



Women, Engineering, and Computer Science: Perfect Together

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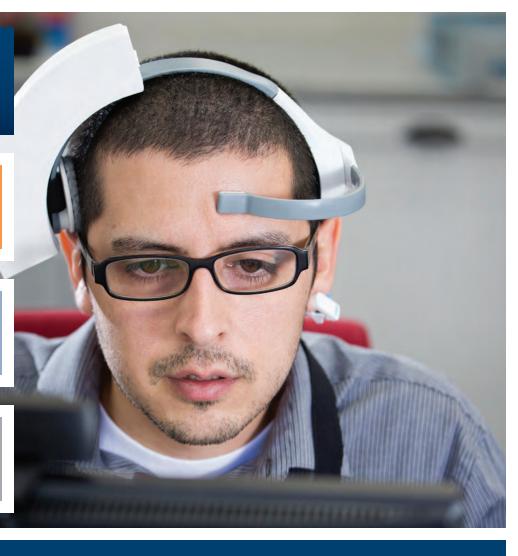
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Student Snotlight

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CONECTION

NEWS FROM THE COLLEGE OF ENGINEERING & COMPUTER SCIENCE

Issue Eleven // Fall 2016

Training the Next Generation of Biomedical Device Engineers

The fusion of engineering and biology has already revolutionized medical diagnosis and treatment. Now engineers are being called on to address the needs of an aging population and those with mobility impairments through collaborative endeavors, ushering in a new age of medical discovery.

To meet this challenge, the College of Engineering & Computer Science is creating a unique curriculum to address the workforce demands of the biomedical device manufacturing industry. Through a \$300,000 grant from the W.M. Keck Foundation, the college is developing a cross-disciplinary degree option and has procured specialized equipment to train students for this quickly growing field.

"Biomedical engineering is traditionally a hybrid of biology and engineering concepts," says Sang June Oh, interim associate dean of the College of Engineering & Computer Science, who is overseeing the curriculum, "but our emphasis on medical devices tilts the curriculum heavily toward the engineering side."

Two years ago, ECS faculty held two roundtables with industry leaders from the region to better understand their workforce needs.

"The message was clear," says Raman Unnikrishnan, professor of electrical and computer engineering, and former dean of ECS. "Our industry roundtables revealed that employers weren't simply looking for traditionally trained graduates from biomedical programs – they needed engineers who could conceptualize, design, simulate, prototype, test, and manufacture medical instruments and devices."

CONTINUED FROM PAGE 1 >

Oh considers this curriculum to be a natural fit for Cal State Fullerton given its location within the Los Angeles-San Diego corridor – one of the country's busiest centers of biomedical device manufacturing.

A Unique Opportunity

"A bachelor's in biomedical engineering is often intended as a stepping-stone to medical school or a graduate engineering program," says Unnikrishnan, "but our goal is to prepare undergrads primarily for the workforce."

The biomedical device engineering option is currently being planned as a curriculum offering for engineering majors. Unnikrishnan says this will give students a foundation in traditional engineering while adding a biomedical device "flavor" through cross-disciplinary courses taught by mechanical engineering, civil engineering, computer engineering, and electrical engineering faculty.

"Depending on the device's purpose and interaction with the body, its development may draw from fields ranging from data capture and analysis to biomechanical engineering," explains Unnikrishnan. "But regardless of the device, considerations such as design, cost-effectiveness, and compatibility with FDA rules and regulations always apply."

The curriculum includes hands-on experience through a two-course design sequence that students will take during their senior year.

As part of this experience, students will be able to research emerging technologies, such as assistive robotics and human-machine interfaces, which can benefit individuals with neuromuscular disorders or spinal cord injuries.

"Individuals with limited mobility can use these devices to communicate, operate a computer, and perform manual tasks using robotic arm control," says Kiran George, coordinator and professor of the Computer Engineering Program. "This research can greatly enhance someone's quality of life."



Developing the Region's Workforce

Thanks to the high demand for advanced medical devices, the industry is flourishing. The U.S. Bureau of Labor Statistics projects hiring within the biomedical engineering field will rise by 23 percent between 2014 and 2024. Orange County is already seeing much of this growth. The area is home to numerous medical device companies, including Irvine-based Edwards Lifesciences, a manufacturer of artificial heart valves and hemodynamic monitoring devices that employs 8,700 workers worldwide.

Chacphet "Chuck" Limsakoune, a principal engineer with Edwards Lifesciences, says the industry offers a great deal of opportunity.

"Large manufacturers have a steady demand for talent, particularly when they're working to launch a new product," he says. "And there is a significant flow of venture capital into Orange County that's created a vibrant startup environment."

Limsakoune's team includes ECS alumni Jeanette Corona (ME '15) and Mike White (ME '15), who started as interns through the company's industry training and mentorship partnership with the college. For them, transitioning to the biomedical device industry meant embracing a highly collaborative culture.

"As a student, I was accustomed to working independently and being responsible for my own projects," explains Corona.

"The industry is very group oriented," adds White. "We're constantly adapting to the changing demands of the project and working closely with other members of our team."

In keeping with this industry dynamic, ECS's new curriculum emphasizes collaboration.

"As part of the senior design sequence, students will work in teams to develop biomedical devices from conception to implementation," says George.

Oh believes this experience – along with the specialized curriculum and lab equipment made available through the generosity of the W.M. Keck Foundation – will establish ECS as an important training site for future biomedical device engineers.

"This training can enable graduates to support industry growth in our region while helping to create life-saving and life-changing medical devices," says Oh. •

Women, Engineering, and Computer Science: Perfect Together

Tempered by some giggling and chatting, a whole lot of serious concentration was happening as 40 Girl Scouts recently worked with their CSUF student mentors in a College of Engineering & Computer Science lab. Their collaboration was part of the Creative Coding program, one of several initiatives on campus designed to help girls and women engage with engineering and computer science.



"We saw that these girls needed only a little encouragement to use their unique talents to learn to code and to learn that coding is fun," says Doina Bein, assistant professor of computer science. "That encouragement is what will drive more girls to study and pursue careers in science, technology, engineering, and math (STEM)."

Encouraging women to study STEM is imperative to the national job force. The U.S. Department of Labor projects there will be 2.5 million jobs in computing and engineering by 2022. Without more women in the field, those jobs will likely be filled by people outside the United States. It's a crisis that has caused many of the country's most notable companies to get involved, including Google, with its igniteCS award focused on computer science education. For the last two years, Cal State Fullerton's Creative Coding program received igniteCS funding from Google, most recently \$9,640 to expand its work with the Girl Scouts of Orange County.

"Women currently make up a small percentage of the STEM workforce. The number is even smaller for women in engineering and computer science, roughly 15.9 percent," says Susan Barua, interim dean of the College of Engineering & Computer Science. "We're committed to encouraging and providing opportunities here for women to pursue engineering or computer science and to help them be successful when they enter the workforce."

Those opportunities are wide-ranging at CSUF, and among them is The Women in Computing and Engineering program. As a learning community, it unites a cohort of female students at ECS.

"The Women in Computing and Engineering program at California State University Fullerton empowers and meets the needs of today's women through leadership and educational services," says Marcela Rojas, coordinator of the program. "It also helps increase retention and graduation rates of female students in the College of Engineering and Computer Science."

Another support is The Association for Computing Machinery-Women (ACM-W) student club. While the club is active in outreach, including the Creative Coding program with the Girl Scouts of Orange County, it also provides activities and projects for its members that enhance learning and career development.

"We strive to build diverse teams at Raytheon, so partnering with CSUF to encourage more women to graduate with STEM backgrounds is a very good business initiative," says Cathy Lekawa, a director of software engineering at Raytheon, Fullerton. "Recruiting from a diverse pool of candidates enables us to build a more qualified workforce. The more diverse our project teams are, the more often we are able to turn good ideas into amazing ideas."

Level-setting computer science and engineering teams inside the classroom and in the workplace with more women is key to the most vital component of next-generation discovery: collaborative problem solving. "Women are a part of that important diversity and a necessary ingredient to modern problem solving," says Barua. "From increasing the number of women faculty at ECS to attracting and retaining more women students, we are focusing on meeting the needs of a workforce skilled in engineering and computer science, and driving technological progress."

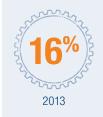


"By attracting and retaining more women students and female faculty to ECS, we are bringing unique perspectives and creativity to solving technical problems."

SUSAN BARUA

INTERIM DEAN, COLLEGE OF ENGINEERING & COMPUTER SCIENCE

Women on the rise in engineering and computer science at CSUF:





More members of Women in Computing & Engineering program at CSUF:

22 Women in 2012

40 Women in 2016

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Once a Titan, Always a Titan



Michael D. Falkow (CS '90; M.S. '94) Assistant City Manager – City of Inglewood Lecturer, Computer Science

For as long as I can remember, I have been driven to learn, to achieve, and to succeed. Couple this with a strong intrinsic motivation to help others, and you get a person who goes out of his way to find ways to experience new things, expand his horizons, and share the results with others in an effort to help them reach higher.

Some might call it uncommon, but much if not all my success and fulfillment in life are attributable to this strong motivation, determination, and commitment. For example, my career as an assistant city manager for the beautiful City of Inglewood is demanding – especially as we prepare to become the future home of the Los Angeles Rams! But despite that, I have been teaching a graduate course in computer science at CSUF on Thursday

evenings since 2014. Recently, I completed just over two years on the CSUF Alumni Association Board of Directors, which was extraordinarily wonderful.

"Alumni Association members receive great benefits: money-saving discounts, online career services, access to all 23 CSUF libraries, and university updates, news, and invitations to alumni events."

DIANNA FISHER. EXECUTIVE DIRECTOR, ALUMNI ENGAGEMENT

My connectivity to CSUF since graduating with my bachelor's degree in 1990 has been consistent and fulfilling. I provided technology consulting for the School of Communications (now the College of Communications) back in 1993–94 and taught undergraduate computer science courses at the same time. After graduating with my master's degree in 1994, I maintained my bond with the university by participating on various ECS advisory boards and at alumni events.

For me, teaching and volunteering at CSUF give me a sense of satisfaction and enjoyment that is difficult to describe. I don't see any of it as laborious or undesirable – except maybe grading papers! I love the interaction with the students, other alumni, fellow faculty, and administrative staff. Just being on campus energizes me and keeps me young at heart and in mind. The best part is seeing the positive impact on the Titan community. I guess it's my way of paying it forward for all the great things CSUF did for me, as that is the most rewarding feeling one can have. Once a Titan, always a Titan!



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A Message from the Dean



The fall semester always brings with it a note of excitement and expectation, and this year is no different. We have 1,307 new undergraduate and graduate students joining our college, as well as five new faculty members. Exciting new research in engineering and computer science is underway. And students are embracing new curriculum offerings and the many opportunities offered by our on-campus clubs.

There has never been a greater demand for engineers and computer scientists, and I am proud of how our college is playing an important role in preparing students to be creative problem solvers in the areas of security, energy, health, and the environment. I am equally proud to hear from alumni who tell me their education helped them not only achieve fundamental knowledge, but provided them an understanding of how innovation is a learned process and how to apply that process in sound decision-making.

It's a pleasure to share a few of the dynamic happenings in our college through this newsletter. There's a new biomedical device engineering program in development and important new research being undertaken by faculty. Our student clubs attended a number of events over the summer to compete and engage in knowledge

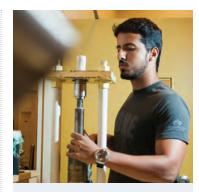
sharing. And our work to attract and retain more female students and faculty to ECS is bearing fruit. Everywhere you go at ECS, you feel the energy from students and faculty exploring, designing, and problem solving. This is an exciting place to be!

All of this activity would not be possible without you, our alumni and supporters. Thank you for giving your time, talent, and financial support to forward our goal of preparing graduates to solve 21st-century problems. Let us hear from you about your own successes. And if it's been awhile since you have been back to ECS, come and make a visit. I promise you'll come away inspired.

Susan Barua Interim Dean



Assistant Professor Nina Robson and her team of student researchers aim to help patients regain arm mobility after a stroke through the use of Google Glass and Oculus Rift technology. Their Augmented Reality Wearable Robotic Device (ARWED) helps patients perceive a fully functioning arm in order to take advantage of mirror neurons' role in imitative learning.



Over the summer, 80 Brazilian students joined CSUF undergrads on campus for the Summer International Research Institute (SIRI). Program Director Binod Tiwari and CSUF faculty advisers supervised 18 student projects addressing challenges such as reducing earthquake damage, measuring the effect of rainfall on landslides, and improving hearing aids.

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Faculty Focus

Accolades



Raman Unnikrishnan, former dean of the College of Engineering and Computer Science and professor of electrical and computer engineering, received the 2016 Distinguished Educator Award from the ECE Division of the American

Society for Engineering Education. The award recognizes Unnikrishnan's leadership and innovation in electrical and computer engineering education.



Chandrasekhar Putcha, professor emeritus of civil and environmental engineering, took part in the 2016 Office of Naval Research Summer Faculty Research Program. Putcha studied the reliability of measurement instruments such

as pressure gauges at the Naval Surface Warfare Center-Corona Division in Norco.

New Faculty

Yu Bai, assistant professor of computer engineering, focuses on hardware implementation of artificial intelligence. His research interests include neuromorphic computing, FPGA design, and nanoscale computing systems.

Darren Banks, assistant professor of mechanical engineering, focuses on phase-change cooling and laser-induced cavitation applications.

Rakeshkumar Mahto (M.S. '09), assistant professor of computer engineering, focuses on computer architecture and microchip design.

Yong-Seok Park, assistant professor of mechanical engineering, is developing a computation method for composing high-performance, globally distributed, and culturally diverse design teams.

Aaron Stillmaker, assistant professor of computer engineering, was the lead physical designer for "KiloCore," the first microchip to contain 1,000 processor cores.

Promotions



Kiran George has been promoted to professor of computer engineering. George focuses on human-machine interfaces and assistive robotics, and he is a recipient of multiple grants from the National Science Foundation and the U.S. Army

Research Laboratory. Through a grant from the Disability Communications Fund, he is developing a low-cost, brain-computer interface to help individuals with ALS.

Mikhail Gofman has been promoted to associate professor of computer science. Gofman's research focuses on system security, virtualization, and biometrics, and he is director of the Center for Cybersecurity.

David Naish has been promoted to associate professor of civil and environmental engineering. Naish focuses on structural engineering subjects such as seismic design and reinforced concrete applications.

Prasada Rao has been promoted to professor of civil and environmental engineering. Rao invented the Titan Sprinkler, a programmable sprinkler nozzle that can reduce water waste when watering lawns.

Grants Awarded

Doina Bein, assistant professor of computer science, was awarded \$85,326 from the **Air Force Office of Scientific Research (AFOSR)** for her work with cognitive autonomous systems.

Kristijan Kolozvari, assistant professor of civil and environmental engineering, received \$159,995 from the National Science Foundation to create a framework for the design of earthquake-resilient tall buildings. Kolozvari's project will identify the structural, nonstructural, and environmental factors that help skyscrapers withstand earthquakes.

Joel Lanning, assistant professor of civil and environmental engineering, was awarded \$76,700 from the California Department of Transportation for his work with braces to mitigate earthquake damage to bridges.

Scott Parr, assistant professor of civil and environmental engineering, received two grants from Louisiana State University: \$15,288 to analyze maritime transportation using data from the Coast Guard's Nationwide Automatic Identification System, and \$28,735 to improve guidance for evacuation-time estimate studies.

Publications

Doina Bein, assistant professor, co-authored two peer-reviewed conference papers: "Reducing the Data Communication Delay in Wireless Sensor Networks" and "Optimal Maximum Likelihood Estimates of Data Fusion in a Distributed Network of Sensors."

Mikhail Gofman, associate professor, collaborated with Sinjini Mitra, assistant professor of information systems and decision sciences, to write "Multimodal Biometrics for Enhanced Mobile Device Security," published in *Communications of the ACM*.

Sudarshan Kurwadkar, assistant professor of civil and environmental engineering, recently published "Modeling Photodegradation Kinetics of Three Systemic Neonicotinoids — Dinotefuran, Imidacloprid and Thiamethoxam — in Aqueous and Soil Environment," and co-authored two other publications: "Uptake and Translocation of Sulfamethazine by Alfalfa Grown Under Hydroponic Conditions" (with Garrett Struckhoff, assistant professor of civil and environmental engineering); and "Adsorption of Hexavalent Chromium onto Activated Carbon Derived from Leucaena leucocephala Waste Sawdust: Kinetics, Equilibrium and Thermodynamics."

Abhishek Verma, assistant professor of computer science, co-authored two peer-reviewed conference papers with computer science graduate students H. Vo ("Discriminant Color Texture Descriptors for Diabetic Retinopathy Recognition") and Hussein Al-Barazanchi and Hussam Qassim ("Novel CNN Architecture with Residual Learning and Deep Supervision for Large-Scale Scene Image Categorization").

Student Spotlight



In June, CSUF's **Titan Racing Formula SAE team** participated in the 80-team Formula SAE® student design competition in Lincoln, Neb. After a mechanical failure forced them out of last year's event, the students made structural modifications to their vehicle's chassis to create this year's "Titan IX" race car.

The **Titan Rocket Engineering Society** traveled to Green River, Utah, for the Intercollegiate Rocket Engineering Competition. The first-time participants competed in areas such as design, presentation, and of course, the rocket's launch. Despite a mechanical failure, their carbon fiber rocket reached an altitude of 1,200 feet.



Titan Racing Baja took part in this year's Baja SAE® off-road vehicle design challenge, in which the team's Hyperion vehicle competed in events focused on design and performance. These included tests of acceleration, handling, and endurance — plus a side-by-side race against its competitors.



The **Titan Rover** joined entries from 27 other schools in the University Rover Challenge. Designed and built by CSUF engineering students, the rover competed in a variety of challenges on the rocky terrain of the Mars Desert Research Station in Utah.



Students' Biometric Research Wins Award

Computer science majors competed in IEEE's SusTech 2016 and took home a prize for their project "Multimodal Biometrics in Consumer Mobile Device: a Step Toward IoT Security."



Faculty Service Milestones

- Mohinder Grewal, professor of electrical engineering and the 2008–09 recipient of the CSUF Outstanding Professor Award, 40 years of service
- Chandrasekhar Putcha, professor of civil and environmental engineering, 35 years of service
- Shahin Ghazanshahi, professor of electrical engineering, 30 years of service
- Fleur Tehrani, professor of electrical engineering, 30 years of service
- Elizabeth Morales, administrative support coordinator in computer science, 25 years of service
- Sergio Guerra, director of Center for Academic Support in ECS, 20 years of service
- Shawn Wang, professor of computer science, 15 years of service
- Uksun Kim, professor and chair of civil and environmental engineering, 10 years of service
- David Naish, associate professor of civil and environmental engineering, 5 years of service
- Chean Chin Ngo, assistant professor
 and acting chair of mechanical engineering,
 5 years of service
- Jonathan Woodland, machine shop technician, 5 years of service





This fall, 15 teams and thousands of spectators came out to see who could launch pumpkins the farthest using homemade trebuchets, catapults, and other physics-inspired contraptions. The competition was part of the annual Pumpkin Launch festival, a STEM-themed family event co-presented by Cal State Fullerton.



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Your gifts, your service, and your talent are fundamental to our goal of preparing graduates to solve 21st-century problems. *Here's how you can get involved with the college:*

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Planned gifts can provide significant benefits to you and your family, now and in the future, while supporting generations of Titans to come. Consider including a bequest provision in your will or naming the College of Engineering & Computer Science at Cal State Fullerton as a beneficiary of your life insurance policy or retirement plan. Regardless of its size, your gift will make a difference in the lives of our students.







VOLUNTEER OPPORTUNITIES

Share your career development experiences in the classroom, mentor an aspiring professional, or serve a department or program in an advisory capacity.

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Connect the college with your company — we're continually seeking partnerships that provide student project support, internship, and employment positions for our graduates, targeted research opportunities for faculty, and industry links that help facilitate curricular currency.



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Interested in sharing your professional experience with ECS students? Sign up to be a "Professor for a Day." Contact Kimberly Murphy, development coordinator, at kimurphy@fullerton.edu today.

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