25th Anniversary Message from Directors – Past & Present

On the occasion of the 25th anniversary of Cal Poly’s Computer Engineering Program (CPE), it’s fitting to be joined by some of my predecessors in this Message from the Director to look back on a thriving program that is the work of so many fine minds, hands and hearts.

“I have the deepest admiration for our CPE staff and faculty,” says Len Myers (CPE director, 2003-06). “It’s truly their deep desire and commitment to the program and our students that has made it the success it is today.”

From its beginning in 1988, CPE’s breadth has been its most defining feature: To major in computer engineering is to learn something about everything that goes into digital and computer programming. We have a multifaceted gem of a multidisciplinary program that’s reflected in the caliber and wide range of our hiring companies: Agilent, Boeing, Chevron, Cisco, Google, Hitachi, Intel, JPL, Microsoft, Second Sight, Raytheon and Western Digital, to name a few.

The Computer Engineering Program stemmed from the idea that students were highly interested in studying both the electrical and computer science disciplines. “At the time, and even today, there’s no other program like this in the college,” says the program’s first director, Jim Harris (1993-97 and 2008-09).

As experimental an idea as a computer engineering program was at the time, it’s no surprise that there were many behind-the-scenes struggles in determining funding, staffing and curricula. Those logistical concerns, however, were the furthest thing from students’ minds. From Day One, the students fastened their life in exactly the direction that you want!

Reminiscences from Recent Grad: Jen Overgaag

Message to Students from Jen Overgaag, Network Consultant (B.S., Computer Engineering, 2005)

Very often when I tell people my story, they respond with wide eyes and tell me how lucky I am to have seen and done so many things in my life and career. I’m always very grateful for the compliment, but internally I know that luck has played only a small part — the rest of my journey has been very carefully navigated.

You and I can consider ourselves lucky to have been admitted to the CPE program at Cal Poly, but now that you’re there, you are being armed with the tools that you need to steer your career and

See “Past & Present” on page 4
Western Digital Celebrates 5 Years of Partnering with Cal Poly Engineering

The current explosion in digital content has set off a rocketing demand for ever-greater digital data storage space. That puts Western Digital (WD), a long-time innovator and storage industry leader, on the frontlines of developing next-generation storage solutions. These Big Data challenges have created an ongoing partnership between Cal Poly and WD.

Over the past five years, WD has provided more than $500,000 and collaborative support for computer engineering projects that have given students applied research and hands-on learning opportunities in disk drive performance, testing technologies, workload measurements and thermal design.

“Many people think that hard disk drives are a ‘dinosaur’ technology when the truth is quite the opposite,” said Dave Renuart, a Cal Poly alumnus, director of product quality engineering at WD and member of CPE industrial advisory board. “In fact, a disk drive contains nearly every engineering discipline taught, and is stretching the limits of physics far beyond what was thought possible just 10 years ago.”

A recent senior project sponsored by WD offered students paid positions with access to “one of the finest oscilloscopes that many engineers will ever use” to develop a data acquisition board.

Over the years, the multidisciplinary projects have ranged from tool design and development to data acquisition and analysis — and have led to more than a dozen full-time positions and internships with the company.

“WD has had a successful partnership with CPE for many years; we have a history of hiring brilliant engineers from the program. We plan to create even more exciting opportunities for these engineers in the future,” said Renuart.

Cal Poly Engineering Women ‘Go Big’ at Grace Hopper ‘Think Big’ Conference

Cal Poly went big — 32 students strong — at the recent Grace Hopper Celebration of Women in Computing. The world’s largest gathering of women in technology, the conference challenged attendees to “Think Big, Drive Forward.”

Among more than 400 universities represented, Cal Poly brought the largest cohort of students from a public undergraduate university. The Cal Poly attendees represented a cross-section of majors, including computer engineering, computer science and software engineering disciplines. Most of the students are members of the Cal Poly chapter of Women Involved in Software and Hardware (WISH), a mentoring program that pairs female students with industry professionals.
Senior Perspective: Cecilia Cadenas

Learns by Doing – and Documenting

By Cecilia Cadenas, CPE Senior

From my very first computer engineering class, I experienced firsthand the breadth, depth and impact of Cal Poly’s Learn by Doing motto. Before I came to Cal Poly, I had never written a single line of code. My first major class — CPE 101 with Julie Workman — changed all that. It was a pivotal influence in finding my path. Prior to entering the classroom, I was told that this class had a 50 percent fail rate, and that scared me — a lot! I started to question my choice of major. But by the time I completed this course, I knew that I was right where I was supposed to be. I not only learned to write code (both my own and in collaborative group settings), but this was also the class that first instilled in me the importance of documentation and communication.

Throughout my years here, I have found that Cal Poly’s distinctive style of education inspires hard work and ambitious goals, and at the same time, prepares and positions you for the multiple opportunities that come your way as a result of your efforts.

CPE 123: Boosting Freshman Success

CPE 101, better known as Introduction to Programming, is a challenging course and not just at Cal Poly. For students who have little or no coding background, competing against students with these skills is difficult.

That’s why CPE 123 was launched by the department three years ago — to give incoming students the ABCs of programming at the very start of their academic career. Taken prior to CPE 101, the class teaches students how to work in groups on projects such as robotics or mobile phone applications. While there is still significant work to do to make programming even more accessible, the CPE 123 prerequisite is creating a CPE “Success 101” story.

Malta team members above from left: Ian Dunn (CSC), Vanessa Forney (CSC), Amanda Eto (GRC), Spencer Woodworth (CSC), Cecilia Cadenas (CPE), Andrew Carrillo (EE), Erik Nelson (MATE), and Jeffrey Forrester (CSC).

An example of that is my internship at Raytheon over the past two summers. From my first day at Raytheon, it was abundantly clear why my professors had emphasized group work, making code simple and always documenting. As an intern, I was able to apply those computer engineering skills in a real industry environment and prove my mettle as a useful and dependable team member.

Another aspect of Learn by Doing is how quickly you learn how much reality differs from the textbook. Getting to work with real hardware in the labs not only provides you with hands-on experience, it can also help improve how you respond when a project isn’t going as planned. That kind of situation-handling is a very real-world skill, and it was hugely helpful this spring when I was part of an interdisciplinary student expedition to Malta. The project deployed an underwater robot to gather data from ancient water systems and caves, and the technology and logistical challenges were considerable. Sometimes things did not go as planned. At such times, my training kicked in, and it had also prepared me to learn larger lessons: Professors Zoe Wood, Jane Lehr and Chris Clark used those occasions to make the point that we, as individuals, must trust in the problem-solving skills of the team as a whole.

Learn by Doing, together with having professors of this caliber, has really helped me gain confidence in myself — and to know that once I have a degree I will be more than ready to take on any job, challenge or opportunity.

New Class Inspires Students to Put On Thinking Caps

The newest definition of a computer system includes humans in the mix — which was the inspiration for a new class taught last spring by Tina Smilkstein, assistant professor in the Computer Engineering Program.

The EE 521 class focused largely on medical technology applications within the growing field of human-computer interactions.

“The scope of the class took computer engineering students into areas beyond the boundaries of their curriculum,” said Smilkstein. “The makeup of the multidisciplinary teams drew from psychology and biomedical engineering disciplines, as well as the full range of computer-related majors — and the result was some incredible projects.”

One of the projects explored the realm of brain-computer interface technology by designing a non-invasive EEG (electroencephalography) system that uses a dry electrode cap to pick up the wearer’s brain activity.

“Specific regions of the brain control different mental functions — muscle movement, focus, awareness, memory,” said Kellen Hillmann, electrical engineering senior and project manager. “With this device we can map out activity levels of each part of the brain. Worn as a helmet, it can be used by anyone to monitor multiple areas of their own brain.”

The students built their electrodes from scratch and designed a smart phone app for viewing the EEG. A psychology major on the team provided data for analyzing the EEG signals.

See “Thinking Caps” on page 8
Past & Present from page 1

Attention on the up-and-running aspects of the program, and they ran with it. From the beginning, the boundary-spanning nature of the program attracted a certain kind of student — those excited by an environment open to new combinations of learning and ever-expanding career possibilities.

"Without question, the biggest success of CPE is our students," says Myers. "The experience our students have had with their projects and multidisciplinary know-how continues to set Cal Poly's computer engineering program apart. Companies often place our students in positions not ordinarily open to new graduates."

A major milestone, of course, was our ABET accreditation in 1996. "Accreditation was an important step in validating the curriculum approach in the program," says Al Liddicoat (CPE director, 2006-08).

It didn't take long for CPE to show that it was a real entity in its own right. The program established its own advisory board, developed an activity roster that beget new and now-beloved traditions like Roborodentia and the year-end banquet, and it also attracted the support of major donors. "The Cisco Lab gift took us from an outdated space to a state-of-the-art learning environment," says Joe Grimes (CPE director, 1997-2000).

A related milestone was the creation of the Forbes Center for Excellence, which now houses CPE capstone classes. Bert and Candace Forbes' gift continues to refresh lab equipment for student use and helps fund faculty positions within the program. Bridget Benson and Foaad Khasmood are our current Forbes Endowed Professors. Similarly, CPE will benefit from Raytheon's Visiting Industry Scholar this year: Ryan Faries, an electro-optical systems engineer.

A particularly significant moment for the program was when CPE students endorsed the value of their education by advocating for more funding to support teaching positions within the program.

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<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Enrollment</th>
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<tbody>
<tr>
<td>1988</td>
<td>Introduction of CPE</td>
<td>73 enrolled</td>
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<tr>
<td>1992</td>
<td>Roborodentia Starts</td>
<td>226 enrolled</td>
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<tr>
<td>1996</td>
<td>ABET Accreditation</td>
<td>384 enrolled</td>
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<tr>
<td>2000</td>
<td>Cisco Lab Established</td>
<td>416 enrolled</td>
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Program jointly managed by EE & CSC department chairs

Various Dept. Chairs
1988-93
Jim Harris
1993-97 and 2008-09
Joseph Grimes
1997-2000
Art MacCarley
2000-03
“CPE students strongly supported the student fee initiative,” says Art MacCarley (CPE director, 2000-03). “One of their first decisions was to use the fund to create a new permanent faculty position in computer engineering, which is extraordinary and admirable.”

This was also a time that saw a growing number of CPE-related student activities become part of the university landscape, among them, Roborodentia, the annual autonomous robotics competition.

“The students really took on a lot of responsibility to facilitate this activity,” says MacCarley. “And today, Roborodentia has become one of the marquee events during Cal Poly’s Open House.”

When Hugh Smith (CPE director, 2009-13) assumed the helm, the faculty identified two critical needs: improving freshman retention and creating a strong sense of identity for the computer engineering students.

In response, says Smith, “We created a freshman mentoring program where upper-division students are paired with a small group of freshmen as peer mentors. A new CPE course was also added to expose students to project-based learning starting in their freshman year. Both initiatives have helped freshmen students stay engaged with their major. The mentoring, especially, has helped reinforce and grow the sense of family and unity that CPE is known for.”

CPE’s blend of two distinct engineering cultures is not without challenges — but it has also made our faculty and students feel more whole and connected. If you ask our students, most think of CPE as a department, and they clearly feel they’re part of a family.

As part of the CPE family — especially in this anniversary year — we invite you to share your memories of the program, where it took you, and your vision of how it can shape our next generation of engineers.

Happy anniversary!

John Oliver
Director
Computer Engineering Program
There, I helped design and implement solar-powered non-profit in San Francisco. Perhaps the most rewarding project I’ve worked on was the design and implementation of a long-distance wireless network in rural Kenya for an HIV/AIDS research hospital. The hospital had several remote clinics with high tech machinery, but they had no way to transport tests and results to the central hospital other than by motorcycles. Now that the network is in place, patients get their results more quickly, which means a drastic improvement in patient care and research in a part of the world that has such a high infection rate.

I feel that the success in my career has been largely due to the fact that I am confident in my education and experience, which has allowed me to take huge risks that others are not able to take.

As a CPE student you’re well on your way to having that same solid foundation. For now, you just have to continue to challenge yourself, take advantage of the many different clubs at Cal Poly, and continue to develop your professional network. Most importantly, step back every once in a while, open your mind and look for the career path that will keep you looking forward to every day!
Kelly McClure (1959-2013)

A Remembrance

In a year commemorating the 25th anniversary of the Computer Engineering Program (CPE), we sadly note the loss of one of our first and foremost graduates and alumni, Kelly McClure, who passed away in June.

Kelly graduated from the Computer Engineering Program in 1989, the first student to complete the full program. He also earned a master’s degree in computer engineering/biomedical engineering from Carnegie Mellon University.

Throughout his outstanding career, Kelly remained closely connected with his CPE roots, becoming a founding member of the CPE industry advisory board in 2001 and serving, more recently, as its chair.

As senior engineering director for Second Sight Medical Products, a leading company in sight restoration technologies, Kelly placed a premium on innovation and invention, and encouraged student projects and industry partnerships that, as he said, “use technology in ways that enable people.”

“In his roles as an alum, advisor and mentor, he was a proponent and catalyst for student projects that embody the kind of teamwork and unconstrained thinking that breaks new ground,” said Lynne Slivovsky, computer engineering professor.

“Kelly’s first job out of school was at Pacesetter Systems,” noted Art MacCarley (CPE director, 2000-2003). “The fast-growing company changed hands a couple of times during his tenure there, purchased by Siemans and then St. Jude Medical. As a result, in those early years of his career, he had the opportunity to work with some of the top medical technology companies in the world. From there he became director of neurological research and development at Advanced Bionics, which specializes in advanced cochlear implants. Then at Second Sight, came the putting-it-all-together opportunities that combined his skills as an inventor, innovator, researcher and engineer.”

Joe Grimes (CPE director, 1997-2000) warmly recalled a character-defining encounter with Kelly, as a new student, that was the start of a life-long friendship: “In the first quarter of his first class with me, I had asked the class to read some material, reflect on it and record their thoughts in their journal. When I checked his journal, it was empty and I really dressed him down for not doing his assignment. Years later he expressed his appreciation for that moment, saying it was one of the most valuable things he had learned. He said he had kept a journal ever since and required it of all who worked for him.”

Jim Harris (CPE director, 1993-97) remembered first meeting Kelly in the circuits lab: “He was a memorable individual, as well as a great student, from the start. Unlike most — or any — of our students at the time, Kelly was already married, and he and his wife Sue Ann owned a home in Shell Beach, where they lived with their young son Bixler. Even though Kelly had lost his fingers after a helicopter crash in Alaska, he did all the physical work required in the lab without any assistance or complaint.”

Kelly’s sister, Marianne McClure, added that his recovery from the crash was all the more remarkable for the new career path it opened. “At the time, he was studying electronic technology at the University of Alaska in Fairbanks. But his long hospitalizations immersed him in a whole new world, and that led to his life-long fascination with medical technology.”

Robert Greenberg, president and CEO at Second Sight, recognized Kelly’s “immense contributions” to the company, which develops products to restore vision to the blind. Its latest product, in which Kelly was highly involved, vaulted the company to Inc. Magazine’s “25 Most Audacious Companies” list in April.

“Just this year, the company received FDA and Medicare approvals for its first product, the Argus II,” said Greenberg, referring to an artificial retina that offers partial vision to the blind. “And Kelly’s work was instrumental in making this historic achievement possible. Another historic moment was the issuance of the 8 millionth U.S. patent to Kelly and other Second Sight inventors. His dedication to his work, his family and his alma mater, Cal Poly, inspired us all.”

Kelly was associated with 68 patents, especially at Second Sight, where he was particularly excited about his recent work on the electronic retina that would help the blind to see. “It really does not get any better than that,” he said.

“During his career, Kelly worked tirelessly to improve the lives of others through medical technology,” said John Oliver, current CPE chair, “first as principal scientist at St. Jude Medical and later as director of engineering for Second Sight. All throughout his life he had an amazing impact on the people around him. Through the Kelly H. McClure Memorial Scholarship, we can honor his life for many years to come.”

McClure is survived by his partner Paul Burger of Simi Valley; a son, Bixler McClure, of Seward, Ark.; his mother Dorla Farnes of Shoshone Falls, Idaho; his sisters Pat Matthews of Hailey, Idaho, and Marianne McClure of Portland, Ore.; and his former wife Sue McClure of Seward, Ark.

Make a gift online: http://cpe.calpoly.edu/invest/scholarships/kelly-h-mcclure-memorial-scholarship/ or mail to the Kelly H. McClure Memorial Scholarship fund: c/o CPE, Cal Poly, San Luis Obispo, CA 93407
Upcoming Events

CAL POLY OPEN HOUSE
April 10-12, 2014
Open House is an annual Cal Poly event that showcases the campus to admitted and current students, their supporters, alumni and the San Luis Obispo community. Please join us.

Post-Open House: BEER GARDEN @ ENGINEERING PLAZA
April 12, 2014 – 3:30 - 6 p.m.
Meet, mix and mingle at the first-ever college-wide gathering of professional engineering alumni at the “Beer Garden @ Engineering Plaza.”

ROBORODENTIA
April 12, 2014 – 1 - 3 p.m.
The Roborodentia is an Open House favorite — a rodeo of robotic technology.

VIA SAT SCRIBBLER ROBOT COMPETITION
April 12, 2014 – 10:30 a.m. - 12:30 p.m.
Come watch Scribbler robots in action.

CPE, CSC & EE OPEN HOUSE SHOWCASE
April 12, 2014 – 10 a.m. - 3 p.m.
Don't miss the fourth annual Computer Engineering, Computer Science & Software Engineering, and Electrical Engineering Showcase at Mott Gym.

25th ANNIVERSARY CELEBRATION BRUNCH
April 13, 2014 – 10 a.m. - 12:30 p.m.
Celebrate 25 years of computer engineering at Cal Poly.

CPE AWARDS BANQUET
May 16, 2014 – 6 - 9 p.m.
Join us in celebrating outstanding CPE students, faculty and staff — and our 25th Anniversary. For more details — or to share your memories or suggestions — please call us at 805-756-1229.

COLLEGEWIDE SENIOR EXPO
May 30, 2014
Get a glimpse of some of the inventions and visions of tomorrow. More than 200 individual and team projects will be showcased at the third annual celebration of senior projects.

Thinking Cap from page 3

In addition to Hillman, team members included Bassem Tossoun, a computer engineering graduate student; Tanner Stevenson and Ken Tran, biomedical engineering seniors; Sourabh Katti, electrical engineering senior; and Matt Glenwright, psychology senior.

An imperceptible change in face color that accompanies the human heartbeat was the basis of another project. Electrical engineering students Alan Kenyon, Miguel Buenrostro and Matt Lienemann adapted an algorithm, developed at MIT, to amplify a face's color change in real time.

"With a camera application, individuals see their heartbeat face-to-face," said Smilkstein.

Other projects included a heads-up display prototype for a contact lens that runs on wireless energy and solar power, a cognitive diary system for extending independent living, a wheelchair control system for people with limited fine-motor coordination, and a sound-filtering system to reduce the effect of noise on personal well-being.

"This class worked because of the dedication of the students and their ability to not only communicate with each other but to teach each other," added Smilkstein. "The multidisciplinary aspect allowed sharing of knowledge between students at a level that they might not otherwise experience in their university career. And as further evidence of their outstanding skill sets, focus and work ethic, they completed these projects in only seven weeks!"

We want to hear from you!
Keep us updated on what you’ve been up to! Send in your news!
http://cpe.calpoly.edu/alumni/alumni-update/

Help us keep you updated on what the Computer Engineering Program is doing. Send us your email!
http://cpe.calpoly.edu/alumni/email-registration/