THE ROCK

TESTING THE WATERS

PACIFIC SOECS DIGS DEEP INTO HYDRAULIC FRACTURING WATER RESEARCH
CURIOSITY IS THE SPARK BEHIND EVERY PRODUCT

Pacific’s Technological Innovation and Entrepreneurship program brings creative leaders from engineering, computer science, and business together to apply their skills to research and develop new products. The students will have the opportunity to design an innovation space for this program that will not only serve them, but others on campus too. As the program continues to expand and grow, it plans to bring in students from the sciences and graphic design as well.
HELLO!
The heads of the programs update us on what is new and exciting

ALUMNI RECOGNITION
Paul J. Schneider
Marc Goto

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TESTING THE WATERS
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CO-OP heads to faraway lands seeking new opportunities for our students

LIGHTS, CAMERA, ACTION!
Take a peek into the mind of filmmaker and Pacific SOECS alum Anthony Shafer

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THANK YOU DONORS
A big thank you to all those who supported SOECS this year

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CONTRIBUTORS
Art Director + Designer
Nico Barredo

Head Copy Editor
Deanna Thompson

Copy Editors
Elizabeth Bacon
Dr. Steven Howell
Eilleen Le

Contributing Writers
Elizabeth Bacon
Dr. Mary Kay Camarillo
Dr. Steve Harvath
Rick Hutley
Eilleen Le
Deanna Thompson

Contributing Photography
Nico Barredo
Sarah Craig
Randall Gee
Blaine O’Neill (www.jodie.io)

Special Thanks
Deborah Burdick
Karina Castañeda
Ji Yeoun Lee
Anthony Shafer
Janet Spears
Dr. Louise Stark
Ester Rafanan
Port of Stockton
Willey Printing

For questions or story ideas:
soeceansoutreach@pacific.edu
On behalf of the School of Engineering and Computer Science, we would like to welcome you back to The Rock. We have been busy the past few months and we look forward to sharing some of the exciting changes with you, including The Rock’s new look and feel.

First, University of the Pacific recently completed a collaborative effort developing, vetting, and approving an Academic Plan titled Crossing Boundaries for Academic Excellence. The plan will guide the allocation of resources and priorities for the University while preparing our students and graduates to be successful in a complex world where solutions to the most pressing challenges require us to cross disciplinary, professional, cultural, and national boundaries. As part of this effort, the School of Engineering and Computer Science has outlined an aggressive strategy to build programming, infrastructure, and resources to be rolled out over the next few years. This strategy will require all of our stakeholders to come together with a unified vision for our students and their success, you among them. This edition of The Rock highlights developments and accomplishments of our students and faculty and demonstrates our enthusiasm for this next phase in our School’s history.

We successfully launched the first ever School of Engineering and Computer Science program at Pacific’s San Francisco campus with the Master of Science in Analytics in Fall 2015. This multi-disciplinary program, designed for working professionals, prepares graduates for an exciting and rapidly evolving career in “big data.” We are also playing a greater role in understanding the issues and challenges facing California in addressing its crisis in water management and water quality through our rapidly expanding Environmental Engineering Research Program. Our Cooperative Education Program continues to provide our students with valuable “experiential learning” that sets them apart from other engineering and computer science programs and includes opportunities for international CO-OP experiences. Finally, our new minor in Technology Innovation and Entrepreneurship is providing SOECS students the opportunity to develop business acumen while understanding what is required to turn an invention into a viable commercial enterprise.

It is an exciting time to be part of Pacific’s School of Engineering and Computer Science and we are fortunate that you are on this journey with us.

Steven Howell, Ph.D.
Dean, School of Engineering and Computer Science
“MEP made a difference in my experience at Pacific by providing workshops and network opportunities that helped me develop both educationally and professionally.”

-KARINA CASTAÑEDA ‘15

Pacific’s MESA Engineering Program (MEP) helps students develop personally and professionally during their years at Pacific in preparation for their future in the workforce. The program offers support, guidance, and various resources, such as free tutoring services, 24/7 access to a dedicated MEP study room, CO-OP placement assistance, and volunteer and scholarship opportunities. Our goal is to ensure the students graduate on time.

For more information and how to apply, please contact Ester Rafanan at erafanan@pacific.edu or 209.946.7499
HELLO!

PROGRAM UPDATES

The School of Engineering and Computer Science had a wonderful year last year and is ready to take on this next school year full-force. We have been working hard and staying busy with the School’s new Analytics Program, re-branding, expanding our technology and social media footprints, and so much more! Be on the lookout for changes here-and-there as well as program updates. Most importantly, we welcomed the Class of 2019 to campus. Go Tigers!

MR. RICK HUTLEY  |  ANALYTICS  |  PROGRAM DIRECTOR
Our inaugural cohort is underway, doing very well and already helping us to improve the program even further. With their help, we have decided to make future programs a full four semesters to better align with the busy travel schedules of working professionals. Expansion to the Sacramento campus is underway and we will begin accepting our first international students in the very near future.

DR. JEFF BURMEISTER  |  BIOENGINEERING  |  PROGRAM DIRECTOR
Our program is well positioned with respect to the University of the Pacific’s strategic plan, Pacific 2020. In addition, new faculty will yield new BENG courses and continuing improvements to our ABET accredited curriculum. Finally, the efforts of our ever increasing alumni pool have made all of this possible.

DR. CAMILLA SAVIZ  |  CIVIL ENGINEERING  |  DEPARTMENT CHAIR
In 2015, 46 Civil Engineering students completed their BSCE degree and 17 students received their MSES degree with a CE concentration, many as part of the Blended BS/MSES program. We are very excited about the strong job and career prospects for our CE graduates.

DR. MIKE DOHERTY  |  COMPUTER SCIENCE  |  DEPARTMENT CHAIR
Our program continues to grow in pace with trends in employment opportunities. In 2015, we awarded 33 BSCS degrees and 15 MSES degrees. We have expanded to nine full-time faculty members, with the recent addition of two new Assistant Professors and two new Lecturers.

DR. JENNIFER ROSS  |  COMPUTER ENGINEERING  |  DEPARTMENT CHAIR
Our master’s program continues to flourish with recent thesis projects in aerial robotics and computer networking. The Computer Engineering Department is expanding in the field of high-performance computing with the addition of a new faculty member in fall 2015.
The enrollment in the Electrical Engineering Program continues to grow as the demand for graduates in power, telecommunications, and electronics industries remain strong. Input from the Industrial Advisory Board helps ensure our graduates have the skills needed to succeed.

DR. RAHIM KHOIE | ENGINEERING PHYSICS | PROGRAM DIRECTOR
The Engineering Physics Program, with an enrollment of more than 20, continues to be a vibrant and vital program in the Department of Electrical and Computer Engineering. The addition of several new elective courses in various sub-specialties is giving students an even wider range of opportunities to pursue their interest in this rapidly advancing field of engineering.

DR. ABEL FERNANDEZ | ENGINEERING MANAGEMENT | PROGRAM DIRECTOR
We are honored to introduce Dr. Mehdi Khazaeli as a new faculty member within Engineering Management. Capitalizing on his broad industrial and academic background, the Program plans on introducing exciting new undergraduate courses in Design and Innovation, Building Information Modeling, Data Analytics, and Manufacturing Systems Modeling.

DR. CHI-WOOK LEE | MECHANICAL ENGINEERING | DEPARTMENT CHAIR
We recently added two new assistant professors (Drs. JuEun Lee and Shadi Othman) and Dr. Tien Roehling accepted an Assistant Professor position after previously serving as a Lecturer. With the new faculty members, our program will be stronger and better able to introduce more graduate/undergraduate classes in manufacturing and biomechanics.
DISTINGUISHED ALUMNUS OF THE YEAR
Paul J. Schneider, P.E.
(Civil, ’99)

Dean Howell presented Paul J. Schneider, P.E. with the annual Distinguished Alumnus of the Year Award in spring 2015. The award recognizes individuals who serve as a source of inspiration for the School of Engineering and Computer Science and the University of the Pacific through distinctive career achievements and volunteerism. Schneider is Vice President of the prestigious Siegfried Engineering, where he began his career with a Pacific CO-OP internship. Since graduating from Pacific, Schneider has had an exceptional career in engineering and philanthropic pursuits that has had a major impact at the state and local levels. Some of his accomplishments can be seen at Stockton Cineplex, Stockton Arena, and Banner Island Ballpark, to name a few. He is also the lead engineer for the In-Shape Fitness Centers throughout California. Paul and his wife, Julie, are proud Pacificans and supporters of academic and athletic programs.

DISTINGUISHED SERVICE AWARD
Marc Goto (Civil, ’61)

Marc Goto was the inaugural recipient of the Distinguished Service Award. The Distinguished Service Award acknowledges individuals whose dedication and service represents the spirit of Pacific and the School of Engineering and Computer Science. Goto has been a committed supporter of the School and University by serving on the Dean’s Advisory Council, co-hosting the annual Student and Alumni BBQ, coordinating and assisting with international alumni outreach efforts, and actively contributing his time and energy to past and current Pacificans. Goto also has the distinction of being one of the individuals responsible for procuring The Rock located at Khoury Hall, which has become one of Pacific’s most important symbols of pride and school spirit. Throughout his time with Pacific, Marc has demonstrated his commitment to all things Pacific and been its ardent champion in the community.

Do you know someone who would be a great candidate for the 2016 Alum of the Year or the Distinguished Service Award? Please send your nominations to Elizabeth Bacon at soecsevents@pacific.edu by March 15, 2016.
LAUREN ANDERSON  
Engineering Management  
"...A big thing is the fact that we have CO-OP. It’s really important for engineering students to have experience before they go out into the real world. I think that gives us a leg up."

DONNY MARRA  
Computer Engineering  
"What I plan on doing after graduation is going to law school to study intellectual property law. I saw an area where I could apply my own engineering background into creating proposals for inventions various tech companies come up with."

DELIA DAVILA  
Bioengineering  
"In high school, I was in MESA (Mathematics, Engineering, Science Achievement) and I got to take part in a bioengineering-related project that involved a prosthetic arm. This got me really excited about bioengineering."

CLAYTON WILSON  
Engineering Physics  
"My favorite thing about the engineering physics program is the sheer amount of people willing to help you through your problems and help you get things done."

FAITHE YATES  
Mechanical Engineering  
"I really love mechanical engineering because not only do you get to design something, you get to see it become real."

ZAHI HAKIM  
Electrical Engineering  
"As far as I can remember, my dad has always pushed me towards engineering. He always took me to work on “Bring Your Kids to Work Day” and showed me all the cool things he did as an electrical engineer."

LILLIAN SAM  
Civil Engineering  
"Climate change is real. What I want to do is find an alternative solution to disposing of waste. I’ve been researching it a lot which got my spark into civil engineering. Civil engineering fits what I want to do with my life."

Cameron Franke  
Computer Science  
“Balancing school and athletics have proven to be the single most challenging part of my college experience. It really all comes down to discipline and time management.”
LOUISE STARK LEAVES HER MARK

We bid Dr. Stark adieu as she reflects on her life. From her stint in catering to being a pioneer in computer image processing, her story is one for the ages.

“Are you sure you’re in the right place? Maybe you should consider something like secretarial work.” That is what Louise Stark was told by a professor during her first week as an engineering student. Little did that professor know, Stark would go on to have an extremely successful career and become the first female professor at University of the Pacific’s School of Engineering and Computer Science, all while setting a standard for excellence in education.

Stark has always had a love of engineering, even as a young child - although she did not recognize it at the time. Growing up, she enjoyed math and doing puzzles. She was interested in computers but never considered going to college. All of that changed when the catering business she co-owned was sold. With change on the horizon, she decided to pursue her dream of becoming a computer engineer at the University of South Florida.

While in South Florida, her academic interests included computer vision, virtual reality, and artificial intelligence. When asked about the research projects she has worked on, she jokingly said, “Well, I can say I got a PhD for recognizing chairs!” Her research work included photographing chairs and analyzing the images with her newly developed paradigm to discover the minimal amount of parts a chair needed to be able to function. She used that paradigm to eventually recognize a total of 101 chairs! The success of the chair research was so strong that her paradigm is still being passed down and used in research efforts today.

Throughout the years Stark has been in a multitude of publications due to her extensive research. She even has the distinction of being interviewed by national news media after Osama Bin Laden’s capture. The news broadcast highlighted the fact that her image processing research played a factor in the 2011 military operation.

From her first day at Pacific, Stark has been a strong and positive influence in the School. Early in her career she began serving as the faculty advisor for the Pacific chapter of Society of Women Engineers (SWE). From there, she was instrumental in bringing Expanding Your Horizons to Pacific in 1992. She also helped develop Pacific’s Team Tech program, which competes annually and took top prize in their first competition. The team has placed in multiple competitions since taking first.

Expanding Your Horizons will likely remain one of Stark’s most powerful contributions to the local community. Thanks to her visionary leadership and unwavering support, the program continues to bring hundreds of middle and high school girls to Pacific’s Stockton campus every fall for workshops and presentations that show them the importance (and fun!) of STEM fields and careers.

At the Faith Davies Award Ceremony in 2015, Stark’s service to students was recognized with the prestigious Podesto Award for Excellence in Student Life, Mentoring, and Counseling. The award recognizes the instrumental role that she has played in enriching the student experience during her time at Pacific. She was also bestowed with the Order of Pacific in May 2015, which is the highest honor that can be given to members of the University and recognizes distinguished service and outstanding contributions to Pacific over a significant number of years.

After having worked at Pacific for an astonishing 23 years and her many professional accolades, Stark’s favorite memory of being here is simple: she just enjoyed being a female engineering professor and working with the students. She will be greatly missed as she moves forward into retirement but her legacy and dedication to Pacific will never be forgotten.

From the School of Engineering and Computer Science, thank you Dr. Louise Stark for all that you have done!
Dr. Louise Stark gets ready to embrace President Pamela Eibeck after receiving the Podesto Award for Excellence in Student Life, Mentoring, and Counseling at the 2015 Faith Davies Award Ceremony.

To donate to The Louise Stark Endowed Scholarship for Women Engineers Please visit: pacific.edu/makeagift Type “Louise Stark Scholarship” when prompted
THE NEW FACES OF SOECS

1. DAVID MUELLER  
ELECTRICAL & COMPUTER ENGINEERING  
ASSISTANT PROFESSOR  
As a recent graduate of University of Missouri, Columbia, Dr. Mueller completed his dissertation on the optimization of mid-infrared quantum cascade lasers using evolutionary programming. He has a strong instruction and research background and has been included in the Journal of Vacuum Science & Technology.

2. IRENE CAMY  
COOPERATIVE EDUCATION ASSISTANT DIRECTOR  
Ms. Camy joins Pacific with nearly 20 years of experience in higher education. She has served as a Director of Career Services, Learning Resource Center Manager, and Instructor at Heald College where she focused on student professional development, developed internship opportunities, and conducted seminars on professionalism skills.

3. JUEUN LEE  
MECHANICAL ENGINEERING ASSISTANT PROFESSOR  
Dr. Lee joins Pacific from the University of Bern, Switzerland, where she served as a postdoctoral fellow at the Institute for Surgical Technology and Biomechanics. She completed her Ph.D. at Carnegie Mellon University in the Department of Mechanical Engineering where she focused on analyzing surgical technology in engineering aspects. She has also been published by Journal of Biomechanics and Medical Engineering and Physics.

4. MIKE CANNIFF  
COMPUTER SCIENCE LECTURER  
As a longtime adjunct instructor with the School of Engineering and Computer Science’s new Analytics Program after serving as Senior Quantitative Analyst for Google. He worked several years in the semiconductor, biotech, and web industries in senior data science roles. He holds multiple patents and has created business critical predictive time series and supervised learning engines across these industries.

5. MICHAEL WILLIAMSON  
ANALYTICS CLINICAL PROFESSOR  
A graduate of UC Berkeley, Dr. Williamson joins the School of Engineering and Computer Science’s new Analytics Program after serving as Senior Quantitative Analyst for Google. He worked several years in the semiconductor, biotech, and web industries in senior data science roles. He holds multiple patents and has created business critical predictive time series and supervised learning engines across these industries.

6. MIKE CANNIFF  
ANALYTICS DIRECTOR  
Mr. Hufley is a former CIO from the telecommunications industry as well as Vice President, Global Innovations at Cisco Systems. As an Internet of Things (IoT) expert, he has worked extensively with the executive teams of some of the largest corporations in the world. His work has involved helping them to understand Internet trends and impact and to develop innovative solutions involving next generation technologies. He is a leader in the field of analytics, data analysis, and the development of long-term technology-based innovation.
9. TIEN ROEHLING
MECHANICAL ENGINEERING
ASSISTANT PROFESSOR
An accomplished researcher, Dr. Roehling completed her Ph.D. at the University of California, Davis, in materials science and engineering. She also served as a post-doctoral research associate in thermochemistry and focused on the stabilization and aging of solid oxide electrolytes. Dr. Roehling is highly published and been featured in scholarly journals that include Chemistry of Materials, Journal of the American Ceramic Society, and Journal of Physical Chemistry.

8. SHADI OTHMAN
BIOENGINEERING
ASSOCIATE PROFESSOR
Dr. Othman is a gifted academician who joins Pacific from the University of Nebraska, where he served as an associate professor. Dr. Othman brings with him experience in biomechanics, imaging, tissue engineering, and regenerative medicine. He is also a graduate of the University of Illinois at Chicago’s bioengineering program and his research has been included in such publications as Biomaterials, Tissue Engineering, and Magnetic Resonance in Medicine.

4. LEILI JAVADPOUR
COMPUTER SCIENCE
LECTURER
A doctoral graduate of Louisiana State University, Dr. Javadpour is joining Pacific with a strong background in software development, big data analysis, and linguistics data. As a Ph.D. student, she designed a framework for resolving pronominal anaphora by marrying linguistics studies and new semantic features. Her research has been featured in Human Factors.

10. VIVEK PALLIPURAM
ELECTRICAL & COMPUTER ENGINEERING
ASSISTANT PROFESSOR
Dr. Pallipuram completed his Ph.D. at Clemson University, where he specialized in computer architecture. He was a post-doctoral researcher at the University of Delaware and developed statistical prediction models for non-dedicated clusters and investigated resource allocation methods and scheduling policies. His research has also been published in the Journal of Supercomputing.
Let’s take a look back at some of the highlights of the past year. From the high flying drones of Senior Project Day to our Mechanical Engineering program celebrating 30 years, we can all collectively say that 2015 was a year filled with triumphs and milestones.

1. The 2015 School of Engineering and Computer Science Awards Banquet was a great day for Paul Schneider (left) who later that night won Distinguished Alumnus of the year.

2. The students of Team Tech took 2nd place in the national SWE convention in Nashville, Tennessee. With their mentor, Regent Jose Hernandez, they built a small satellite that sub-orbited the Earth.

3. Dean Steven Howell wishes the class of 2015 a bright future and expresses beaming pride for all of the students’ accomplishments.
Alumni from all over the nation came to Pacific’s homecoming weekend. Every year SOECS holds a BBQ for alumni and students to eat great food and share college stories.

Drones! Every year upperclassmen participate in Senior Project Day, an event that showcases the work of our soon-to-be graduates.

Dr. Louise Stark gives a short but beautiful speech at her retirement party this past April. It was attended by faculty, staff, friends, and family who all wished her a wonderful retirement.

Rick Hutley (Program Director) gives a lecture to the inaugural class of the MS in Analytics Program at Pacific’s San Francisco Campus.

The Mechanical Engineering program celebrates 30 years of excellence at Pacific. Pictured are current students, alumni, and President Pamela Eibeck.

This year’s Cardboard Regatta drew in dozens of homemade boats designed and constructed by the students of the Pacific ENGR 10 class. Sink or swim, it was fun day by the pool.
#FOLLOWME

KEEPING UP WITH GENERATION Z

Written By Eileen Le
They have grown up in the digital age: reliant on electronic devices, always connected, and unaware of the world without the internet.

In the fall, the future engineers and computer scientists of the Class of 2019 arrived on campus as we welcomed this latest group of Generation Z to our School.

Generation Z is the latest generation of teenagers who were born after the Millennials – any time between roughly 1995-2009. They have been all the buzz lately because of how differently they think from their predecessors. They have grown up in the digital age: reliant on electronic devices, always connected, and unaware of a world without the Internet. As a result of the hyper-intensive society and today’s busy environment, Gen Z-er’s want everything and they want everything now. Why wait for something when the world is literally at your fingertips?

Due to how deeply integrated social media sites (like Instagram and Snapchat) are in today’s society, Gen Z-er’s are visual learners with substantial focus on photos and videos. In fact, according to a New York ad agency, Sparks & Honey, “52% of teens use YouTube or other Social Media sites for a typical research assignment in school.” In fact, many Generation Z children and teens are starting school earlier and embracing the accessibility of online classes and the entrepreneurial spirit it fosters. Never before have we seen this much empowerment and young people intent on changing the world.

So what made Generation Z who they are? They grew up in a post-9/11 world. They were born into a time of terrorism and recession, only knowing a world of re-building and social and economic renewal. According to Advertising Age, Generation Z is the “least likely to believe there is such a thing as the ‘American Dream.’” They focus on reality rather than creating a perfect life. In this way, they have had to become more adult-like, which is why they have been described as ‘mature,’ ‘independent,’ and ‘motivated.’

Gen Z-er’s get their answers and find their inspiration online. They feel pressure to work but are also eager to do so. McCrindle expresses that what helps them stay motivated is receiving recognition. They not only enjoy achieving goals but also being complimented for them. They yearn for that ‘thank you’ or ‘congratulations’, which they find comparable to a ‘like’ on an Instagram post.

As a result of the world they were brought into, Gen Z-er’s are very global and have influence beyond their years.

Generation Z has been shaped by terrorism, recession, technology, and social media. They have grown up in a world full of change. They are different than previous generations and the School of Engineering and Computer Science has certainly taken that into account with our recent re-branding, social media activity, and updated outreach methods. We have been evolving with Gen-Z, staying relevant and communicating with them in their way. So forget what you learned about the Millennials. Generation Z is here: ready to take action and impact the world. They don’t just represent the future, they’re creating it.

**WHAT YOU TALKIN’ ABOUT!?**
Check out these 5 apps that are creating new ways of interaction and communication

- **Snapchat** allows you to send photos and videos (“snaps”) that disappear after they are viewed. Even though Snapchat has been around for a while, it’s still continuing to grow at a rapid speed.
- **Whisper** is a social network of discovery where people can anonymously express themselves and share their thoughts and secrets with people near them or from their school.
- **Yik-Yak** is designed for people to share thoughts with others in their local areas while keeping their privacy. Users can upvote when they agree with something or downvote when they don’t like it.
- **Periscope** consists of live broadcasts streaming from all around the world. As you watch something, you can see when other people join you, comment, leave hearts, and more. There’s even an ability to replay!
- **Bubbly** has already established success around the world and is heading to the U.S. It’s like Instagram but for your voice, allowing you to share audio with followers while editing them with cool effects.
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For More Information On The MS In Analytics Program Visit: pacific.edu/analytics

The program is offered at Pacific’s San Francisco and Sacramento campuses
Sponsored by:
University of the Pacific
School of Engineering and Computer Science
& McGeorge School of Law
Pacific SOECS takes a deeper look into the water waste produced by hydraulic fracturing in California.
Hydraulic fracturing has been in the news in recent years, mostly because the public is concerned about environmental impacts, induced seismicity, and other issues. Hydraulic fracturing is not a new technology - it involves formulating fluids (typically water-based) and injecting these fluids into deep geological formations to increase oil and gas production.

Pacific’s Dr. Will Stringfellow and Dr. Mary Kay Camarillo recently participated in a large-scale study to investigate the environmental hazards of hydraulic fracturing and other types of well stimulation in California. The project was sponsored by the California Natural Resources Agency as part of Senate Bill 4 and managed by the California Council on Science and Technology (CCST). Stringfellow led a group of scientists and engineers in studying the hazards posed to water resources as a result of the large quantities of water and industrial chemicals used. One concern is that in California (and elsewhere) hydraulic fracturing is being done in regions experiencing extreme water stress. Also, potential impacts of the large quantities of chemicals used have raised concerns.
According to Stringfellow, “Hydraulic fracturing in California is different than what is done in other regions. Differences stem from differences in geology and most production is for oil, not gas.” California is the fourth largest oil producer in the United States. Much of the oil production in California occurs at the southern-end of the Central Valley, concentrated in Kern County. Oil/gas production also occurs in other parts of the state, including L.A. and Orange Counties as well as off of the adjacent coastline.

Drs. Stringfellow and Camarillo found that an estimated 340 chemicals were being used for hydraulic fracturing in California - only about 230 of these could be positively identified. The identity of the remaining chemicals was not disclosed.

According to Camarillo, “Treatment of waste streams containing hydraulic fracturing chemicals appears very feasible. We need to demonstrate treatment before implementing it full-scale.” Another conclusion of the study is that, although hydraulic fracturing uses large quantities of water, water use for hydraulic fracturing is actually lower than for other types of oil production. Water consumption for energy is also much lower than for other uses (e.g. irrigation).

Scientists in Stringfellow’s group found that disposal practices for oil/gas waste streams need further review. Impacts on groundwater resources have not been fully studied to verify that these resources are not being impacted. Also, data collection practices for hydraulic fracturing and other types of oil/gas production need updating. The study authors provided valuable information to the State of California for reducing risks associated with hydraulic fracturing.

Stringfellow said that it was an “eye-opening” experience to work on a project that has received so much interest and scrutiny. As a result of the project, he was able to work directly with members of the state government. Camarillo states, “The most poignant moment for me was when I was reviewing the chapter on offshore oil development. I was about half-way through the document when an oil spill actually occurred off the coast of Santa Barbara. It made me realize...
Graduate student Ji Yeon Lee looks through the microscope as part of her research investigating the biological treatment of hydraulic fracturing waste.

For more information on the Senate Bill 4 project led by CCST, visit: ccst.us/projects/hydraulic_fracturing_public/SB4.php

how important this work is for ensuring the safety of oil production in California.”

“The work on oil/gas production has greatly influenced the work that we are doing as part of the Ecological Engineering Research Program,” said Stringfellow. “This is exactly the type of work that we want for involving students. It’s timely and relevant. It combines engineering, science, and policy.”

Currently, work in the research group is focused on developing better analytical techniques for hydraulic fracturing chemicals and treatment methods for hydraulic fracturing waste streams. The group also continues to analyze data sets to better characterize the chemicals being used. According to Camarillo, “Ultimately, we hope that our research results in good engineered solutions to environmental problems, resulting in better protection of human health and the environment.”
The Minority Engineers Scholarship Fund was established to provide a way for students to receive the financial help they need. "We created this scholarship to help provide an avenue for students with diverse backgrounds to receive the support and encouragement they need to be successful in achieving their academic dreams," says Janet Spears (’84). "I wanted to give students the same opportunity that I had and inspire them to consider engineering and computer science as a career. When you can impact change for future generations, I believe it is your responsibility to do so."

If you have an interest in supporting this fund or establishing your own scholarship to support students, please contact:

Elizabeth Bacon, Assistant Dean for Advancement at ebacon@pacific.edu or call 209-946-2643
There is a new gold rush underway and it is even bigger than the one in 1849! This “gold” everyone is seeking today lies on the Internet. Just like the mad rush of the forty-niners to the west, today there is an urgent and frenzied surge towards the riches to be mined from Big Data.

Our journey begins with the Internet or rather, the Internet of Things. The Internet has transformed every aspect of our personal lives – both our daily activities and the objects around us. However, it appears we have not even scratched the surface of the Internet’s potential. It is projected that over the next five years we will increase the number of things connected to the Internet several times over. This so called “Internet of Things” is accelerating at an unimaginable rate and is estimated to have an impact that will be over 35 times greater than the Internet itself.

The Things are a vehicle to obtain the data that give us visibility into our world in ways we have never had before. It is projected that 50 billion things will be connected to the Internet by 2020! This is giving rise to Big Data. Data itself is of minimal use unless you analyze it to determine what it is truly telling you. Analytics is one of the hottest topics on the business radar today. Thanks to the Internet of Things and Big Data, we have access to vast quantities of data at our disposal from a myriad of sources.

Modern analytics enables us to view the world in ways we could not even imagine before. We now have the ability to determine with increasing accuracy whether customers will be more interested in product A versus product B, what level of risk a prospective applicant represents, almost instantly detect fraudulent activity, sense the emotional reaction of our users, predict when a piece of equipment is likely to fail, or even determine which available course of action will be the most beneficial for a company. Whether we are interested in consumer sentiment, industry trends, or corporate performance projections, analytics is the tool for improving our insights.

Data Scientists, the Jedi Masters of the data world, are in very high demand. McKinsey & Company predicts that by 2018 the demand for these rare skills will exceed available resources in the market by around 60%. To help meet this demand, University of the Pacific launched a Master of Science in Analytics targeted at helping working professionals to take their career to the next level in this exciting and lucrative area.

All of these steps lead to the final and stage of our journey: Innovation. With the unprecedented growth in the Internet of Things and Big Data, we are now in an era of hyper-innovation. New products and services are being invented at an incredible pace and companies across all industries are working feverishly to innovate across every aspect of their business in order to react to market changes and remain ahead of the competition.

This new gold rush has huge economic implications. Cisco Systems estimates the impact could be as high as $19 billion over the next 10 years. Success will depend heavily on a company’s ability to connect to the world around them, capture the data, and perform analytics in order to innovate. Having the right analytic team in place will be a big determinant in being able to be the advantage of the IOT era – and Pacific is poised to deliver those critical Data Scientist skills.
CO-OP GOES GLOBAL

WRITTEN BY STEVE HARVATH
If you graduated from the School of Engineering and Computer Science (SOECS) then you know what “CO-OP” is. The question, “Where did you do your CO-OP?”, is viewed as the unofficial anthem of the School and next year the answer could very well be “Germany.” The School has launched a comprehensive effort to broaden the experiences of its students.

TAKE OFF
In the Fall of 2014, SOECS initiated its first search for international CO-OP partners with some familiar countries. While we have sent the occasional CO-OP student abroad, it has been a rarity largely due to the fact that building consistent relationships is difficult and student interest is unpredictable, especially in areas of the world that do not speak English. With growing economies and globalization at an all time high, we wanted to ensure that our students have the opportunity to have safe and reliable international CO-OP experiences that foster a healthy world-view. To that end, we reached out to past partners in Japan, Germany, and Mexico, and continue to find more.

“A lot of our students have never traveled to other parts of the country, let alone another continent. We believe that gaining exposure to other parts of the world, and working with people, will enable our students to learn extensive team building, communication, and project management skills that will be critical as the industry moves forward.” says Steve Howell, Dean of the School of Engineering and Computer Science. “If a student plans on working at a global firm, they will need to be able to adapt to other cultures and find ways to work through barriers such as time zones, language, and business ethos. Pacific has an opportunity, through its CO-OP program, to help students not only study abroad but work there.”

HEADING TO JAPAN
This year, SOECS was able to establish a partnership with ARC System Works in Japan. Working with Pacific’s International Programs and Services, SOECS was able to provide support and logistics for Jason Jung, a computer science major, who successfully applied to ARC for a summer CO-OP. While getting there proved complicated due to visa issues and some time restrictions, Jason enjoyed being the self-proclaimed pioneer for his fellow students in launching the reinvigoration of the International CO-OP Program. Jung’s father, alum and Dean’s Advisory Council member, Robert Jung, has commented that “the time in Japan has been exceptional for Jason and provided him with an amazing personal and professional experience that will only make his future job prospects that much better.”

PURSUING GERMANY
Following up on the successful partnership with ARC System Works, SOECS has begun working with universities in Germany to establish a working exchange program. One example is Hochschule Esslingen University of Applied Sciences. This university has a program that allows German students to swap places with students from the United States and also help place American students in CO-OPs with German automotive firms. An exchange student from Hochschule Esslingen would take engineering classes in English for the equivalent of one semester followed by an internship for another semester.

“We are excited for the opportunity to partner with Hochschule Esslingen and give our students yet another kind of working experience in the very prestigious German automotive industry. Our students could help manufacture some the best machines and engines on the road today,” says Howell.

BUILDING RELATIONSHIPS IN MEXICO
Also launched recently was a ‘cube sat’ collaboratively developed for the NASA program by students from Universidad Popular Autonoma del Estado de Puebla (UAPAD) in Oaxaca and Pacific. A ‘cube sat’ is a mini-satellite that is put into orbit and produces pictures of Earth that are then sent back to students on a receiver. These satellites can be as small as a ping-pong ball or as large as a 10cm x 10cm x 10cm cube.

The ‘cube sat’ project is the first step to more extensive relationships with universities and companies in Mexico that could include experiential learning opportunities to exchange students from Pacific and Oaxaca.

ONWARD AND OUTWARD
The School is committed to helping students achieve their dreams of travel and working for internationally renowned corporations. As part of this initiative, SOECS is working with the International Studies Program to expand CO-OP programming to include cultural training, travel etiquette, and language requirements. These new courses will enable students to get the most out of the experience and assist them with transitions between cultures.

In addition, SOECS is building a fund to provide fellowships that will support student travel and living expenses during their CO-OP program. Such fellowships will range depending on the location and financial need of the student.

HELP SUPPORT OUR CO-OP PROGRAM
If you work for an international company and have opportunities for internships abroad, please contact us for more details. We are looking for companies with branches or subsidiaries abroad that may be able to offer safe and enriching CO-OP experiences.

If you would like to donate to the Pacific International CO-OP Fund please contact Elizabeth Bacon, Assistant Dean for Advancement at ebacon@pacific.edu or visit: pacific.edu/co-op
LIGHTS
CAMERA
ACTION!

SHINING A SPOTLIGHT ON SOECS ALUM ANTHONY SHAFER
WRITTEN BY EILEEN LE
You may have seen his name in the credits of some of the biggest motion pictures, such as *Star Wars*, *Hulk*, and *Transformers*. Remember that Michael Jackson hologram from the 2014 Billboard Music Awards? He helped create that too. He has accomplished many amazing things in his lifetime due to his determination, fearlessness, reinvention, and sheer talent. He embodies the importance of following your dreams and pursuing your passion by staying grounded and not losing who you are along the way. Through his numerous projects and career paths, he has always managed to come full-circle and end up doing what he loves. Meet: Anthony Shafer.

Shafer is the type of person who knew what he wanted to do in life early on. In fact, he knew in the third grade – he wanted to make movies. Growing up without electricity on a farm in the mountains, Shafer was not exposed to media as a young child. Seeing movies in the theater was magical to him because he became “inspired by art and technology and how it all merges together.”

While his family did not have the economic means for him to go to college, Shafer’s parents encouraged him to pursue his dreams and an education. He received a full-ride scholarship to University of the Pacific where it was important to him that he did not lose himself going through the engineering program. When he was not studying, he was making movies. He was laser-focused to work for George Lucas on *Star Wars* even though it seemed impossible. In 1997, Shafer graduated from the School of Engineering and Computer Science with a Computer Engineering degree and landed a job with Industrial Light & Magic (ILM) where his dream to work with George Lucas came true.

Shafer went on to do visual effects for *Star Wars: Episodes 1-3*. He even tested the acting waters as a dead Jedi, he also had a brief shot at being Darth Vader but was unfortunately half-an-inch too short for the role. He has also been involved with other amazing motion pictures including: *The Perfect Storm*, *Jurassic Park III*, *Harry Potter and the Prisoner of Azkaban*, and *Pirates of the Caribbean: Dead Man’s Chest*. But he is more than just movies, he is a man of constant reinvention. At Pacific, he was gearing towards being a moviemaker. During his time in the movie industry, he was planning startups. After making movies, he started his own stereoscopic company. He is always thinking a few steps ahead and never afraid of trying new things. Anything technical and creative: he has been there and done that.

Since Shafer has long been immersed in the technical world, we wanted to know the direction he sees technology going. Along with his personal theme of reinvention, he feels technology will do the same: “It’s continuously making us as humans reinvent ourselves...The world is changing at a pace where our society isn’t ready to accept it.” He thinks that if you are not willing to change then you will essentially go extinct. Adapting to this constantly changing world makes you stay relevant and not just become a “button pusher.” Technology will become more personal and “we will want an experience that’s unique to us because the world is so connected.”

From making movies to creative consulting and making apps to his present-day work, Shafer has been diving more and more into technology. He is currently working at Tippett Studio as a cinematographer on a 4D ride film that involves using virtual reality to create a digital environment of a Chinese province. The project was commissioned by a land developer in China who is working on creating a more urbanized environment with an amusement park featuring the ride in the center of the city. This is new ground for Tippett Studio and just another first for Shafer. He suggests it is “similar to writing in a different language” because the project is so technical and requires many machines and devices that each has a different translation.

Shafer has had quite a trail of accomplishments that continues to grow. Because it can be difficult to be unique in the digital age, he offered advice for Pacific students on how to stay true and follow your passion but also stand out. He believes that it is important to “craft your life before your life crafts you.” Once you know what you want, you can build the tools to support that. Do not be afraid to experiment and try new things. It is okay to take a non-standard approach to solving a problem or to destroy something to make it better. Life is the journey of increasing your self-potential.

“The space suit I’m wearing is Adam Savage’s from Myth Busters. (We worked together at ILM.) I posed in the suit as a wink/nod/tribute to all of the inventors, makers, and fabricators.”
As the School of Engineering and Computer Science continues to grow and evolve, our commitment to our students, alumni, industry partners, and friends remains steadfast. With the restructure of our Outreach and Cooperative Education departments, we are providing our current and prospective students more personalized services and opportunities. Our new MS in Analytics is allowing us to provide the wider community with a new kind of employee; one who is not only on the cutting-edge of technology, but one who is breaking barriers and creating new opportunities for growth.

In addition, we have identified new priorities for the School that align with Pacific 2020 and the overall vision for University of Pacific. These priorities will further help our students be competitive in the job market and create new ways to partner with industry and alumni in delivering high-quality learning opportunities.

For more information please go to: engineering.pacific.edu

In an effort to better support our students, alumni and friends have given almost five times the number of gifts towards scholarships during the 2014-2015 fiscal year. Endowed scholarships, such as those recently sponsored by Gwynne and Ron Wade and John and Sallie Chaney, provide financial relief to students and allow them to focus on their education.
This year alone, the School has given out nearly 40 scholarships, all of which are due directly to the support of our network of alumni, friends, and corporate sponsors.

Additionally, we have successfully undertaken a re-branding effort, bringing our message to new platforms that allow us to better engage with prospective students, alumni, faculty, corporate partners, and more. By utilizing new technologies, we are able to communicate more effectively to more people with little impact on the budget.

Collectively, this last year has been one of great progress as we raised nearly $1 million in support. We increased the number of scholarships we can offer to students by 21% and we received funding for our first endowed professorship, the Fletcher Jones Endowed Professor, which will be awarded next year. These are tremendous milestones that emphasize how much our stakeholders believe in what we are doing to provide the best private education to our students.

“We are building incredible momentum towards accomplishing our goals and we cannot and will not achieve them without you. Thank you for investing in our vision and inspiring us to work harder to get there.” – Steve Howell, Dean
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-AUSTIN HAGYARD ‘16

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