development company that has such a great consumer focus," noted Professor **Peter Schuster**. "The interesting projects and corresponding support for student learning provided by JumpSport has been terrific." ■

## Donors Provide Gift Annuities to Support Engineering Students

**A**lthough **Richard Livezey** considers engineering "tough as medicine," he also sees it as a path to success. He should know. He holds a degree from Cal Berkeley in mechanical engineering and has had a successful 30-year career as president and CEO of Sentinel Fire Equipment Company. The Livezeys' son, Michael, also an engineer, graduated from Cal Poly in 2007 with a degree in industrial engineering, and then landed a job at Raytheon.

Because of Michael's positive experience at Cal Poly, and because they want to help financially struggling students in engineering, the Livezeys have established charitable gift annuities at Cal Poly and UC Berkeley.

A charitable gift annuity (CGA) involves an irrevocable transfer of cash or marketable securities to Cal Poly. In exchange, Cal Poly makes fixed payments to the donor or designees for life. A CGA is a way to increase your income, reduce your taxes and make a generous future gift to Cal Poly at the same time.

"The best deal of my life was signing up with two gift annuities," Richard Livezey said. "It's a great deal with fantastic return on investment."

The Livezeys chose to establish a scholarship endowment with their gift annuities because, according to Livezey, "Financial aid helps get your mind off your next meal."



Karin and Richard Livezey have established a charitable gift annuity at Cal Poly to help financially struggling engineering students.

"It makes me feel good knowing that I helped a student out by paying part of their bill," he said. "Hopefully, with this support, a student can get through the program and get out – with the college degree that will help them get a good-paying job."

Livezey was also inspired by his wife, Karin, a retired kindergarten teacher who encourages members in their community to pursue four year degrees.

Livezey's advice to students currently attending Cal Poly is, "Work, work, work. Don't give up. Even if it takes you longer, just keep working at it."

For more information about charitable gift annuities, see [giving.calpoly.edu/plannedgiving/](http://giving.calpoly.edu/plannedgiving/) or contact Stacy Cannon at 805-756-7125; [cscannon@calpoly.edu](mailto:cscannon@calpoly.edu). ■



## GIVE YOUR GIFT A BOOST

Maximize the impact of your investment in Cal Poly through your employer's matching gift program.

More than 13,000 companies have programs that match employee charitable contributions. By signing up, you can potentially double your gift to our Learn by Doing programs.

Many companies also match gifts from retirees and spouses, and some will automatically match gifts made through payroll deductions.

For more information, see [www.giving.calpoly.edu/matching](http://www.giving.calpoly.edu/matching) or contact Linda Stark at 805-756-2713 or [lstark@calpoly.edu](mailto:lstark@calpoly.edu).



## IQ Celebrating 10 Years of Launching Entrepreneurships

Two top winners of last year's Innovation Quest (IQ) competition didn't need to look for jobs when they graduated – the contest had helped them launch their own companies.

That's business as usual for IQ, which started 10 years ago as a "startup of startups." The springboard for 21 profitable companies to date, IQ was created by three successful Cal Poly Engineering alumni interested in giving back to their university by fostering innovation and enterprise. Silicon Valley entrepreneurs **Carson Chen** (B.S. Electrical Engineering, 1973), **Rich Boberg** (B.S. Electrical Engineering, 1970), along with electrical engineering professor **Mike Cirovic**, founded and funded IQ in 2003 and were soon joined by high-technology veteran Laura Pickering (B.S. Electrical Engineering, 1984).

To recognize outstanding innovative projects, IQ presents three awards each year that total \$30,000. But the competition is much more than its no-strings-attached funding. The program offers participants ongoing support, resources and inspiration – from application to awards – through an intense and stimulating series of workshop, networking and mentoring opportunities designed to help students take their vision from concept to market. In addition, finalists and winners are eligible to join IQ's six-week incubator program and develop their own startup company.

"The whole program helped me realize that pursuing my dream of building an impactful business had more to do with a strong intuition and hard work than industry experience," said last year's first-place winner, **Shaun Rihimi** (B.S., Biomedical Engineering, 2012), CEO and primary founder of Thimble Bioelectronics. He was awarded \$15,000 to pursue the development of a wearable medical device that inhibits pain transmission.

"Innovation Quest motivated me to pursue Thimble as a full-time venture rather than as a side project," said Rihimi. "The cash award gave us peace of mind during the early

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Engineering students used cardboard and duct tape to design makeshift vessels and compete in the Poly Canyon Village pool at the Western Digital Build-a-Boat-Challenge. Below: Civil engineering freshman Tyler van Iderstein piloted the winning boat.

## E-WEEK 2013

Cal Poly Engineering celebrated National Engineers Week (eWeek) in mid-February with the theme "Innovate Your Dreams," which showcased the practical as well as visionary applications of the school's Learn by Doing approach.



Computer engineering student David Hoyt holds up his hexacopter during the club exhibition that opened the eWeek festivities. At right: Mechanical engineering student Nick Marquez, third from right, holds up the 32GB iPad Mini he won at National Engineers Week. Below: Cars that travel more than 100 miles per gallon of gas were displayed at Cal Poly's first Future Fuels Expo.



Engineering students full of random knowledge filled up on pizza during the Woodstock's Trivia Contest designed specifically with an engineering slant.







Cal Poly students traveled to Malta in March to help autonomous robots explore underwater caverns.

## Cal Poly Robots Explore the Ancient Underwater Secrets of Malta and Sicily

Autonomous robots and ancient history – it was the best of both worlds for students immersed in the International Computing Exchange (ICEX) expedition to Malta and Sicily this spring. Eight Cal Poly students launched their underwater robots to explore ancient water systems and marine caves largely unseen for 2,000 years.

Joining Cal Poly students and faculty was a team of four Harvey Mudd College students as well as Associate Professor of Engineering **Christopher Clark**, a former Cal Poly faculty member.

The Cal Poly Student ICEx team members included **Cecilia Cadenas**, a computer engineering senior; **Andrew Carrillo**, an electrical engineering master's student; **Ian Dunn**, software engineering junior; **Amanda Erb**, graphic communication junior; **Vanessa Forney**, computer science junior; **Jeff Forrester**, computer science senior; **Erik Nelson**, materials engineering senior; **Spencer Woodworth**, computer science senior; Cal Poly faculty members **Jane Lehr** and **Zoë Wood**.

The students collaborated with marine archeologists and biologists from the University of Malta to investigate previously unexplored underwater sites.

And their research is expected to offer a broad range of impacts. Said Wood: "The survey of cisterns, for example, will help us to better understand the development of Malta's ancient water storage systems, that, in turn, can inform current water management strategy and policy. Similarly, the robotics and visualization technology developed through this project will be relevant to applications in oceanography, biology, homeland security and defense, and robotics education."

A student blog of the 2013 expedition may be viewed at <http://icex2013-maltasicily.blogspot.com>. For additional information on the Malta Cistern Mapping Project see: <http://users.csc.calpoly.edu/~zwood/MaltaMapping/index.html> ■

## Cal Poly CubeSat Team Receives NASA Group Achievement Award — and Looks Beyond Earth Orbit

Cal Poly was among a team of four organizations to receive a NASA Group Achievement Award for outstanding teamwork during the Educational Launch of Nanosatellites III (ELaNa) mission process and launch.

The award was presented to a.i. solutions, NASA, QinetiQ North America and Cal Poly at the 2012 NASA/Kennedy Space Center Honor Awards ceremony held Aug. 28.

"In honoring the NASA ELaNa program, this award is also recognizing all the university students within the CubeSat community who just a few years ago had no flight opportunities in the United States," said **Roland Coelho**, Cal Poly research associate.

Through NASA, the ELaNa educational initiative has provided launch opportunities for CubeSats – small satellites used primarily by universities for research missions – since 2008. During that time, 13 CubeSats have flown on three ELaNa missions.

### Beyond Earth Orbit

Even with CubeSats looping Earth, the Cal Poly space explorers are looking farther into space.

Cal Poly is working with the University of Michigan, University of Texas and NASA's Jet Propulsion Laboratory (JPL) to develop two Interplanetary NanoSpacecraft Pathfinder In Relevant Environment (INSPIRE) satellites – the first CubeSats to leave Earth's orbit for interplanetary space.

If the interplanetary test launch succeeds, CubeSats could someday blanket the solar system, conducting inex-

pensive, high-risk missions to comets, asteroids, moons and planets.

Approved by NASA to launch sometime between 2014 and 2016, the first INSPIRE mission will simply attempt to escape Earth's gravitational influence in an unknown direction. The mission will test whether the small satellites can survive the harsh environment of space.

One of the challenges of the project

ELaNa 3 CubeSat project scientists and students posed with the launch vehicle at Vandenberg Air Force Base. Pictured in back row, left to right: Landon Bradley (Utah State University), David Klumpar (Montana State University), Justin Foley and Justin Carnahan (Cal Poly); in front row, [name TBD], Dr. Charles Swenson (Utah State University) and Roland Coelho (Cal Poly).



is figuring how the tiny satellites will communicate with Earth because they lack complex communications systems or large power sources.

"As we head away from Earth, we're talking about using much larger antennas" to communicate with the low-powered craft, says JPL's Andy Klesh, the principal investigator for INSPIRE. ■



## Raspberries

From Page 1

face a labor shortage,” said Ramirez. “And because of the way the fruit grows and its fragility, it’s unlikely that mechanization is an answer. So, I went to Cal Poly to see if students from different disciplines could provide a new perspective.”

Santamaria, an industrial engineering (IE) major, Yatco (manufacturing engineering) and Cabanez (liberal arts and engineering studies) pooled their multidisciplinary expertise and came up with an entirely new concept: organizing pickers into teams of four and mapping new walking routes to reduce wasted movement.

“Using flow process diagrams (an IE tool we learned in class) to visually map the current walking routes, we predicted we could reduce the wasted walking distance by 78 percent,” said Santamaria.

Ramirez added, “The harvest efficiencies correlated to a \$2.25 per box savings using the team harvest method. As for wasted feet, in some cases it can be 500 percent more efficient.”

In their project presentation, the Cal Poly team showed that the increased productivity is achieved without capital expenditure or machines. It’s a win-win for growers and pickers, too, because more produce picked means increased wages as well as higher sales profits. Multiple test runs validated the team’s results and convinced fresh berry company Driscoll’s to host two presentations of the data to more than 23 of the company’s Central Coast and Central Valley growers.

“We want to share the outcomes of this research; it’s in our interest to spread best practices,” noted John Erb, Driscoll’s

district manager.

“Steve, Jeff and I didn’t expect a 200-level class would lead to us making presentations to growers, ag managers, and the vice president and upper management of the world’s leading berry company,” said Santamaria. “But that’s what’s great about Cal Poly. We get real-world experience in our classes, while Learn by Doing allows us to apply engineering fundamentals to help our communities. We hope that our presentations will convince Driscoll’s to continue to validate and ultimately adopt the proposed method so that the growers, pickers and consumers can reap the benefits of productivity gains.”

Another project outcome for the students was a greater understanding of how agriculture and engineering intersect. “It never occurred to me that engineering could lead to a job in agriculture, but this project definitely opened the doors to new opportunities,” said Santamaria. ■



Cal Poly Engineering students Steven Yatco, Jeffrey Cabanez and Tricia Santamaria presented their raspberry-picking concepts to a group that included Luis Cordoba, Patrick Sheehee, Felix Ramirez, Eric Calderon, Jose Tinoco and Abraham Ramirez.

## Strawberries

From Page 1

intensive agriculture and the post-harvest handling of agricultural products. Since more than three-quarters of the strawberries consumed in the nation are grown in California, the new Cal Poly center will open the doors of a large and important industry sector to Cal Poly engineers.

“Locally produced foods are important to Californians, and we have created this unique partnership to address challenges facing farmers in the 21st century,” said Mark Murai, president of the California



In February, Cal Poly received a \$1 million gift from the California Strawberry Commission to form a Strawberry Research and Education Center.

Strawberry Commission. “We are committed to a robust partnership focused on innovation and applied research intended to help keep strawberry farming viable in California.” ■

## IQ

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prototyping and business development stages. IQ’s startup incubator is great because it offers entrepreneurs a comfortable zone in which to develop the work ethic and personal network of investors.

“The more entrepreneurs that are helped by IQ, the better the world will be,” said Rahimi.

Another team of biotech engineers won third place and \$5,000 for their use of tissue-engineered blood vessels to accelerate the

development of new drugs. Team members **Mike Machado, Marcus Foley** and **Amin Mirzaaghaeian**, all of whom graduated last year from Cal Poly’s blended bachelor’s and master’s program in biomedical engineering, are co-founders of Genicell. The idea-turned-startup company is based on their IQ-honed testing-platform concept, which, among other virtues, eliminates the need for animal testing. (See page 21 for more on Genicell.)

“The Innovation Quest program was the impetus for our journey down the entrepreneurial path,” said Machado, Genicell’s CEO. “We discovered an entrepreneurial spirit we

never knew we had.”

Said Chen: “Genicell and Thimble exemplify our vision for IQ. We designed IQ to be a catalyst for harnessing ideas and innovations that make sense, and it’s a particularly good fit for a polytechnic campus. From the start, IQ has been all about planting seeds and nurturing innovators.”

Agreed Pickering: “Ten years ago, entrepreneurship didn’t exist on campus. Innovation was something that happened in a lab and almost every senior project, once completed, was archived in the library never to be heard from again. Today, just look at all

the new resources dedicated to supporting student innovators and entrepreneurs from all disciplines: the Center for Innovation & Entrepreneurship, Cal Poly Entrepreneurs, the SLO Hothouse and, more recently, the Innovation Sandbox, which stimulates creative play outside the traditional academic environment.

“The true measure of IQ’s success is the success of our students who have started companies. They have become young business leaders who are growing their businesses, creating jobs and following their dreams.” ■





The Cal Poly Society of Women Engineers' Outstanding Women in Engineering for 2012 were, left to right: Ann Livingston-Peters, Shasta Billings, Angela Muscat, Laura Ashley Harris, Alicia Welling and Silvia Aguilar.

The Cal Poly Society of Women Engineers (SWE) announced the recipients of the 2012 Outstanding Women in Engineering Award at the annual Evening With Industry banquet. The six honorees include:

**Silvia Aguilar** (Mechanical Engineering) is a College of Engineering ambassador and a member of the Associated Students board of directors, the Student Community Liaison Committee, and the Engineering Student Council. She was the keynote speaker at the Parent Institute for Quality Education (PIQE), a program that serves parents of underrepresented students, and she also delivered the keynote address at the California Dream Act "Steps to College" Conference.

**Shasta Billings** (Civil and Environmental Engineering) serves as president of the Cal Poly Society of Civil Engineers and is a member of Team Nicaragua for Engineers Without Borders-Cal Poly (EWB). Her interest in the field of water quality has led to her involvement in water quality assessment for EWB, an internship with the Central Coast Regional Water Quality Control Board, and research on new filter designs for the Polytech Waterbag, an award-winning treatment device for use

## Cal Poly Society of Women Engineers Honors Six Outstanding Members

in disaster relief.

**Laura Ashley Harris** (Industrial Engineering) is president of Cal Poly SWE. In March, she received the Emerging Leader award at the regional SWE conference held in Salt Lake City. Harris serves as an engineering ambassador and is active in many organizations including Alpha Pi, Chi Omega, the Institute of Industrial Engineers, the National Society of Collegiate Scholars, and Mortar Board.

**Ann Livingston-Peters** (Materials Engineering) has worked on the Cal Poly Super-mileage Vehicle Team since her freshman

year and is the current club president. Her contributions have helped Cal Poly win third place in the Shell Eco-marathon for the last two years. She is also president of the Materials Engineering Student Society. Because of her interest in composites and materials, she has worked as a student technician in Cal Poly project labs, the Aero Hangar and Mustang '60 facilities.

**Angela Muscat** (Industrial Engineering) serves as an engineering ambassador and chair of the training committee, is a member of numerous honor societies, including Mortar Board, Alpha Pi Mu, Rho Lambda, Order of Omega, and the National Society of Collegiate Scholars. Her work in the areas of human systems integration, program management and systems engineering at a high-profile government agency earned her the organization's Exceptional Performance Award.

**Alicia Welling** (Civil Engineering) has worked on the Cal Poly Concrete Canoe since 2010, contributing to three national titles. This year, Welling is serving as project manager for the team. In addition, she has supported herself through school with a 20-hour-per-week job. She has earned membership in Chi Epsilon, the Civil and Environmental Engineering Honor Society. ■



Caroline Reeves, a mechanical engineering senior, helped Cal Poly advance to the NCAA Championship Tournament for the first time.

## Engineering Student Plays Key Role on Cal Poly's First NCAA Tournament Team

Senior mechanical engineering student **Caroline Reeves** played a key role in the Cal Poly women's basketball team's history-making 2012-13 season.

The 6-0 guard from Nevada City, Calif., recorded 6.7 points and 2.1 assists per game as the Mustangs went 21-10 and made their first NCAA Championship Tournament appearance in school history.

Cal Poly fell to No. 5-ranked Penn State 85-55 in the first round of the NCAA tournament in Baton Rouge on Sunday in late March. Reeves scored seven points and had three assists in the loss.

The 21 wins for Cal Poly matches the program's high set during the 2008-09 season. ■



## Twin-gineers

*IME Department boasts two sets of identical twins*

**T**alk about double majors. Cal Poly's industrial engineering program currently boasts two sets of twins, first-year and fifth-year students, respectively.

**Anna and Blaire McCreary** grew up playing the same sports and sharing an aptitude for math and science, which led them to Cal Poly. In addition to their engineering studies, both play on Cal Poly's club field hockey team and enjoy basketball as well – "though that's just for fun and intramurals," noted Anna.

As for engineering interests, Blaire said, "We're very similar in that we're more drawn to problem-solving than straight manufacturing. We're different in that I think I have more of an interest in human factors and sales, and Anna is drawn to operations research."

"It's too early to pinpoint our specific career interests," added Anna. "but we're both attracted to companies like Disney. It



The Industrial and Manufacturing Engineering Department has two sets of twins: Left to right, Ann McCreary, Michael Shelton, Blaire McCreary and Tyler Shelton.

reflects what we like best about industrial engineering – creating and enhancing the human experience."

Similarly, **Michael and Tyler Shelton** share common interests, friends and sports activities, as well as an affinity for the big picture, people-oriented aspects of industrial engineering.

"Cal Poly is known for fostering collaboration," said Michael. "As twins, I think

we have a natural advantage in that area – it's all we've known, although there's always been a healthy competition, too."

The brothers were both drawn to the Sales Engineering Club in their freshman year. Michael, an officer in the club, is also an intern at Rockwell Automation where he hopes to start his career in sales engineering when he graduates in the fall.

Tyler, who graduates in June, also looks

forward to working in a major company, and expresses confidence about his future.

"Many students here have parents who are engineers. In our case it was our sister Samantha (now Samantha Mazza), a 2004 industrial engineering graduate, who influenced us. We saw how quickly she found a job and how successful she has been throughout her career." ■

## 2013 Cal Poly Rose Parade Float Captures Bob Hope Humor Award

**"T**uxedo Air," the 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 in the 2013 Rose Parade in Pasadena on Jan. 1.

"Tuxedo Air" conveyed the 2013 parade theme of "Oh, the Places You'll Go!" through the depiction of adventurous penguins learning to fly with the hope of reaching warmer and more exotic lands.

Cal Poly students, including dozens from the College of Engineering, have worked with their counterparts at Pomona every year since 1949 to build a float for the annual New Year's Day parade. In true Learn by Doing fashion, students de-



sign the float and build it themselves (half at each campus), then put it together with the help of volunteers in the days leading up to the parade.

For more images of the Cal Poly float, see <http://calpolynews.calpoly.edu/slideshows/Rose13/>. ■

## Graduate Student Elected President of SFPE

**C**al Poly graduate student **Joshua W. Elvove** was elected president of the Society of Fire Protection Engineers (SFPE) for 2013.

Elvove is a licensed professional engineer in four states, and a certified safety professional, with more than 32 years of overall fire protection and life safety experience with the federal government and the private sector.

Although a highly experienced professional, Elvove is also a graduate student in Cal Poly's Fire Protection Engineering Program (FPE). "It's never too late to extend your knowledge, especially in an ever-changing field like fire protection engineering," he said. "Cal Poly's FPE master's program offers a broad range of fire protection classes that are based upon theory but can be applied in practice. The faculty has a broad range of field experience and the education modality used makes it effective and convenient."

Elvove has served on the Society's

board of directors since 2004 and is an SFPE Fellow. SFPE Fellows represent a distinguished group of members who have attained significant accomplishments in engineering.

Elvove's federal experience includes serving as the senior fire protection engineer for the U.S. General Services Administration; leading the managing safety and fire protection program for the Department of Veterans Affairs' western and Rocky Mountain regions.; and serving as a fire protection engineer for the both the Naval Facilities Engineering Command and U.S. Army Corps of Engineers. His private sector experience includes working for Parsons Infrastructure as the fire protection engineer for the Incheon (Korea). ■



Joshua W. Elvove  
(FPE)



# Transferring Technology, EWB-Style

With the help of Black & Veatch's Building a World of Difference Foundation, Cal Poly Engineers Without Borders returned to Thailand last December to officially hand off its student-designed and built water filtration system to the villagers of Huai Nam Khun.

A \$7,000 grant from Building a World of Difference helped send six EWB-Cal Poly students to conduct a closing workshop on the slow sand filtration system they first installed in 2005 to improve water quality in the village.

"The workshop enabled us to engage the community members in a technical dialogue regarding the modular construction of the systems," explained **Allie Davis**, EWB project manager. "Additionally, the Thailand team provided the villagers with a set of comprehensive manuals that will enable the community members to fix, maintain, operate and even construct the slow sand filters on their own. Successful technology transfers like this are a primary goal of Engineers Without Borders."

While in Thailand, EWB members also conducted cultural and technical assessments for possible future projects, including construction of a pedestrian bridge, a dam retrofit, hydroelectric generation, organic composting and water filtration in a neighboring village. ■

## Project Background

Since 2005, Cal Poly's EWB Student Chapter has maintained a relationship with the community of Huai Nam Khun, Thailand, in an effort to improve the villagers' lives through sustainable development. Huai Nam Khun is located in the Chiang Rai province of northern Thailand and is home to 3,000 Chinese and Burmese refugees who make their living by subsistence farming.



Cal Poly engineering students working with Engineers Without Borders have successfully constructed six slow sand filtration systems to improve drinking water quality in the tiny village of Huai Nam Khun, Thailand.

# Cal Poly Society of Hispanic Engineers Shines at National Convention

Cal Poly's chapter of the Society of Hispanic Engineers (SHPE) won three prestigious awards at the society's annual conference in Fort Worth, Texas.

Cal Poly SHPE was named Region I Chapter of the Year and aerospace engineering student **Rene Farfan** collected first place in the Technical Paper category. Electrical engineering student **Kevin Shibley** was part of a team that took first place in the Extreme Engineering Challenge; the team was composed of students from universities across the nation.

The Chapter of the Year award for Region I, which includes Stanford, UC Berkeley, Oregon, Nevada, Washington and other universities, is based on activities that include professional development, leadership development, academic development, community outreach and chapter development.

"This past year we excelled in all these fields and a lot of that is due to the industry support that we get," said Cal



The Cal Poly chapter of the Society of Hispanic Engineers (SHPE) won three awards in Fort Worth, Texas.

Poly SHPE President **Ivan Lucatero**. "We routinely have company reps come to our meetings and expose us to what their companies do. An exclusive event we hosted last year was a design competition for our members. The theme was 'Entertain and Educate.' We had two teams ultimately compete for a cash prize while creating fun and educational activities for kids, which were then graded by Lockheed Martin

employees."

Shibley, a senior electrical engineering student, was a member of the first-place team in the Extreme Engineering Challenge, which he described as "a non-stop 24-hour competition that engages teams against each other to find out who can out-design, out-develop and out-promote the others in a race against time, talent and creativity."

Shibley's team split a \$4,000 award for first place.

Farfan, a fourth-year aerospace engineering student, took home first place in the Technical Paper competition, which was judged by a select committee for "originality, social impact and completeness."

"Our SHPE chapter is always very strong, having over 100 active members and fostering a great sense of community," said Lucatero, who added that the Cal Poly chapter wouldn't be resting on its 2012 accomplishments. "Our main goal for the future is to improve our community outreach. We are currently working very

hard to establish a SHPE Jr. Chapter in one of the high schools in the Santa Maria area. We are also working closely with Allan Hancock College to promote STEM fields among middle and high school students through Family Science Nights."

For more information on Cal Poly Society of Hispanic Engineers, see [shpe.calpoly.edu](http://shpe.calpoly.edu). ■



## Cal Poly Women Engineers Named Best in the Nation

*SWE chapter has won award nine times since 2002*

Cal Poly's Society of Women Engineers (SWE) is not only one of the largest chapters in the nation, it has also been named the best. Cal Poly received the Gold Level Award, large collegiate section, at the 2012 National SWE conference in Houston.

It was the second year in a row – and the ninth time since 2002 – that Cal Poly SWE has been recognized as the nation's top collegiate section.

The award honors outstanding achievements in a wide range of areas including planning and administration, communication, member recruitment, regional and national participation, education and outreach, inclusiveness and diversity, and alignment with the national SWE mission.

Cal Poly SWE also won the Outreach Award for its high school shadow event, and placed third in the Team Tech competition

for creating a mobility device that allows wheelchair users to switch easily between power-assisted, fully automated and manual operation.

"Our success on all fronts is a direct result of the commitment of our advisor, **Helene Finger**, club officers and our members," said **Laura Harris**, Cal Poly SWE president.

Cal Poly SWE also broke records in individual awards with five Cal Poly alumnae honored in three categories.

"Not only do this year's national awards celebrate the outstanding accomplishments of Cal Poly SWE as a chapter," said **Deb Larson**, dean of Cal Poly Engineering, "but they also honor the caliber of individual members – students and alumnae – on an unprecedented level. The awards high-

light the culture of achievement here that actively nurtures, shapes and inspires new generations of leaders and role models."

The five Cal Poly SWE alumnae that received Individual awards included:

- Distinguished New Engineer Award: **Jennifer Harris Nichols** (B.S., Industrial Engineering, 2003; M.S., Engineering, 2003) and **Tracy Van Houten** (B.S., Aerospace Engineering, 2004).

Harris Nichols' engineering career began at UPS, where she was promoted three times in five years, making her the company's youngest woman engineering manager. She is currently a clinical engineering manager for TriMedx, a healthcare technology

management company. Van Houten, a systems engineer for NASA's Jet Propulsion Laboratory, was part of the team that landed the Curiosity rover on Mars.

management company.

management company.

- Outstanding Collegiate Member: **Megan Adams** (B.S., Mechanical Engineering, 2012) and **Morgan Miller** (B.S., Civil Engineering, 2012). Adams is in charge of the 2013 SWE Future Leaders training and is the 2014 collegiate leadership forum coordinator. Last year, Miller served as president of the SWE Cal Poly section and vice president of Chi Epsilon, the civil and environmental engineering honor society.

- Emerging Leader Award: **Elizabeth Green** (B.S., Business Administration, 2000). A corporate manager at Northrop Grumman, Green was recognized for superior achievements in the areas of systems engineering, risk management and supply chain management. ■



## First Impressions: Ambassadors Show Pride

The Engineering Ambassadors are known to be so enthusiastic, knowledgeable and engaging that, after a tour, prospective students and their parents want to enroll.

The Ambassadors – 50 in all, and entirely unpaid and student-run – love sharing their passion for the College of Engineering with the public. Last year, the group gave 70 college overview tours to more than 3,000 families and prospective students. In addition, Ambassadors offer department tours for each of the 13 engineering majors, and special tours are provided for industry representatives and school groups.

"We showcase engineering labs from every department," explained **Michael Haworth**, club president. "You can see us walking through the Industrial and Manufacturing Engineering Net Shape Lab, Aerospace wind tunnel, Mechanical Engineering controls and vibrations laboratories, and the Electrical Engineering Basic Circuits Lab, just to name a few. By the end of each tour, everyone knows about

Learn by Doing and how industry helps support projects and labs."

Frequently, the Ambassadors provide the first – and most influential – impression of the university to college-hunting students and their parents. Feedback from tours is often glowing:

- Our tour guides were terrific!! Not only did they give a great tour, but they also did a great job of explaining the various majors. I was very impressed with them and with Cal Poly Engineering!"
- "The tour guides helped my daughter decide which engineering major she'd like to pursue."



College of Engineering Ambassadors often make the first Cal Poly impression to prospective students and their parents.

- "Best college tour I've attended!"
- "We left the tour very impressed. Specifically, the hands-on learning approach and the application of engineering principals. My son left that day very excited to apply."

The Ambassadors' pride in Cal Poly fuels their enthusiasm. They spend an entire quarter training for the job.

"My favorite part about being a tour guide is hearing how our tour convinced someone that this university was the right choice for them," said Haworth. "It is extremely rewarding to meet students on campus and learn that your tour convinced them to come to Cal Poly!" ■



# Cal Poly's Supermileage Team Tops 1,000 MPG

A multidisciplinary team of Cal Poly Engineering students recently took their car out for a 1,210-mile spin – on a gallon of gas. And they were not alone.

The Cal Poly Supermileage Vehicle Team competed with more than 1,100 students from 120 schools in the United States, Canada, Mexico, Brazil and Guatemala to design, build and drive the most energy-efficient vehicle possible.

Cal Poly's entry, the Lamina II, placed seventh in an elite pack of prototype cars that achieved 1,000 miles per gallon or more at the Shell Eco-marathon Americas held April 5-7 in Houston.

A record-breaking distance of 3,500 miles per gallon was achieved by Laval University from Canada; the Mater Dei team from Indiana placed second with 2,308 miles; and Cal Poly was among five other top contenders whose runs ranged from 1,210 to 1,451 per gallon.

"Competitions like this really highlight our Learn by Doing approach," said team member **Sean Michel**. "It's rare for these top-ranking vehicles to have been entirely designed and built by students – it's not uncommon for other teams to outsource tasks such as manufacturing the windows and fairing (an aerodynamic shell to the



car). Ours is done all in house. Our multidisciplinary team definitely brings a good mix of know-how in areas ranging from mold making and material strength to engines and technology."

Cal Poly team members included aeronautical engineering students **Adriano Agostino**, **Chad Bickel**, and **Jason Schupp**; computer engineering sophomore **Aaron Gascoigne**; materials engineering majors



Cal Poly Engineering students including **Sean Michel**, left, and **Ann Livingston-Peters**, above right, work on the Supermileage car Lamina II. Cal Poly finished in an elite group at the annual Shell Eco-marathon in April.

**Dorian Capps**, **Ann Livingston-Peters**, **Finley Marbury** and **Kyle Savage**; and mechanical engineering students **Larry Huang**, **Sean Michel** and **Gabriel Mountjoy**. ■

## SalesForce.com Offers Software Engineering Students a Real-World Project Experience

Cal Poly's software engineering capstone class sets ambitious goals: "We want students to experience the software development life cycle in a context that is as real as industry projects as possible, but in an academic context so that students receive significant mentoring, reflect on their experiences and are able to fail safely," said Associate Professor **David Janzen**.

To establish the real-world environment, Janzen's students undertake projects for an industry client. This year, five class teams are developing a mobile analytics application for Salesforce.com.

Salesforce.com, a global enterprise software company, is known for its customer relationship management (CRM) product and is currently ranked the most innovative company in America by Forbes magazine. Many Cal Poly graduates have made Salesforce their professional home; in fact, all five of the Salesforce.com representatives working with the software engineering capstone students are alumni.

In March, **Gene Rivera** (B.S., Business Administration, 2000), **Jimmy Hua** (B.S., Computer Science, 2006), **Thomas Dvornik** (B.S./M.S., Computer Science, 2011), **Kevin Carr** (B.S., Software Engineering, 2009), and **Josh Roe** (B.S.,

Computer Science, 2007) traveled from company headquarters in San Francisco to review and critique the students' progress.

"This is a great opportunity for students to learn what the company has to consider when developing products," said Hua, technical staff member for Salesforce.com's research and development and former student of Janzen. "Moreover, giving back is part of Salesforce.com's brand. We love working with Cal Poly students."

Janzen explained that the capstone application project includes three components: a software development kit (SDK) that Android app developers would integrate into their own apps to track their users' usage, a database on Salesforce.com that stores app analytics data, and a mobile dashboard that app developers can use to view and analyze usage of the apps.



Software Engineering capstone team Salsaforce included (bottom row, left to right): **Mark Henry**, **Cory Karras**, **Martin Silverio**, **Stephanie Bong** and **Brandon Page**. Top row: Cal Poly Engineering alums and Salesforce.com employees **Kevin Carr**, **Jimmy Hua**, **Josh Roe**, **Thomas Dvornik** and **Gene Rivera**.

"For instance, the makers of a game could integrate the students' SDK into their app to collect usage data and then use the dashboard to see things like whether the number of females from Italy who have completed at least two levels in the game are increasing or decreasing over time," he said. "Each of the five Cal Poly teams is creating a version of the system using different software architecture and technologies. We expect the mobile analytics app to be released as an open-source application in the Salesforce.com third-party developer market." ■





Cal Poly Engineering students Doug Gallatin, Drew Bentz, Will Budney, Michael Chamoures and Timothy Peters and professor Foaad Khosmood, third from right, are building four quad-copters as part of their capstone class.

## Students Hover Over ‘Quad-copters’ Project

With the use of unmanned drones moving well past science fiction to everyday reality, five Cal Poly Engineering students are bringing a Learn by Doing approach to the growing field of autonomous flying robots.

Computer science graduate students **Timothy Peters** and **Doug Gallatin** along with computer engineering undergrads **Drew Bentz**, **Will Budney** and **Michael Chamoures** are building the hardware and writing the software for four “quadrotor” helicopters in a capstone course taught by **Foaad Khosmood**.

“What’s unique about our quad-copter is that it flies on its own – it’s not remote-controlled,” said Peters. “It’s equipped with sensors that detect obstacles and allow it

to stabilize. Initially, the quad-copter will be used to navigate a three dimensional maze which will provide the basis for future student projects.”

The quad-copters, which were built with funding from CP Connect and the CPE Capstone Fund, were successfully undergoing flight tests in preparation for a demonstration at Open House. Peters said professor Khosmood would like to develop both a robust platform for the helicopters that could be used by other schools and a new competition similar to the popular Roborodentia, the annual autonomous table-top-based robotic contest.

“The autonomous quad-copters should get a lot of



The quadrotor helicopters fly autonomously by sensing physical objects and can be directed by hand-held foam boards.

attention at Open House, helping to attract attention and high school students to the department,” Peters said. “Our project pushes the technology forward – it helps us become engineers who can do research on the frontiers of a new industry.” ■

## Dairy Waste = Dairy Energy

*Project attracts interest from President Armstrong*

Cal Poly President **Jeffrey D. Armstrong** is no stranger to dairies; in fact, he is recognized as a leader in nutrition and reproduction in large food animals. And on a recent tour at Cal Poly’s Dairy Manure Research Station, he learned about research efforts that may enable the Cal Poly dairy to provide more than milk.

Under the direction of Environmental Engineering Professor **Tryg Lundquist**, graduate students **Neal Adler** and **Sean Thomson** are researching energy generation from dairy manure using anaerobic digesters. By breaking down biodegradable material, anaerobic digesters produce biogas, including methane, which can be used to power gas engines.

“Anaerobic digesters have been around a long time,” noted Adler, “but California’s greenhouse gas regulations make it difficult for operation of large-scale units in the

San Joaquin Valley because of the nitrogen oxide emissions from biogas-fired generators.”

According to Lundquist, the project by Adler and Thomson tests an innovative and potentially viable alternative. “The students have constructed three pilot digesters – the silver cylinders next to the dairy lagoon – that use walnut shells as a medium for microbial attachment.”

“We’re trying to recover as much methane and CO<sub>2</sub> as possible in small, packed-bed digesters that use walnut shells, a



President Jeffrey D. Armstrong (center) in front of anaerobic digesters at the Cal Poly dairy. Pictured on either side of the President are Neal Adler and Sean Thomson, graduate student researchers on the packed-bed anaerobic digestion project. Kyle Fooks, left, is a graduate student researcher for a reciprocating biofilm reactor project at the dairy; Nate Gockel, right, is a civil and environmental engineering undergraduate and digester plant operator.

waste stream product widely available in California,” explained Adler. “By keeping the units small, we would alleviate air quality restrictions and provide an attractive digester solution that could provide carbon credits and electricity for dairies.”

“This project represents Learn by Doing in action and showcases the expertise of students and faculty in developing applied solutions to real world problems,” said Armstrong. “In fact, I’d like to explore the possibility of establishing an anaerobic digester plant for the region in collaboration with community partners.” ■



# QL+ Lab's Latest Cutting-Edge Project

*Ergonomic knife is designed for veterans with diminished hand, wrist or arm functions*

Cal Poly student innovators are partnering with Schweitzer Engineering Laboratories (SEL) to produce something fundamentally cutting edge: a knife

SEL has teamed up with Cal Poly Engineering's Quality of Life Plus (QL+) Laboratory to hone the design and manufacturing processes for the Ergo Knife, an ergonomically designed cutting utensil for those with diminished hand, wrist or arm functions.

The project is a natural fit for QL+, founded in 2009 by alumnus **John Monett** (B.S., Industrial Engineering, 1964). The multidisciplinary facility on the Cal Poly campus is dedicated to researching and developing innovations to improve the quality of life of wounded and disabled veterans.

The Ergo Knife, still in development, is one of a range of prosthetic devices and adaptive technologies created by Cal Poly Engineering students.

SEL, a well-known innovator in the power industry, is helping Cal Poly Engineering students design and manufacture the knife utensil by sharing the company's manufacturing expertise and providing the students with access

to its plastic injection molding system. The students will travel to SEL's manufacturing facilities in Pullman, Wash., and Lewiston, Idaho, to develop a prototype and produce a finished product. In addition, the company is funding a portion of the project.

The role of the company with this project is not that far afield, notes Ed Schweitzer, CEO and founder of SEL, listed last year as one of "The 100 Best Companies to Work For."

The company works frequently with university engineering programs, including Cal Poly's, focusing on power systems.

Schweitzer considers the Ergo Knife project to be empowering in a similar way.

"This will provide students experience from the design through the manufacturing process," said Schweitzer, "It's one more way for us to encourage entrepreneurialism by showing them firsthand how to build a product."

SEL serves the power industry worldwide through the design, manufacture, supply and support of products and



The Ergo Knife is an ergonomically designed cutting utensil for those with diminished hand, wrist or arm functions. It's one of many innovations coming out of QL+, an on-campus, multidisciplinary student laboratory.

services for power system protection, monitoring, control, automation and metering. ■

## Students Find Corn-fed Solution for Radio Frequency Absorption

*A tour de force* project of two electrical engineering students produced a solution that has industry-changing potential. Using bio-friendly byproducts, **Sean Casserly** and **Ben Smythe** created a new material for radio frequency (RF) absorbers.

"RF absorbers are an industry essential," said Smythe. "They're used in testing all wireless communication devices for unwanted signals bouncing around."

But there are some major downsides to how absorbers are currently made.

Explained Casserly: "The carbon urethane composition of absorbers crumbles over time, releasing dust and particles that not only contaminate clean rooms, reduce absorber lifetime and disrupt test equipment, but they are also carcinogenic."

The project goal was to replace toxic absorber materials with organic fillers (corn stover, which is a mix of corn stalks and leaves) combined with bio-friendly binders.

"The absorber prototype we created using corn and recycled rubber was able to match and even outperform the standards for commercial absorbers now on the market," said Smythe. "Through hard work, determination and persistence, we were able to create a truly innovative project." ■



Faculty advisor **Dean Arakaki** (left) and **Sean Casserly** grind corn stover with a laboratory blender.



The GWRI research team installs a magnet extensometer settlement system at the Santa Maria Landfill. The team includes, left to right: **Jeffrey Clarin**, landfill site manager; civil and environmental engineering graduate student **Jason Cox**; faculty advisor **Jim Hanson**; civil and environmental engineering graduate students **Taki Chrysovergis** and **Michael Onnen**, civil engineering undergraduate student **Andy Flores**; and landfill staff member **Doug Shearer**.

## Project Aims to Optimize Landfill Waste Placement

Cal Poly's Global Waste Research Institute (GWRI) has recently undertaken testing programs to identify opportunities to improve waste placement practices at the landfill in Santa Maria, Calif.

**Jeffrey Clarin** (B.S., Environmental Engineering, 1998), site manager at the Santa Maria Landfill, has worked closely with the GWRI research team to facilitate data collection from the landfill and evaluate the efficiency of alternative operational strategies.

Specifically, the site has been instrumented with magnet extensometer systems and thermocouple arrays

for monitoring long-term settlements and temperatures within the waste mass. The team is evaluating the influence of adding moisture to the incoming solid waste prior to compaction.

GWRI Director **Nazli Yesiller** and Professor **Jim Hanson** (Civil and Environmental Engineering) are co-advising the project. **Jason Cox**, lead graduate student on the project, said, "My research in geoenvironmental engineering and waste management has been a great experience so far. I have thoroughly enjoyed working with the crew at the landfill." ■





From left: Liberal Arts and Engineering Studies Co-director David Gillette; 2012 graduates Andrew Mai, Jeffrey Franklin, Tyler Whipple, Brigit Hawley and Spencer Ellsworth; and Co-director Michael Haungs. Not shown is Griffin Davis.

## The Art of Engineering is a Matter of Degree

When Cal Poly conferred its first Bachelor of Arts in engineering studies in 2009, it affirmed the inherently interdisciplinary nature of global change, societal challenges and emerging opportunities.

Beginning with that first commencement class, graduates of the Liberal Arts and Engineering Studies (LAES) program have been recognized for their combined skills and interests in engineering, the arts, technology and humanities. Their degrees symbolize a new model of technical and cultural fluency for an increasingly competitive and technology-based global economy.

One of those first graduates, **Bill Trammel**, noted, “Students are not always simply left brain or right brain, but often an eclectic mixture of both, with a number of talents in both areas. This kind of cross-disciplinary thinking is vital to a healthy academic environment, and LAES’ real-world, project-focused curriculum is exactly what is needed.”

The CSU agrees. This spring, LAES became an official part of the Cal Poly curriculum when CSU Chancellor Timothy White authorized that the pilot program be converted to regular status.

“We are proud of this important milestone,” said **Douglas Epperson**, dean of the College of Liberal Arts. “The LAES program is preparing students for optimum success in a dynamic world of work that increasingly demands and rewards well-developed creative and critical thinking; effective cultural, interpersonal, and communication skills; current technical knowledge and talents; and a commitment to life-long learning.”

**Deb Larson**, dean of the College of Engineering, points out how LAES’ innovative partnership leverages the special strengths of a polytechnic university.

“The LAES program offers students the opportunity to connect liberal arts perspectives to real world is-

suess,” said Larson. “It not only prepares our students for rapid advances in science and technology, it gives them the social, historical and global perspectives in which to apply their knowledge wisely and creatively. The Bachelor of Arts designation encapsulates these distinguishing features, and opens doors to non-traditional careers and expanded opportunities.”

“In the real working world, no one works with just engineers or just artists,” said **Michael Robotham**, a 2010 graduate of the program. “They all work together. Having the ability to talk to every type of person in between that spectrum puts me at an advantage.”

“Graduates have gone on to work in fields as varied as audio and visual filmwork, community development, gaming and even theme park technologies,” said **David Gillette**, LAES co-director.

“Interactive entertainment projects are highly interdisciplinary by nature,” said **Foad Khosmood**, assistant professor in the Computer Science Department. “LAES labs and facilities, for example, helped multidisciplinary teams of Cal Poly students to produce sound effects and music for the annual Global Game Jam, the largest game design competition in

the world. During the 48-hour ‘hackathon’-style event, participants explore all facets of game development – be it through programming, design, narrative creation or artistic expression.”

At a national symposium on engineering and liberal education last spring, Charles Vest, president of the National Academy of Engineering, said that the integration of engineering and the liberal arts is essential to meet growing global challenges and societal changes.

“Different ways of thinking, analyzing and knowing can combine with the purely technical to work wonders,” said Vest. ■

*“It not only prepares our students for rapid advances in science and technology, it gives them the social, historical and global perspectives in which to apply their knowledge wisely and creatively. The Bachelor of Arts designation encapsulates these distinguishing features, and opens doors to non-traditional careers.”*

**Debra Larson**  
Dean, College of Engineering

## Eye on the Future: Cal Poly Works to Increase Women in Computing and Technology

Women hold up half the sky, but they’re hard to spot in computing and technology fields. According to National Center for Women & Information Technology (NCWIT), women currently hold only 25 percent of all computing-related occupations in the U.S. and comprise just 18 percent of all computing and information sciences degrees earned at U.S. institutions.

To boost the talent pool and support female students, the Cal Poly Computer Science and Software Engineering Department (CSC) has undertaken multiple initiatives, which have been led by Assistant Professor **Zoë Wood**. The feedback from students about these efforts is encouraging.

For three years, the department has sent students to the Grace



Hopper Celebration of Women in Computing (GHC) conference, the world’s largest gathering of women in computing. In 2012, 17 Cal Poly students received grants for airfare, registration and hotel accommodations to attend the event held in Baltimore, making them the largest cohort of students from a public university.

CSC sophomore **Jessie Pease** who called the Grace Hopper Conference “eye opening,” added “The professional technical women were there to mentor us, encourage us to pursue our dreams, and motivate us to become leaders in our fields.”

Alexa Francis, a junior in software engineering, said: “Not only are the technical sessions at Grace Hopper informative and inspiring, but the connections that I’ve made have provided so many opportunities. I’m so fortunate that the Computer Science Department cares enough about women in computing to help finance these trips.”

In addition to providing Grace Hopper grants, CSC supports the Women in Hardware and Software club (WISH). Wood, the faculty



advisor to the group, explained, “Through WISH, we have established a robust mentoring program that pairs female majors with industry professionals, and upper class females with incoming freshmen.”

Says Francis, “WISH helped me as an underclassman by supporting me as one of the few women in the field. WISH hosts both social and industry events. Last week, we

had a PASS Party to help members figure out what they should register for next quarter. Our Cookies and Cocoa for Coders study group is this week. Other events range from rock climbing to field trips to Google headquarters to visiting high school students. WISH has opened doors to internships and given me some great friendships.”

Cal Poly’s latest effort to increase women in computing fields is to join Pacesetters, a two-year program launched by NCWIT. The 20 universities and 14 companies participating include startups and global corporations, universities and state government departments.

Pacesetters participants use innovative recruitment and retention methods to tap new talent pools and introduce interventions for those at risk of leaving, with the goal of bringing significant “net new” women to their organizations. The program is sponsored by the National Science Foundation, Google and Qualcomm. ■



# Grad Student Explores the Future of Regenerative Medicine

“Working to answer questions that nobody else in the world is asking” – that’s how **Mike Gibbons**, a biomedical engineering graduate student, describes the highs of his internship at the Stanford University-affiliated Veterans Affairs (VA) hospital in Palo Alto, Calif. “Every day there gives me the possibility to be the first person to ever

creating new treatments that can actually repair damaged tissues and organs.

The program is funded through a \$1.4 million Bridges to Stem Cell Research Award established in 2009 by the California Institute for Regenerative Medicine (CIRM), the largest source of funding for human embryonic and multi-use stem cell research.

According to **Trevor Cardinal**, associate professor in the Biomedical Engineering Department and director of the stem cell research program, it is the built-in internship that makes Cal Poly’s program unique.

“Our grad students spend nine months working with one of our partner institutions on a rigorous project in a research-intensive environment. When they return for the culmination of their degrees, they then integrate their experience into stem cell research projects on campus,” said Cardinal. “What Mike has learned through his internship experience at Stanford’s VA will be directly applied to clinically relevant research at Cal Poly’s tissue engineering lab this spring.”

In addition to Stanford, Cal Poly’s stem cell research partners include the Salk Institute, Scripps Institute, UC San Diego and Novocell.

“The project at the Stanford VA is a great blend of biology, physiology and engineering,” said Cardinal. “It showcases the interdisciplinary nature of the program – especially since Mike is working with **Robert Chacon**, a graduate student who majored in biological sciences in the College of Science and Mathematics.”

“One of the coolest things I’ve done,” noted Gibbons,

“was to fabricate and transplant artificial muscle fibers into a mouse muscle, from start to finish. Then, using in vivo imaging techniques, I had the thrill of seeing that our engineered fibers behaved very similarly to living-muscle fibers.”

“My Cal Poly education has been invaluable – from my core engineering foundation as an undergraduate to Dr. **Kristen Cardinal**’s tissue engineering class, Dr. Trevor Cardinal’s transplantation class, and Dr. **Lily Laiho**’s imaging class.

“I use techniques and principles I learned in those classes

every single day in the Palo Alto lab. My Cal Poly engineering education, strengthened during my internship at Stanford, has given me a great jumping-off point as I pursue my Ph.D. Eventually I would like to go into teaching, where I hope I can have the same impact on my students as my professors at Cal Poly have had on me.

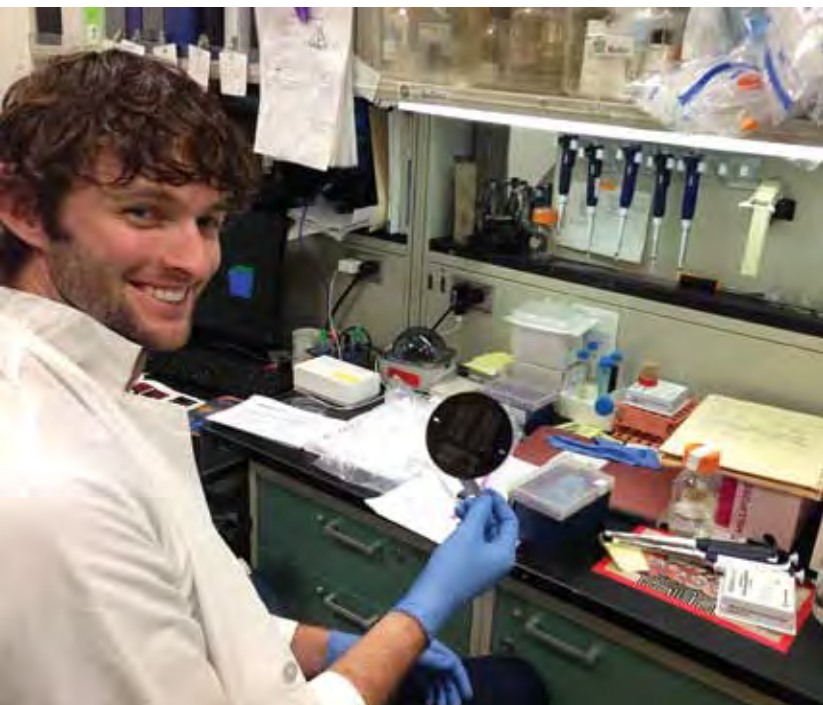
“One of the things that has made the 12-, 16- and even 20-hour days worth it is knowing that the work we’re doing could, one day, restore muscle function in patients with any number of diseases that affect the musculature. Working in a VA hospital, we get a daily reminder of the

men and women who have sacrificed their freedom – in terms of mobility and quality of life – for all of our sakes. To be working on projects that might someday give them the chance to stand on their own two feet again, or pick up their kids or grandkids in their own arms, is extremely rewarding.

“The field of regenerative medicine is still growing at a rapid pace, and I’m excited to be a part of the therapies that will undoubtedly start coming into the marketplace in the next five to 10 years,” he said.

In addition to Gibbons, this year’s stem cell class includes biomedical engineering students **Charlie Clapp**, **Carl Dargitz**, **Jeffrey Palmer** and **Sarah Ur**; biology students **Robert Chacon**, **Blake Gilmore**, **Brett Henninger** and **Cole Schmidt**; and **Jane Isquith**, animal science.

For more about CIRM, see <http://www.cirm.ca.gov/> ■



Cal Poly graduate student Mike Gibbons works with stem cells in a biomedical engineering lab as part of his study of regenerative medicine.

observe a particular phenomenon.”

Gibbons is one of 10 Cal Poly graduate students this year receiving a master’s degree specialization in stem cell research. He is among a new generation of researchers entering into the emerging field of regenerative medicine – where instead of just treating symptoms, the focus is on

## Cal Poly’s Game Designers Jam On

More than 30 Cal Poly students and local developers participated in Global Game Jam 2013 (GGJ’13) in January. The event is the world’s largest game creation activity, held concurrently with some 320 other locations in 63 countries around the world. More than 16,000 people participated in 2013.

Organized by the Cal Poly Game Development Club (CPGD), the three-day local jam commenced with the broadcast of the keynote video and revelation of this year’s jam theme: the audio sound of a human heartbeat. For the next 48 hours, the jam teams developed nine games in all. The jammers received audio production assistance

from the Cal Poly Liberal Arts and Engineering Studies (LAES) laboratories. By Sunday afternoon, all games and source code were uploaded to GlobalGameJam.org and released under the creative commons license in accordance with GGJ rules.

“Computer games are inherently interdisciplinary artifacts,” said Assistant Professor **Foad Khosmood** (Computer Science/Computer Engineering), CPGD advisor and co-executive director for GGJ’13. “Creating games requires skills in art, design, program-



ming, storytelling and audio production. Game jams are excellent environments for rapid prototyping of ideas and concepts — they provide an opportunity to enhance

More than 30 Cal Poly Engineering students participated in Global Game Jam 2013.

student portfolios, much valued by industry recruiters.”

Although the GGJ is not a competition, local sites often hold audience choice awards. At Cal Poly, the stealth action-adventure game **Torus** was the audience favorite. Designed by students **Tim Adam**, **Nick Alereza**, **Robert Crosby**, **Matt Hennes** and **Ian Mitchell**, the game featured high-quality animation and a persistent world where player actions were recorded and remembered in future games.

To see Cal Poly’s participation in GGJ’13, visit: [globalgamejam.org/calpoly](http://globalgamejam.org/calpoly). ■



# Faculty Notes

## Dean's Office

**Nazli Yesiller**, research fellow, received two awards from ASTM, an international standards organization that develops voluntary consensus technical standards for a wide range of materials, products, systems, and services. She received the ASTM Committee D18 Special Service Award for service as chair of D18.04 (Hydrologic Properties and Hydraulic Barriers Committee) for three terms (2007-12).

Yesiller also received the Richard S. Ladd D18 Standards Development Award from Committee D18 for her efforts in preparation of ASTM Standard Designation D7760 "Standard Test Method for Measurement of Hydraulic Conductivity of Tire-Derived Aggregates Using a Rigid-Wall Permeameter."

A member of ASTM D 18 since 2002, Yesiller has served in numerous leadership positions for several committees, including Hydrologic Barriers and Hydrologic Properties.

## Multidisciplinary

**John Clements** (Computer Science) and **Antonio Barata** (Music) attended the National Science Foundation-sponsored workshop on "Computational Thinking Through Computing and Music" held at University of Massachusetts Lowell. The goal of the workshop was to develop ways to enhance students' grasp of computational thinking by engaging them in fundamental concepts that unite computing and music.

**Scott Hazelwood** (Biomedical Engineering) and **Steve Klich** (Mechanical Engineering) published a chapter in *Orthopaedic Biomechanics* (First Edition; B.A. Winkelstein, ed.; CRC Press, Boca Raton, FL, pp. 383-418, 2013) on "Computational Approaches to Studying Normal and Pathological Mechanobiology of Whole Joints and Their Tissues."



Civil and Environmental Engineering Professor Tryg Lundquist, right, and the Cal Poly Algae Technology Group has received a \$1.3 million grant from the Department of Energy to fund work at the Cal Poly Algae Field Station at the San Luis Obispo Water Reclamation Facility.

## Algae Bloom

*ENVE's Tryg Lundquist and the Cal Poly Algae Technology Group awarded a \$1.3 million Grant from the DOE*

The U.S. Department of Energy (DOE) has awarded a \$1.3 million grant to a Cal Poly research team, the Algae Technology Group (ATG), to develop efficient recycling of water and nutrients in algal biofuels production.

ATG is led by professors **Tryg Lundquist** in the Civil and Environmental Engineering Department and **Corinne Lehr** in Chemistry. It includes faculty and students from six departments, including Environmental Engineering, Chemistry, Biology, Animal Science, Food Science and Electrical Engineering.

The DOE hopes to significantly improve

the sustainability of algae-based biofuels and accelerate technological breakthroughs. The ATG project will turn waste resources, such as those from municipal and agricultural wastewaters, as well as nutrients recycled from algae biomass processing into sustainable algal biofuels. The project will be carried out in experimental raceway ponds at the City of San Luis Obispo Water Reclamation Facility, a pilot facility that has been invited to join the U.S. Department of Energy National Algae Biofuel Testbed program.

"Renewable energy and the recycling of



water are necessary for a sustainable society," Lundquist said, "but current technologies are too expensive for many communities." The DOE research project could result in technology that has the ability to save Californians hundreds of millions of dollars in water recycling costs each year.

"Ultimately, we would like our research to help commercialize the use of algae in the wastewater recycling process and production of biofuel," explained Lundquist. ■

*"Ultimately, we would like our research to help commercialize the use of algae in the wastewater recycling process and production of biofuel."*

— Tryg Lundquist (ENVE)



■ ■ ■  
**Foad Khosmood** (Computer Science) and **David Gillette** (English), director of the Cal Poly Liberal Arts & Engineering Studies program, presented an on-campus, three-lecture series on “Interactive Fiction.”

## Aerospace Engineering

**David Marshall** contributed four papers to a special session at the 51st AIAA Aerospace Sciences Meeting in Grapevine, Texas. The work focused on the NASA research he has been leading for five years on new generation aircraft. The papers included:

- “Summary of the Aerodynamic Modeling Efforts for AMELIA” (AIAA-2013-0973) co-authored with graduate student **Jon Lichtwardt** and alumni **John Pham** (B.S./M.S., Aerospace Engineering, 2012), **Bryan Blessing** (B.S./M.S., Aerospace Engineering, 2012) and **Travis Storm** (B.S./M.S., Aerospace Engineering, 2010).

- “Cal Poly’s AMELIA 10 Foot Span Hybrid Wing-Body Low Noise CESTOL Aircraft Wind Tunnel Test and Experimental Results Overview” (AIAA-2013-0974) co-authored with former faculty member **Tina Jameson** (B.S./M.S., Aerospace Engineering, 2003), **Robert Ehrmann** (B.S./M.S., Aerospace Engineering, 2010), graduate students **Lichtwardt** and **Eric Paciano**, and NASA scientists **N.J. Burnside**, **R. Fong** and **W.C. Horne**.

- “Flow Uniformity Calibration of AMELIA’s Circulation Control Wings” (AIAA-2013-0975) co-authored by **Paciano**, **Lichtwardt**, **Jameson** and **Fong**.

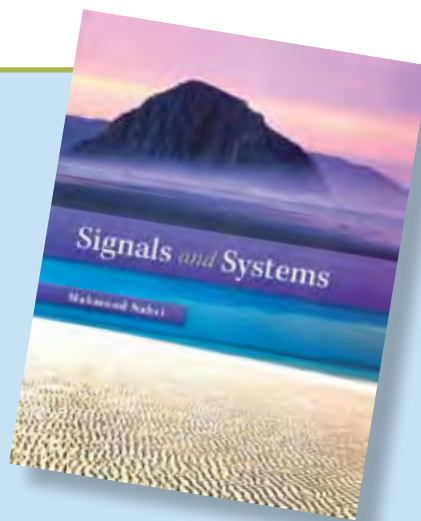
- “STOL Performance of Cal Poly’s AMELIA including Wind Tunnel and Computational Results” (AIAA-2013-0976) co-authored by **Lichtwardt**, **Paciano** and **Jameson**.

## Biomedical & General Engineering

**Kristen O’Halloran Cardinal** co-authored “Thinking Inside the Box: Keeping Tissue-Engineered Constructs In Vitro for Use as Preclinical Models” with graduate student **Michael Gibbons** and **Marcus Foley** (B.S. and M.S., Biomedical Engineering, 2012) published in *Tissue Engineering Part B: Reviews* (Vol. 19, no. 1, pp. 14-30, February 2013). The article summarizes work in the tissue engineering field that is aimed at creating tissue engineered model systems.

## Nahvi Publishes EE Textbook

Professor Emeritus **Mahmood Nahvi** published “Signals and Systems” (McGraw Hill, pub., ISBN 13: 9780073380704 ISBN 10: 007338070920) a textbook on the analysis of signals and linear systems in the time and frequency domains.



**Scott Hazelwood** published “A Biomechanical Comparison of Three Spondylosis Repair Techniques in a Calf Spine Model” with co-authors **Rolando Roberto**, **Bobby Dezufli**, **Chris Deuel** and **Shane Curtiss** in *Orthopaedics & Traumatology: Surgery & Research* (Vol. 99, no. 1, pp. 66-71, 2013).

## Civil & Environmental Engineering

■ ■ ■  
**Rakesh Goel**, associate dean, co-authored “Analytical Evaluation of Plastic Hinge Length and Depth of Piles in Marine Oil Terminals” with civil engineering student **Neda Saeedy**. The paper was presented at Prevention First 2012 in Long Beach, a conference on pollution prevention at marine oil terminals and offshore platforms, and on engineering, safety and security products, and associated services.

Goel had two papers presented at the 15th World Conference on Earthquake Engineering in Lisbon, Portugal: “Analysis of Curved Bridges Crossing Fault Rupture Zones” co-authored with **Bing Qu** and student **Osmar Rodriguez**, and “Plastic Hinge Length and Depth for Piles in Marine Oil Terminals Including Nonlinear Soil Properties” with **Saeedy**. Goel, **Qu**, **Rodriguez** and student **Jennifer Tures** published “Bridge Design for Earthquake Fault Crossings: Synthesis of Design Issues and Strategies,” Report No. CP/SEAM-2012/01, California Polytechnic State University.

■ ■ ■  
**Anurag Pande** was one of seven invited speakers at the International Association of Traffic and Safety Sciences (IATSS) 2012 International Workshop held at the United Nations University in Tokyo. Pande’s topic was “International Association of Traffic and Safety Sciences.”

■ ■ ■  
**Ashraf Rahim**, **Gregg Fiegel** and **Reed Calkins** (B.S., Civil Engineering, 2009; M.S., Civil and Environmental Engineering, 2011) co-authored “Performance Prediction Models for Cracked, Seated and Overlaid Concrete Pavements in California,” which was presented at the Transportation Research Board annual meeting in Washington, D.C.

## Computer Science & Software Engineering

**John Clements** served on the program committee for 2013 Symposium on Trends in Functional Programming. While on sabbatical he worked for Mozilla Research on a new, best-in-class systems-level programming language.

■ ■ ■  
**Foad Khosmood** delivered “Comparison of Sentence-level Paraphrasing Approaches for Statistical Style Transformation” at the International Conference on Artificial

Intelligence (ICAI 2012) in Las Vegas, and he gave a talk on the International Game Developers’ Association at SIGGRAPH 2012, the 39th International Conference and Exhibition on Computer Graphics and Interactive Techniques, held in Los Angeles.

Last fall, Khosmood brought Ubiquitous Entertainment Inc. to Cal Poly. Company CEO **Ryo Shimizu** provided a workshop on the company’s new free HTML5 game engine, **Enchant.JS**. Khosmood also organized a campus UC Santa Cruz information day. In collaboration with the UCSC Jack Baskin School of Engineering, the event featured UCSC professors active in research. Cal Poly students interested in pursuing master’s or Ph.D. programs in engineering attended.

■ ■ ■  
**Chris Lupo** co-authored “Breaking Weak 1024-bit RSA Keys with CUDA,” which was presented at the IEEE International Conference on Parallel and Distributed Computing, Applications and Technologies (PDCAT) in Beijing, China. His co-authors included computer engineering student **Kerry Scharfglass** and computer science master’s degree students **Darrin Weng** and **Joe White**.

■ ■ ■  
**John Seng** published an invited paper titled “Retrospective on Power-Sensitive Multithreaded Architecture” at the International Conference on Computer Design 2012 in Montreal, Canada. His original paper was selected as one of five high-impact papers out of 30 years of ICCD conference proceedings.

## Rakesh Goel Named SEI Fellow



**Rakesh Goel**  
 (Civil and Environmental Engineering)

**Rakesh Goel**, associate dean of research, graduate programs and partnerships for Cal Poly’s College of Engineering, has been named Fellow of the Structural Engineering Institute (SEI) of the American Society of Civil Engineers.

The Fellow designation is conferred upon a select group of members to acknowledge their outstanding leadership, mentorship, professional accomplishment and service to SEI and the profession.

Goel, a professor of civil engineering at Cal Poly for 15 years and chair of the Civil and Environmental Engineering Department for four years, specializes in earthquake analysis and design of buildings and bridges. He has also been awarded the Humber Research Prize and Norman Medal by the American Society of Civil Engineers. ■





**Zoë Wood** documented work done with Cal Poly students in two research papers:

- “FlexRender: A Distributed Rendering Architecture for Ray Tracing Huge Scenes on Commodity Hardware” co-authored with R. Somers and published in Proceedings of the 8th International Conference on Computer Graphics Theory and Applications (GRAPP) held in Barcelona, Spain.

- “Uncertainty Visualization and Hole Filling for Geometric Models of Ancient Water Systems,” with students **Jeffrey Forrester**, **William McVicker**, **T. Gambin**, and **C. Clark**, published in Proceedings of the 4th International Conference on Information Visualization Theory and Application (IVAPP) in Barcelona, Spain.

Wood, **Jane Lehr** (Ethnic Studies), McVicker, Forrester, Gambin, and Clark published “Mapping and Visualizing Ancient Water Storage Systems with an ROV - An Approach Based on Fusing Stationary Scans within a Particle Filter” in Proceedings of the IEEE International Conference on Robotics and Biomimetics (ROBIO2012) held in China.

## Electrical Engineering

**Xiaomin Jin** had two graduate students present papers at SPIE OPTO, a conference that addresses the latest developments in a broad range of optoelectronic technologies and their integration for a variety of commercial applications. Gabriel Halpin presented “Simulation of Nanoscale ITO Top Grating of GaN LED” co-authored by Jin, electrical engineering graduate student **Greg Chavoor** and colleagues from the School of Physics and State Key Laboratory for Artificial Microstructures and Mesoscopic Physics, Peking University, Beijing, China.

Jin’s master’s student **Michael Marshall** presented “Study of Silicon Solar Cell Top and Bottom Grating Location.”



**John Saghri** received a \$20,000 research grant from Raytheon Space and Airborne Systems for the 11th year in a row to sponsor EE graduate students’ theses projects in the area of synthetic aperture radar automatic target recognition and tracking.

## Fiegel Receives NSF Grant to Fund Study of Garbage Waste

A \$375,000 National Science Foundation (NSF) grant will enable geotechnical engineering professor **Gregg Fiegel** and students to really dig into garbage and discover new uses for waste.

In collaboration with **Jim Hanson** (Civil and Environmental Engineering) and **Nazli Yesiller**, director of Cal Poly’s Global Waste Research Institute, Fiegel will direct research on “Sustainable Management and Beneficial Reuse of Residual Wastes and Byproducts.” The three-year grant was awarded as part of the NSF Research Experiences for Undergraduates (REU) program. ■



**Gregg Fiegel**  
(CE)



**Lynne Slivovsky** gave a keynote talk at the 2012 Sustainability in Energy and Buildings conference in Stockholm, Sweden. She spoke about “The Questions That Keep Me Up At Night,” a reflection on the fact that the world is on a path of profound technological development and what that means for educators, designers, innovators, engineers and scientists.

## Industrial & Manufacturing Engineering

**John Pan** received renewed funding from Western Digital for his work on hard defect pattern analysis. IME graduate student **Tayler Jones** is working with him on the research. Hard defects (non-readable and non-rewriteable areas on hard disk drives) are a major contributor to failures of hard disk drives. In the last five years, Pan has been awarded \$180,000 in grants from the company.

## Materials Engineering

**Kathy Chen** participated in the Girls RISEnet (<http://www.girlsrisenet.org>) workshop on “Engaging Girls in STEM” in Los Angeles, the National Girls Collaborative Project <http://www.ngcproject.org>) CalGirls Kick-off conference in Berkeley, and the Nanoscale Informal Science Education (NISE, <http://www.nisenet.org>) Network-wide Meeting in Boston. She presented “Materials Engineering with a Social Context: a Course on Materials, Ethics and Society” at the Materials Research Society (MRS). Meeting in Boston. she helped organize a symposium on

“Communicating the Social Relevancy in Materials Science & Engineering” at the conference.

As a member of the Central Coast STEM Education Collaborative (<http://ccstem.org>), Chen received a mini-grant to enhance STEM literacy and build collaborations with organizations such as the San Luis Obispo Museum of Art and Cal Poly’s Liberal Arts & Engineering Studies (LAES) program. Chen is also leading an effort to involve members of the Alpha Sigma Mu Materials Honor Society in hands-on projects and activities at the Boys & Girls Club at the Oceano Teen Center.



**Richard Savage**, chair, and master’s degree student **Chris Botros** co-authored “Application of Quantum Dots to Photovoltaic Cells to Increase Efficiency,” presented by Botros at the international Materials Research Conference in Boston.



**Linda Vanasupa** was invited to serve as one of two Learning Community Advisors for the Executive Leadership in Academic Technology and Engineering ([http://www.drexel.edu/engineering/programs/special\\_opp/ELATE/](http://www.drexel.edu/engineering/programs/special_opp/ELATE/)). This program, supported by grants from the Alfred P. Sloan Foundation, the Henry Luce Foundation, and the National Science Foundation, was developed to provide leadership development for women in academic STEM disciplines. As one of the Learning Community Advisors, Vanasupa will facilitate reflective conversations for a group of six developing leaders in academia.



**Daniel Waldorf** published “Virtual training and documentation for manufacturing operations: Online guidebooks

provide flexible, up-to-date instruction” in [thefabricator.com](http://thefabricator.com), a publication of the Fabricators & Manufacturers Association, Intl. ® (February 15, 2013). See <http://www.thefabricator.com/article/trainin-gretention/virtual-training-and-documentation-for-manufacturing-operations>

## Mechanical Engineering

**Charles Birdsong** is collaborating with NASA Dryden Flight Center and two teams of mechanical engineering seniors on “Aircraft Ground Collision Avoidance,” a project to adapt the ground collision avoidance system that is currently in the F16 fighter jet to a cellphone-based app that can be used by general aviation pilots. The long-term multidisciplinary effort will incorporate senior project students over the next few years until the product is ready for release.

Birdsong is also working with a team of students on the development of an automated crash avoidance vehicle project. The team was named one of two North American finalists to compete in the Enhanced Safety of Vehicles Student Design Competition held in Seoul, Korea, in June 2013. Sponsored by the U.S. Department of Transportation, the competition is intended to create student interest in the area of automotive safety.



**Brian Self** and **Jim Widmann** coauthored “Using Inquiry-Based Learning Activities to Promote Conceptual Understanding in a STEM Course” with senior mechanical engineering student **Kathryn Bohn** and graduate student **Jeff Georgette**. Bohn presented the paper at the 16th Annual California State University Teaching Symposium at the California Maritime Academy.



**Hemanth Porumamilla** presented “Participatory Technical Short-courses For Industry” at the Frontiers of Engineering Education (FOEE) symposium. This event is organized by the National Academy of Sciences to strengthen the nation’s engineering and innovation capability by catalyzing emerging engineering education leaders. The paper is based on an initiative by Porumamilla and **Frank Owen** to develop a short-course program for industry. A pilot course, “Common-Sense Control,” offered in summer 2012 was attended by eight participants from industries throughout California. ■



### 1970s

#### Susan Mooney Johnson

(B.S., Industrial Engineering, 1977)

#### Johnson Appointed Director of Federal Reserve Bank

The Federal Reserve Bank of San Francisco appointed Susan Johnson a director of the Salt Lake City Branch. Johnson is president of Futura Industries Corp., a Utah-based aluminum extrusion and fabrication business. Prior to joining Futura, she served as president and chief operations officer of Daw Technologies and president of Savage Manufacturing Corp.

Active in community affairs, Johnson has served on educational, corporate advisory and boards of directors for the Natural History Museum of Utah; Davis Applied Technology Center; Utah State University; ARUP Laboratories; the Western National Trust; and the Northern Utah Academy of Math, Engineering and Science.

Johnson was the 2006 College of Engineering Honored Alum.



#### William Swanson

(B.S., Industrial Engineering, 1973)

#### Q&A with Bill Swanson of Raytheon

Read an interview with **Bill Swanson**, chairman of the board and CEO of Massachusetts-based Raytheon, who worked his way up from the “factory floor and rose through the ranks to lead from the corner office.”

Swanson’s American success story has its roots in San Luis Obispo County and Cal Poly Engineering.

<http://www.sanluisobispo.com/2013/02/05/2382596/bill-swanson-raytheon-interview.html#storylink=rss>

Biomedical engineering graduate **Marcus Foley**, left, works with **Kristen Cardinal** in a Cal Poly biomed lab in 2012. **Foley** and his **Genicell** colleagues have just moved into an incubator lab space in Berkeley.



### Recent Grads Engineer a Company

No sooner had **Marcus Foley**, **Mike Machado**, and **Amin Mirzaaghaeian** defended their biomedical engineering master’s degree theses last June, than they founded **Genicell**, a tissue engineering company based on the research they had done under the direction of Assistant Professor **Kristen Cardinal** at Cal Poly.

Two other alums have since joined **Genicell**: mechanical engineer **Scott Garrett** (B.S., Mechanical Engineering, 2011) and lead business developer **Matt McGunagle** (Economics).

Calling themselves “a team of passionate biotech engineers,” **Foley**, **Machado** and **Mirzaaghaeian** have

developed a functional model for early stage in-vitro drug permeability screening of the blood-brain barrier. Consisting of tissue engineered blood vessels grown inside bioreactors, this system allows **Genicell** to conduct drug permeability tests that are otherwise conducted on animals. **Genicell**’s service will allow pharmaceutical companies to test more drugs, reduce costs and time to market, and save animal lives.

For more information, see [www.genicell.co/](http://www.genicell.co/). To watch news coverage of **Genicell**’s participation in the SLO HotHouse Accelerator program, see <http://www.ksby.com/videos/cal-poly-hothouse/> ■

### 1980s

#### David Stephenson

(B.S., Electronic Engineering, 1980)

#### Stephenson Joins Ruckus Wireless as Senior Engineer

Ruckus Wireless Inc. announced **David Stephenson** has joined the company as senior principal engineer within its system architecture group. Stephenson has

more than 20 years of networking experience and actively participates in a number of industry organizations.

After graduating magna cum laude from Cal Poly, Stephenson earned a Master of Science degree in electrical engineering from Stanford University.

<http://www.dailymarkets.com/stock/2013/02/11/wi-fi-alliance%C2%AE-hotspot-2-0-technical-task-group-chair-joins-ruckus-wireless-as-senior-principal-engineer/>



#### Brian Hackney

(B.S., Electronic Engineering, 1983)

#### Hackney Brings Science to the Airwaves

Brian Hackney claims he owes it all to KCPR. The physics and electrical engineering double major got his first shot at broadcasting at Cal Poly’s own radio station. Now he’s a meteorologist, science reporter, and fill-in news anchor for CBS 5 in San Francisco.

<http://physics.calpoly.edu/content/physics-alum-brian-hackney-career-success-began-cal-polys-learn-doing>



#### John Randolph

(B.S., Electrical Engineering, 1983)

#### Randolph Selected for CIGRE Study Committee

**John Randolph** has been named the U.S. representative to CIGRE’s study committee on substations for 2012 -2019. CIGRE is an international council for improving electric power systems, based in France. John started his industry involvement as the student chapter chair of the IEEE Power and Energy Society at Cal Poly and recently completed his role as chair of the IEEE/PES Substations Committee. He has worked the past 30 years in substation design and standards at Pacific Gas & Electric.

### 1990s

#### Jonathan Becker

(B.S., Electrical Engineering, 1999)

#### Becker Pursuing EE Doctorate at Carnegie Mellon

**Jonathan Becker** is currently a Ph.D. candidate in electrical engineering at Carnegie Mellon University in Pittsburgh, Penn., one of the country’s top five graduate programs in computer science, particularly robotics, computer vision, human-computer interaction, speech understanding, and machine learning. Becker also serves as a lab associate at Disney Research Pittsburgh, which, in



addition to robotics and motion capture, conducts research in radio and antennas, and has a focus in sports visualization.

## 2000s

### Ben Fine

(M.S., Mechanical Engineering, 2003)

### Fine Selected as New Public Works Director in Pismo Beach

Ben Fine, who has worked four years as Pismo Beach's associate civil engineer, has been named the city's public works director/city engineer. Fine is a licensed professional civil engineer with a bachelor's degree in agricultural engineering and master's degrees in mechanical engineering and business administration from Cal Poly.

<http://www.sanluisobispo.com/2013/01/30/2375077/new-public-works-director-chosen.html>

■ ■ ■

### Patrick Wilkinson

(B.S./M.S., Electrical Engineering, 2005)

### After Five Years, Move Green Still Gaining Ground

Erik Haney and Patrick Wilkinson are the brains behind Move Green, a local moving company that prides itself on environmental efficiency and care of belongings during "green" moves.

[http://www.noozhawk.com/article/030613\\_santa\\_barbara\\_move\\_green\\_gaining\\_ground/](http://www.noozhawk.com/article/030613_santa_barbara_move_green_gaining_ground/)

■ ■ ■

### Kyle Wiens

(B.S., Computer Science, 2005)

### Luke Soules

(B.S., Industrial Engineering, 2006)

### Soules' and Wiens' iFixit Peers Inside the Latest Devices

It all began in 2003, when Cal Poly freshmen Kyle Wiens and Luke Soules sold laptop parts out of a dorm room. When they couldn't find manufacturer-issued repair guides, they wrote their own. Last year, iFixit earned \$5.9 million in rev-

## Boeing Honors Alum for 787 Dreamliner Innovation

Boeing has honored **Michael D. Bowman**, a 1979 Cal Poly mechanical engineering graduate, with the Special Invention Award, highlighting the best of the company's innovations.

The annual award recognizes the "more electric architecture" that distinguishes the Dreamliner 787 and marks a major technological shift in the way planes can be made and operated.

A pneumatics expert, Bowman was part of a team that invented the electric-based secondary power system technology that serves as the fundamental platform for the Dreamliner. The technology allows the overall airplane system to generate, distribute and consume energy more efficiently.

"Development of these architec-

tures was a team effort involving propulsion, pneumatics, air conditioning, electrical and hydraulic systems," Bowman said. "This was an exciting challenge aiming to design a more efficient way of getting secondary power from the airplane engines."

The innovation was one of 12 inventions recognized by Boeing, among hundreds nominated for the prize

The awards, announced Nov. 12, are given each year to individuals and teams for innovations that prove most valuable to Boeing and to the future of aerospace. ■



Michael D. Bowman  
(AERO)

enue by selling parts, kits and tools. iFixit is not the only website that offers repair manuals, but its tear-downs are special because they expose a company's proprietary technology, said an analyst at Cascade Insights. <http://www.omaha.com/article/20130121/MONEY/701219971/1697>

■ ■ ■

### Kyle Gazay

(B.S., Materials Engineering, 2007)

### Gazay is Guest Speaker at Hands-On Teaching Showcase

At a "Showcase of Creativity" dinner in Silicon Valley, presented by the nonprofit Resource Area for Teaching, attendees explored how hands-on teaching engages and inspires learning. Guest speaker Kyle Gazay shared with the audience how his choice of careers was influenced by his hands-on learning experiences. He currently works as a senior engineer with thin-film startup Nanosolar in San Jose.

<http://www.americanbankingnews.com/2012/10/24/silicon-valley-non-profit-celebrates-great-hands-on-teaching-at-annual-showcase-of-creativity-dinner/>

■ ■ ■

### Erik Rutherford

(B.S., Mechanical Engineering, 2008)

### Wallace Group Hires Rutherford

Wallace Group in San Luis Obispo announced it is expanding in the field of mechanical engineering with the hiring of Erik Rutherford, who joins the firm as an engineering associate. He was previously an engineering intern and associate engineer with the company for two years, beginning in 2007. In addition to his bachelor's degree in mechanical engineering from Cal Poly, he has a master's degree in engineering from Cornell University.

[timespressrecorder.com/articles/2012/11/09/news/news75.txt](http://timespressrecorder.com/articles/2012/11/09/news/news75.txt)

■ ■ ■

### Erik Bjornstrom

(B.S., Civil Engineering, 2012)

### Bjornstrom at BKF Engineers

Erik Bjornstrom has joined BKF Engineers as a staff engineer. He graduated summa cum laude from Cal Poly.

<http://www.petaluma360.com/article/20130203/BUSINESS/130209957/-1/PT07?Title=People-on-the-move-at-the-North-Bay-Association-of-Realtors-Leff-Construction-and-more-> ■

## Gibson Elected for Enshrinement in Aviation Hall of Fame

Cal Poly aeronautical engineering graduate **Robert L. "Hoot" Gibson**, a four-time commander on the space shuttle, has been elected for enshrinement in the National Aviation Hall of Fame (NAHF).

The 1969 Cal Poly graduate and retired U.S. Navy captain was among four aviation pioneers elected to the NAHF Hall at a meeting of the organization's board of directors in December. Gibson

was enshrined in the NAHF at the National Aviation Hall of Fame Learning Center in Dayton, Ohio, on Oct. 4

Joining Gibson as members of the NAHF Hall are the late Charles Alfred Anderson, the chief instructor for the Tuskegee



Robert L. "Hoot" Gibson  
(AERO)

Airmen and recognized as the "father of African-American aviation"; Maj. Gen. Patrick H. Brady, who developed foul-weather tactical techniques for helicopter air ambulance rescue missions; and the late Dwane L. Wallace, who is credited with several key developments in commercial aviation while serving as CEO of the Cessna Aircraft Co. for 41 years.

After attending Cal Poly, Gibson served in active duty with the U.S. Navy and flew combat missions in Southeast Asia. He graduated from the Naval Fighter Weapons "Topgun" School and the U.S. Naval Test Pilot School before joining NASA in 1978. With NASA, Gibson served on five space shuttle missions, including the first mission to dock with the Russian Space Station, Mir. He completed a total of 36½ days in space. Overall, Gibson logged more than 14,000 hours of flight time in more than 130 types of aircraft.

Gibson's military awards include the Defense Superior Service Medal, the Distinguished Flying Cross, three Air Medals, and the Navy Commendation Medal.

For more information, see [www.nationalaviation.org](http://www.nationalaviation.org). ■





Above: Cal Poly students built the Glenmont in 1928.  
Below: Aeronautical engineering students work in the aero stress lab with instructor Robert A. Needham.



## Cal Poly Aeronautics: Learn by Doing Takes Off

Cal Poly's distinctive Learn by Doing approach has roots in its earliest coursework. The aeronautics program, established in 1927, demonstrated a hands on approach to education. In 1928, aeronautics students designed, built and flew The Glenmont, a six passenger plane modeled after the Spirit of St. Louis. The program attracted prominent aviators to campus, including Amelia Earhart in 1936.

Photos: University Archives, California Polytechnic State University



Amelia Earhart in June 1936, with noted air racing pilot Paul Mantz (second from left) in front of the Aeronautics Department at Cal Poly. At left: The Cal Poly campus in the early 1900s.

### Cal Poly Archives

Visit the archives at Kennedy Library to view more historic images or see more images from University Archives here: [http://www.flickr.com/photos/special\\_collections/sets/72157629572245639/](http://www.flickr.com/photos/special_collections/sets/72157629572245639/)





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