



engineering news

School of Engineering

WINTER 16

SANTA CLARA UNIVERSITY

DEAN'S MESSAGE

Over the past year, the debate over inclusivity has heated up on a number of fronts, particularly in regard to marriage, border control, and most recently humanitarianism.

At Santa Clara University our mission is to educate leaders of competence, conscience, and compassion who will help fashion a more just, humane, and sustainable world. To do that we must not only champion inclusivity, we must model it—we must live it.

Doing so is not always easy. Inclusivity often requires a sacrifice of some sort at the outset, which—hopefully—is made worthwhile by the net gains achieved in the long run.

Here on our campus, the School of Engineering and the College of Arts and Sciences are grappling with our own mixed bag of excitement, fear, uncertainty, and promise surrounding inclusivity as we determine how best to bring our programs into closer proximity in a new planned STEM (Science, Technology, Engineering, Mathematics) complex to be built over the next decade. How do we maintain academic rigor while offering broadened opportunity? How do we best equip our students with the skills they will need to address the challenges of the 21st century?

Questions arise and emotions run high at times. But keeping our eyes on the end goal of educating ethical, inclusive leaders demands we open our minds and our hearts to this once-in-a-lifetime opportunity to accomplish something groundbreaking for our students and our University. In this issue you will find a number of examples showing how inclusivity is woven into the fabric of SCU engineering. Enjoy!

Godfrey Mungal
Dean
School of Engineering

From Nigeria to SCU A Conversation with Tokunbo Ogunfunmi

In honor of National Engineers Week and Black History Month, we send a valentine to SCU's first black professor in the School of Engineering, Tokunbo Ogunfunmi. Born and raised in Nigeria, Ogunfunmi joined the electrical engineering faculty in 1990. A highly respected professor, industry consultant, and IEEE Distinguished Lecturer, he is best known for his groundbreaking research in signal processing and integrated circuit design. In 2014 he was selected as a Carnegie African Diaspora Fellow, a joint effort of 100 African-born North American scholars to turn "the continent's 'brain drain' into 'brain circulation'" by returning to Africa to teach. Recently, Aldo Billingslea, SCU's associate provost for diversity and inclusion, sat down for a chat with Dr. Ogunfunmi. Portions of their conversation are excerpted here.

AB: How did you decide on electrical engineering?

TO: When I was little, my father's transistor radio broke. I took it apart out of a desire to know what was going on there. Then in secondary school I wanted to see the July 1969 lunar landing. We didn't have a TV, so I begged my dad to take me to the school library to see it live. That made a permanent impact—I wanted to understand how such a system can be built to accomplish the huge task of landing a man on the surface of the moon and returning him to Earth safely.

AB: As an immigrant what obstacles did you encounter?

TO: Cold weather was a challenge. I always wore jackets, even in spring. And then, of course, the culture is different. Everyone was talking so fast, I couldn't understand what they were saying. People here are more direct. The culture in Nigeria is more deferential. If someone is older than you, you can't really address them directly or look them in the eye. So that was a bit of a change; I was always looking down. That's one thing I like about the culture here—everybody is valued, everybody matters, and everybody has a say and can tell what's on their mind. In the culture I grew up in, that was not always true.

AB: You've been a part of Santa Clara engineering across two different centuries. How has it changed, particularly from your perspective as a black man on this campus?



Tokunbo Ogunfunmi with members of NSBE (National Society of Black Engineers), the student organization he advises.

TO: After earning my Ph.D. at Stanford, I decided to come to Santa Clara because I love the Bay Area and felt Santa Clara was a smaller, intimate version of Stanford where I could thrive professionally. I believe I am the first black faculty in engineering at SCU. However, the number of black students in engineering is still very low in real numbers and as a percentage. Much has changed but much still needs to be changed. The pipeline has to be filled right from elementary school to high school; hence my involvement with Engineers4Tomorrow, helping interest middle and high school students in STEM through hands-on workshops that help them see themselves as future engineers.

AB: Talk to us about your work as a Carnegie African Diaspora Fellow.

TO: I was invited to Covenant University in Lagos-Ota. I relished the idea of being able to give back to the country where I grew up. A new bachelor's degree program on the Internet of Things, the first in Nigeria, is now on track for adoption. I provided research guidance to grad students and taught two classes during my brief visit. The students were all eager and excited to learn, and it was indeed my pleasure to teach them. I plan to continue research collaboration with Covenant University and to facilitate faculty and student exchanges between CU and SCU.

Read the entire interview online at scu.edu/Ogunfunmi

If You Feed Them, They Will Come

Photo: Joanne Lee



At a recent meeting, SCU's IEEE student chapter enjoyed pizza and planning a law career panel discussion, tutoring opportunities at a local elementary school, hosting a soldering workshop, and a field trip to Flex, a world leader in designing and building intelligent products.

Offering food to college students is a sure way to draw a crowd, and it's a strategy the student branch of the Institute of Electrical and Electronics Engineers (IEEE) at SCU uses with great success. "We have a four-step plan to get students to come to our IEEE meetings: food, friends, technical events, and getting a job," said the group's advisor, Shoba Krishnan, associate professor of electrical engineering. "First they come for the pizza, then they make friends and enjoy socializing at events, next they become interested in presentations and field trips, and as they begin looking for an internship or full time job, they take advantage of the career workshops and networking opportunities the branch provides."

Recently SCU's IEEE chapter won the *Outstanding Small Student Branch Award* for both the Santa Clara Valley Section and for Region 6 in recognition of the group's innovative and creative programs. Quite an honor as this section of the world's largest professional organization covers the entire Western United States, from Alaska to New Mexico and Montana to Hawaii. Krishnan credits their success to the hard work, professionalism, and organizational skills of the student branch leaders: electrical engineering graduate student Beeta Modarressi '14, electrical engineering senior Nate Tucker, and computer engineering junior David Blake Tsuzaki.

Beyond the pizza, though, why bother? Tucker explained: "A lot of EE students tend to be somewhat introverted. This is a great place to meet people, to socialize, to find out which classes to take, and to network with others who are going through the same things." Tsuzaki appreciates how their branch helps students better understand engineering in the real world. "We run a lot of technical events to develop professionally outside the classroom and to give our members exposure to how engineering is done at places like Nvidia, Facebook, and Tesla. It's not just seeing the production

line in operation that's important—it's seeing where you could be as an engineer 10 years down the line. It helps you get excited about the field. At Seagate we saw platter production, but even better, we got to see one of the engineers' excitement as he shared how he got to spin discs until they exploded ... and we got to wear bunny suits. But seeing up close on the inside what companies are up to and what engineering can be is important. It's not memorizing, or staying up all night studying; it's applying that knowledge in the field and seeing class work coming to fruition."

For the past two years the branch has also held a very successful mock interview session, inviting members of the IEEE Young Professionals (YP) program to critique students' résumés and conduct interviews. "YP brought a lot of mentors to the event," said Modarressi. "We had a senior vice president from LinkedIn, a vice president from National Instruments, and representation from many other Silicon Valley companies. It was fantastic. A recruiter from Texas Instruments even scheduled an interview on the spot after doing the mock interview. The community here gives their time very generously, and IEEE is a big draw for them," she added.

Aside from benefiting SCU students, the branch has hosted one of the qualifiers for FIRST LEGO League, an international competition for kids ages 9 to 14, for the past 10 years. Last year, they also hosted IEEE's Region 6 Micromouse Competition, an event where West Coast university teams design, build, and operate an autonomous robotic "mouse," racing through a maze for the fastest time.

IEEE's goal is to inspire connection, collaboration, innovation, and engineering excellence. If it takes pizza to get students in the door to further that purpose, this crew is happy to oblige.

SOWING THE SEEDS FOR AG 3.0

As co-founder and CEO of Agrilyst, a company deemed the “Google Analytics for Greenhouses,” Allison Kopf '11 hopes to alleviate pain points for farmers by introducing them to software that helps make sense of mounds of data. The indomitable New Yorker knows something about overcoming her own pain points—last fall when she took the stage as a finalist vying for a \$50,000 grand prize in the prestigious TechCrunch Disrupt’s Startup Battlefield, she was battling the flu and a 102-degree fever.

“No way did we think the ag tech company would win,” she said, referring also to co-founder and CTO Jason Camp. But after making the cut from a thousand hopefuls down to 25 finalists and presenting in front of what she termed “the pantheon of the tech world,” Kopf was in her element—explaining the product, sharing her passion, and handling Q&A like a pro. “I love pitching because I love talking about what we do. Getting in front of every person we’ve ever dreamed of was an incomparable opportunity to show what tech can do for agriculture. By the year 2050 food production will need to increase by 70 percent to meet world demand, and we’ll need to do it in the face of waning resources and climate change; so indoor, weather-independent production will become essential. Up until now, technology—which has revolutionized other fields like communication and transportation, has lagged in this sector.”

Enter Agrilyst (think “agriculture” and “analyst”), software that analyzes all the variables that go into successful growing—pH, nutrients, light, temperature, and so on—and comes up with “recipes” tailored to specific crops. The company is working in its beta phase with U.S. growers specializing in lettuces, herbs, cucumbers, tomatoes, and peppers. “We manage everything in the operations stack, from crop management to labor forecasting,” Kopf said. “Our

growers also wanted automated food safety tracking. Most use an antiquated and labor-intensive system with binders and checklists. Our workflow scheduling system automates the process with tracking and reports that can be handed off to certifiers. We eliminate time spent on data collection and analytics, shifting the work to a tool and away from a job. This is Ag 3.0. Introducing data management software enables growers to improve the bottom line and be empowered by data rather than burdened by it, which will become ever more important as the world seeks sustainable growing solutions,” she said.

Kopf discovered her passion for technology and sustainability here as a first-year computer engineering student on SCU’s Solar Decathlon team, where she led the interdisciplinary undergraduate crew to its Third Place victory in the international competition.

“Solar Decathlon was definitely the most challenging two years of our lives up to that point academically,” she said. “We had to learn a lot, really quickly; it is really similar to building a startup. The idea that you’re building—literally and physically—it felt significant.”

It was a stroke of luck for SCU that she made her way to Santa Clara at all. “I wanted to go to Stanford,” Kopf admitted. “When I visited Stanford, it just didn’t feel right and that devastated me. I remember telling my mother that I wasn’t going to college, but she suggested we look at this small school she’d heard about that was nearby. When we stepped on campus, I loved it immediately. We pulled out a map and were trying to get our bearings when a student skateboarded over and offered to show us around. I wanted a small, niche community. Someplace close-knit. SCU felt right to me. I applied to only two schools, UPenn for international business programs with an Italian language focus, and SCU for engineering.”

Interesting that business, engineering, and a global perspective were all forefront in her mind even then, as they would come into play with her new venture years later.

“Santa Clara rocks,” she continued. “I owe a lot to Santa Clara. The way you foster and apply your education, the opportunity as a freshman to lead and apply something from the classroom to real life, the Jesuit education that teaches you to think about others in the way you do business ... it’s unique, and it’s helped me get where I am today.”

Which is here, right now: nourishing the world. “We have huge challenges facing agriculture,” Kopf explained. “We have to increase food production, with fewer resources, in an aging industry (the average age of farmers in the U.S.

is 58; it’s 68 in Japan). But ag is hot again. Young people want to get into high-tech farming. Fundamentally, at Agrilyst, we want to tackle these challenges and help growers feed the world. For now, though, we’re just focused on succeeding each day.”

That shouldn’t be too much of a problem. The day after winning TechCrunch Disrupt, Kopf had around 10,000 emails waiting for her. “From farmers who wanted to use the software, investors, and folks who wanted to join the team,” she explained, noting that, in true Bronco style, she answered every single message personally. Fundraising and building a bigger team are the next growth stages, but the seeds have been sown for a successful venture.

More information: agrilyst.com



Allison Kopf '11 accepts the grand prize at TechCrunch Disrupt's Startup Battlefield

THIS HIVE IS BUZZING WITH INNOVATION

Shane Rogers '13 (M.S. Engineering Management and Leadership) has always been entrepreneurial. As a kid, he pedaled his bike to construction sites, peddling lemonade to thirsty workers and earning as much in one hour as he would have in five from a stand in his front yard. Years later he started The Clarity Project—fair trade artisanal diamond mining that funded a school in Sierra Leone. But when he teamed up with fellow alumnus Brian Holm '00 (B.S. Mechanical Engineering), things really got humming.

Together, the pair founded Hive Design. In addition to offering consultation and design services to other companies, Hive has created and launched three of their own products: Eligo—a “smart hydration” unit offering athletes hands-free selection of water and/or electrolytes from a single reservoir; RPM Speed Rope—sophisticated mechanics paired

with cool design that does for jump ropes what Nike did for sneakers; and their latest brainchild, Edwin—“a modern minimal wallet inspired by the binder clip.”

“All the products we work with are things we care about,” said Rogers. “I had used a binder clip as a wallet for years and I loved it, but I wanted quick access to a single credit card and cash.” Holm took the idea and with the help of Bryan Herrera '14 (B.S. Mechanical Engineering) and Phillip Priolo (industrial design intern from San Jose State University), Edwin was born. A Kickstarter campaign “blew up” and product will start shipping in March.

“What makes this all work is that I’m really good on the mechanical side, and Shane is great at the other side of the business. It’s a perfect melding of two people coming together to run a company,” said Holm. The two had previously

spent years working together at a medical device company where they gathered lots of experience designing products. Holm also managed the fabrication shop and designed the mechanical aspects of exhibits for San Jose’s Tech Museum, tested the viability of fuel cell vehicles in Germany, and before graduating from SCU, led the team that pioneered the School of Engineering’s Roverwerx Rover program.

“When we were doing our undergraduate work, we weren’t really thinking about being entrepreneurs, but that’s changing,” said Rogers. “I applaud SCU for their forward thinking. SCU is doing a great job of getting students motivated to think about design and how to come up with an idea, and then giving them the tools to follow through.” Rogers teaches an entrepreneurship course as an adjunct professor for the School of Engineering and shares his experience with other universities

in the KEEN network of engineering educators.

For his part, Herrera is grateful for both his experience at SCU and the opportunity to work at Hive. “Everything I have now is due to SCU. My parents never went to college; I had zero engineering background. I discovered it on my own by playing with Legos; I liked building things. SCU gave me the foundation for a really great achievement. I never thought I’d be launching a new product a year and a half after graduation! I’m blessed with these opportunities.”

As for opportunity, there’s plenty of activity in the Hive. “We have a lot more going on that’s still not public. The path to market is long, but we have a chance to touch a lot of really cool projects,” said Rogers.

More information:
hivedesign.com
scu.edu/engineering/innovation

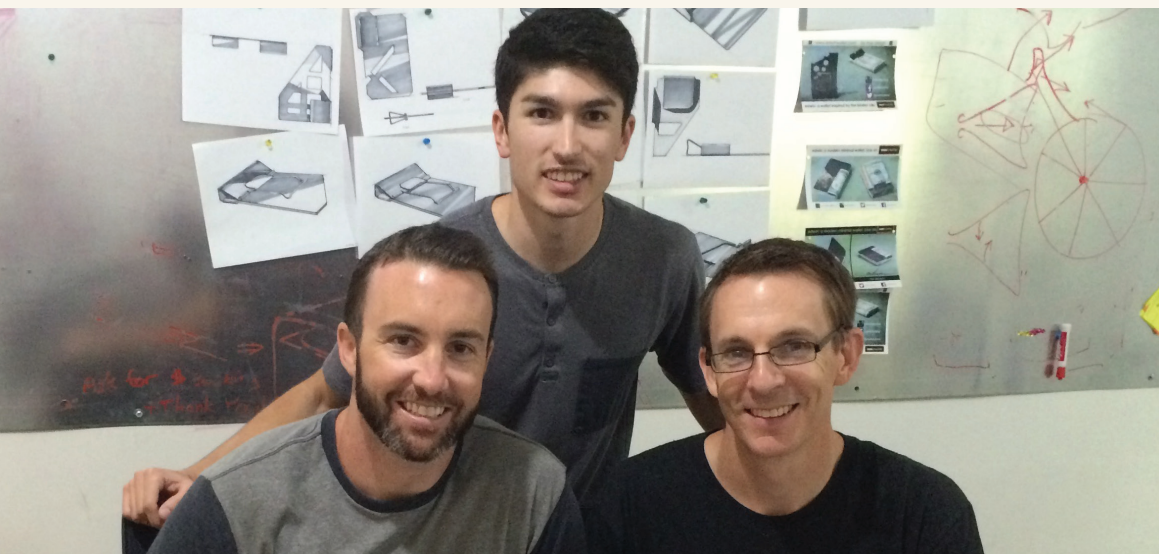


Photo: Heidi Williams

From left, Shane Rogers, Bryan Herrera, Brian Holm

Plays Well with Others

Photo: Courtesy of Heidi Williams



Prashanth Asuri (left) collaborating with SE3D co-founder Mayasari Lim and Kevin Kozel '14, MS '16 and Theron Hawley '14. Production of the 3D bioprinters, seen in the background, is taking place in the EdVenture incubation space at SCU.

Prashanth Asuri, assistant professor of bioengineering, is a dynamo. He's a fast talker, a fast walker, and fast to connect with students, faculty, and staff alike. With his quick mind, collegial spirit, and eager manner, you can easily imagine that somewhere along the way someone has pointed out that he "plays well with others."

A quick look at his impressive list of journal publications bears this out, as his articles are often the result of collaboration with fellow academicians, industry partners, and students. And at Santa Clara he has made a practice of collaborating with colleagues outside his department to provide interdisciplinary research and classroom experiences for his students. Asuri has worked with a biologist to develop an advanced cell culture lab so biology and bioengineering students can work on projects together; with a biochemist to develop microfluidic chips to explain heterogeneity in cancer cells; with a mechanical engineer to delve into how nanoparticles may influence mechanical and thermal properties of hydrogel composites; and with an ethicist from the University's Markkula Center to develop an ethics module within his tissue engineering curricula.

"It's important that we develop an entrepreneurial mindset among future engineers and scientists and facilitate learning in new ways," he said. "We need to mirror real-world workplace experiences where students from varied disciplines meet to solve problems. When people talk about collaboration or convergence, they are often talking about bringing a team together to solve a problem that hasn't yet been fully defined. We need to prepare our students to think holistically, to view a problem from many different angles, and to respect what others bring to the team, in order for them to be effective participants in this kind of problem-solving process."

With this attitude, it's no surprise that Asuri was tapped to take part in the visioning process as SCU prepares to build its new STEM (Science, Technology, Engineering, and Mathematics) Complex here on campus, the largest capital investment the

University has ever undertaken. But he's not only interested in equipping Santa Clara students with the knowledge and skills they will need to enjoy successful and rewarding careers in bioengineering and biomedical science. He's also passionate about inspiring other college students and even high school students to consider these paths. As co-founder of a new enterprise, SE3D Education, Asuri is working on doing just that.

"We're developing low-cost bioprinters, curricula, and software to enable college and high school teachers to provide the kind of hands-on learning and experimentation that can open their students' eyes to the world of opportunity available to them. The demand for STEM workers is growing tremendously, and we have to empower educators by giving them the tools to present material they may not be entirely comfortable with themselves. We're hoping to do for bio-related fields what the Maker Movement has done to improve the pipeline for design and manufacturing. With our tools, students can print arrays of proteins and cells for drug discovery or even design and construct biologically relevant architectures for seeding mammalian cells for tissue engineering applications." Asuri adds that he and SE3D co-founder Mayasari Lim are excited "to be incubating the company here on campus in the KEEN space, EdVenture," a new School of Engineering hub of innovation supported through a grant from the Kern Engineering Education Network, a group dedicated to championing the entrepreneurial mindset.

"Today's students are incredibly tech-savvy and computer literate; giving them access to these tools and letting them play and learn through experimentation can be a game-changer," Asuri said. Couple that with his passion for collaboration and we could have a whole new generation of engineers who play well with others.

More information:
se3d.com
scu.edu/engineering/innovation

Pass the Wrench, Please

Photo: Courtesy of James Reites, S.J.



Mohit Nalavadi '16 looks on as the women of Nyange, Rwanda, take over assembly of the SCU student-designed tile-press.

Senior bioengineering student Mohit Nalavadi wrote the following for *Grade Point*, a higher education news blog at [washingtonpost.com](http://www.washingtonpost.com), where it was published on December 3.

The stop-and-go traffic of my 30-minute commute from Santa Clara, Calif. to Mountain View, Calif. gives me a front-row seat to an engineer's dream: the shiny tech headquarters of the likes of Google, Microsoft, and countless little startups with names like MuleSoft and Okta.

There's a certain energy you feel when you're in Silicon Valley; the spur of cutting-edge technology and the idea of disrupting the status quo is everywhere. But too often, the promise of materializing great ideas feels jaded, stamped with the obligatory, starry-eyed mission statement of "making the world a better place."

So when I entered my freshman year at Santa Clara

University, on the angsty heels of high school mixed with the impending uncertainty of figuring out life's purpose, I resolved to do something tangible with my four years.

It didn't take long to find Engineers Without Borders. EWB is different from most college organizations. Our mission is to apply the engineering skills we learn in school to help developing communities gain a better quality of life.

At university, while a lot of peers were celebrating Pi-Day with a delicious array of baked goods, or perfecting online profiles at LinkedIn workshops, we were iterating designs of a system to deliver clean water to a rural community in Honduras, or sculpting our next funding pitch, or developing an education curriculum so the community could adapt to its changing water infrastructure.

Motivation for this work was never hard to find. Through Skype calls, we could see the faces of the people we were affecting, and hear their voices echo across the globe, carrying words of communion and gratitude.

That gratitude was mutual because the Honduran community was changing the way I saw my role in the world.

All my life, the classroom felt limited. But EWB is dynamic. We are in the field, strategizing our next move, building, testing, and rebuilding, succeeding at times, failing at others, but constantly making decisions. You only learn by doing.

As the Honduras project closed, we moved forward to a new community, Nyange, in Rwanda, where people had asked for a more efficient way to make clay roof tiles. We spent a year building a bike-powered clay-mixer, tile-press, and accompanying education curricula.

It took months of fundraising and a handful of 2 a.m. Skype calls. Then we spent two weeks in Rwanda, implementing our system, meeting with government and university officials, and striving to see life through the lens of another culture.

And though Murphy's Law seemed to meet us at every stage of the trip, it always led us to the inexplicable joy of problem solving.

We arrived at Nyange early, eager to build the tile-press with the community and create the first tile.

Back in Santa Clara, we had rehearsed a method to build the press; we would show how the tools work, build the first half, and have them build the second

half. This would allow the community to understand how the machine works and how to maintain the system.

After showing how to screw in just two bolts, one woman, Mediatrice, reached for the wrench still in my hand. Her eyes spoke without words, "I can do that." Incredulity and happiness merged in a way I didn't know possible. I let go.

Guiding the others, she proceeded to screw in bolts while positioning others' hands to hold the different components. Mediatrice later spoke to me through our translator. She said that the people of Nyange wanted to be self-sufficient, but they didn't have the means.

All the wealth is concentrated in the cities outside of Nyange, and it never finds its way in, and so time is left standing still.

All they need is a catalyst.

Even though her words were translated and maybe they lost some essence, they still weighed with the enormous gravity of the situation that surrounded us. It was the most incredible illustration of the resilience of the human spirit I have ever seen in my 21 years.

And so I landed back in San Francisco sometime later, in my little bubble, contemplating this experience.

I still drive down 101, looking at all the tech companies, wondering if "making the world a better place" is just a worn-out marketing campaign—or whether it is handing someone a wrench and saying, "You can do this."

More information: ewbscu.weebly.com

ON A MISSION TO CORRECT THE DISCONNECT

Here are the facts (according to Code.org):

- Today there are 604,689 computing job openings nationwide.
- Last year, only 38,175 computer science students graduated into the workforce.
- Jobs in computer science on average are growing at twice the national rate, and at four times the rate of other fields in California.
- There will be 1 million more computer science jobs than students with degrees in that field by 2020.

For more than a decade, Dan Lewis, associate professor of computer engineering, has worked tirelessly to rectify this disconnect between the availability of qualified computer scientists and employment demand in California by focusing on computer science education in the K-12 pipeline. To date, he has raised more than \$2.5 million from the National Science Foundation and private sources to create summer camps, professional development for teachers, and improved computer science (CS) curricula, as well as scholarships to incentivize students to study CS here at Santa Clara.

Recognizing that middle and high school teachers often lack the resources or training to teach this subject, Lewis followed up a successful series of summer teacher workshops with a program that provided 10 local high schools with Lego robotic kits, computers, and instructional classroom help from SCU engineering graduate students. In the face of national funding cuts, they doggedly patched together grant monies with a donation of 350 nearly new computers snagged from Santa Clara University's annual PC replacement program.

"When we started with the 10 high schools, only two offered any computer science courses—and those each just had one," Lewis said. "Today, all 10 offer Exploring Computer Science, a course we introduced for ninth graders, most provide at least two courses, and three or four of the schools now have three courses as part of their curriculum. Also, four of the high school teachers we put through training have become leaders who travel the country delivering workshops funded by Code.org," he added.

Although they made headway in the classroom, more work was needed. So in 2012, Lewis and five other educators founded ACCESS—Alliance for California Computing Education for Students and Schools. He now serves on the group's steering committee. Among other goals, ACCESS seeks to elevate K-12 CS education, establish a CS certification pathway for California's K-12 teachers, advocate for CS to count toward high school graduation as math or science core credit and UC/CSU eligibility and admissions, and make high-quality K-12 computer science education accessible in California—particularly for traditionally under-represented groups: girls, low-income students, and students of color. "We're trying to do what we can to promote computer science education and we're working through the California legislature to establish changes in policy," Lewis explained. "Until now there was no teacher certification in the state for computer science and most high school courses didn't teach anything beyond how to use Microsoft Office. We hope to change that. A colleague and I are also cataloging online courses that high school teachers could take for credit toward a new Supplemental Authorization in Computer Science that was proposed by ACCESS and is currently under consideration by the California Commission on Teacher Credentialing."

Photo courtesy of Dan Lewis



Dan Lewis joined the School of Engineering in 1975 and led the effort to establish the Department of Computer Engineering in 1988. He served as department chair 1988-2007.

In characteristically self-effacing fashion, Lewis reflects on his past 10 years' work. "There was a national problem and I was doing what I could locally. It's been really rewarding, and I can see that it's made not a huge, but a measurable impact."

Later this year, 20 more local high school students will participate in a pilot program created by Lewis and Silvia Figueira, associate professor of computer engineering, and funded by Google—the Summer Institute for Humanitarian Computing. During this intensive month-long workshop, the students will perform research, create a mobile app for social

benefit, and prepare technical papers and posters for conference submission.

The hope is that this hands-on, project-based work will inspire some of these students to pursue computing as a field of study and, eventually, a career path. A few million jobs await them.

More information: scu.edu/sihc



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scu.edu/engineering/give

A DISTINCT HONOR



Terry E. Shoup, Ph.D., mechanical engineering professor and former dean of the School of Engineering, has been awarded Honorary Membership in ASME in recognition of his distinctive career contributions as a researcher and educator, and service to the engineering profession.

A champion of engineering education for more than 45 years, Shoup served as a teacher, researcher and administrative leader at Rutgers, the University of Houston, Texas A&M, and Florida Atlantic University. At SCU he has worn different hats: Dean of Engineering for 13 years, Interim Dean of Education, Counseling Psychology, and Pastoral Ministries, and Interim Vice Provost for Enrollment Management.

Shoup, an innovator in the field of machine design and design optimization methods, authored or co-authored more than 15 textbooks and more than 140 technical articles. He was also editor-in-chief of the foremost international mechanism design journal, *Mechanism and Machine Theory*, for over 25 years.

Among a litany of accomplishments and awards, Shoup earned an M.A. in pastoral ministry from SCU in 2002, served as the 125th president of ASME in 2006-07, and was inducted into the Silicon Valley Engineering Hall of Fame in 2011.