# SANTA CLARA UNIVERSITY

ENGINEERING NEWS

School of Engineering

DEAN'S MESSAGE

In early March, 2020, Santa Clara University's winter quarter was almost finished. Following a phenomenal National Engineers Week celebration, students and faculty were gearing up for finals week and anticipating spring break.

But things changed drastically as the COVID-19 outbreak reached astonishing proportions. Students were sent home, face-to-face meetings of classes were suspended, and, with just one day's notice, faculty were challenged to move to a virtual teaching format. School of Engineering faculty and administrators immediately swung into action to ensure a smooth transition to remote instruction and to make decisions about spring classes and labs. In the midst of this planning, Santa Clara County implemented a shelter-in-place order, campus was closed, and faculty and staff began working remotely from home.

Throughout these unprecedented experiences, this community has shown graciousness, patience, creativity, and openness to learning new tools and adapting to a new reality and the uncertainties that lie ahead. It is heartening to be at a place with such amazing people, and I am confident we will emerge from these trials stronger than ever.
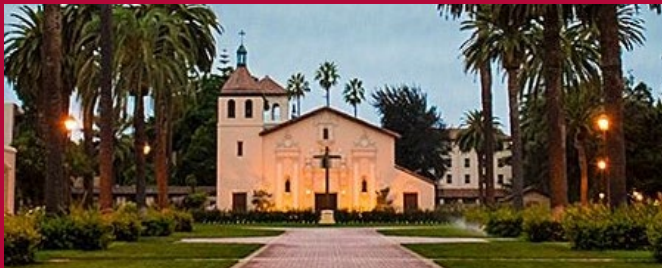
Elaine P. Scott, Ph.D. | Dean
School of Engineering

SCU MAKER LAB JOINS LOCAL EFFORT TO PRODUCE MEDICAL FACE SHIELDS

Just days into Santa Clara County's shelter in place order in March, reporters around the country were sounding the clarion call that healthcare workers in New York and other coronavirus hotspots were facing dire shortages of personal protection equipment.
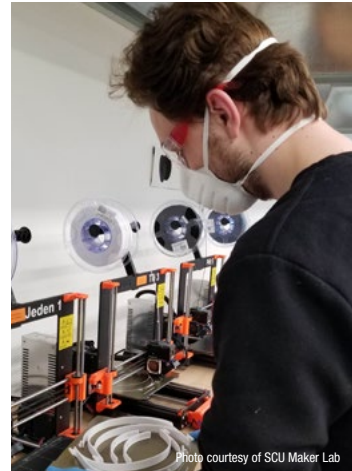

Photo courtesy of SCU Maker Lab

Ryan Foster at work making face shield parts. Other students working on the project are Ann McGuire, Rachel Stolzman, and Shae Hart.

With eleven 3D printers standing at the ready in the School of Engineering's Maker Lab, faculty member and lab director Christopher Kitts knew Santa Clara University was in a position to help. Within days, a partnership was launched, a safety protocol was developed and approved, special university access permissions and authorizations were granted, and a small team of engineering graduate students, faculty, and staff began printing parts for medical use face shields. With Maker Lab Manager Anne Hunter managing the day-to-day production activities, the team delivered parts for 144 face shields at the end of their first week of activity. The team now plans to continue to produce parts for 500-1,000 face shields per week through the spring quarter.

As just one contributor in this supply chain, SCU is assisting Maker Nexus, a local nonprofit maker space leading the effort. Santa Clara's team is providing the 3D printed bottom reinforcement part and Maker Nexus is providing the headband, clear shield, and elastic. More than 400 local makers are also working to fulfill orders of over 25,000 shields requested by local hospitals and other medical professionals. Once the parts are assembled and sanitized, Maker Nexus's partner, Valley Medical Center Foundation, distributes the shields to those in need.

A NEW INITIATIVE BY SCU'S MAKER LAB AND ROBOTICS SYSTEMS LABORATORY ENABLES A RAPID RESPONSE TO ACUTE HUMANITARIAN CRISES ASSOCIATED WITH NATURAL AND MAN-MADE DISASTERS, PANDEMICS, REFUGEE MIGRATIONS, AND THE AFTERMATH OF REGIONAL CONFLICTS.

50TH ANNUAL SENIOR DESIGN CONFERENCE GOES VIRTUAL

May 28, 2020 | Details at scu.edu/engineering/srdesign

ENGINEERING WITH A MISSION

LEADing FIRST GEN STUDENTS TO SUCCESS

SCU'S LEAD SCHOLARS PROGRAM SUPPORTS FIRST-GENERATION COLLEGE STUDENTS THROUGH MENTORING, CAREER ASSISTANCE, AND MORE. STUDENTS ATTEND A WEEK-LONG ORIENTATION, DURING WHICH THEY ADJUST TO LIFE AT SCU, PAIR WITH A MENTOR, AND BOND AS A COMMUNITY.

Jeremiah Rufus '23 reports LEAD helped him branch out on campus. "I saw LEAD as a way to express myself on campus with like people, in a safe place. After winning the LEAD Pageant with my spoken word piece, I had the confidence to enter another talent show on campus," he said.

Having a support system of other first-generation students "was huge for me, and a big deal for my family," said Niyibitanga Inosa '23. "It's most helpful that they reach out to you with information about fellowships, advising, internships. They are proactive; they don't wait to hear from you."

Transfer students Dominic Magdaluyo '19, M.S. '20, and Brooke Watson '20, both landed jobs with help from LEAD's career development and resume building sessions. Brooke said, "I learned all about making connections in a workshop on how

to land an internship. That was helpful because I don't have a large network of contacts through my family like other people do. With help from the workshops, I found the courage to send a cold email to a connection I did have and was able to get an internship!"

Johnny Dimas Flores '21, was surprised to learn how much the program offers. "I expected orientation and resources, but there are multiple events every quarter that are a great way to get to know others. There are not a lot of people of my color identity on campus, so it's great to find others like me through LEAD."

Learn more: scu.edu/lead

Jeremiah Rufus '23
General Engineering

» "Being a part of LEAD and the student organization Igwebuike gives me such a great sense of community. We're like siblings now, but when we first met, they were familiar faces I hadn't seen before."

Niyibitanga Inosa '23
Computer Science and Engineering

» "It was beneficial to meet classmates slowly during the week-long orientation—putting a foot in the water. By the time school started, I felt I was ready and prepared."

Brooke Watson '20
Mechanical Engineering

» "The LEAD community is one you wouldn't find anywhere else. It's rare to have that already set up; I didn't have to go out and find it on my own."

Johnny Dimas Flores '21
Mechanical Engineering

» "LEAD helped me fill in the gaps to cover my tuition with a scholarship last year. It was a huge help and paid for summer school so I can graduate on time."

Dominic Magdaluyo '19
Computer Science and Engineering

» "At the transfer orientation, I built a close camaraderie with the other transfers and my LEAD mentor. It inspired me to become a mentor for other transfer students the following year."

Photo by Nicole Morales

Faculty panelists from left: Michael Taylor, mechanical engineering; Sarah Kate Wilson, electrical and computer engineering; Silvia Figueira, computer science and engineering; Dean Elaine Scott; Tonya Nilsson, civil, environmental, and sustainable engineering; Robert Schaffer, general engineering

FACULTY OPENS UP ABOUT MENTAL HEALTH

Even before the stresses associated with a coronavirus world of moving back home and adapting to a virtual learning environment, student well-being and mental health has been a growing concern for colleges and universities across the country. During SCU's Engineers Week celebration in February, Dean Elaine Scott and faculty held a lively panel discussion on "A Faculty Perspective on Mental Health." Part of a week-long focus on wellness that included fun activities like a paper airplane contest, games, jigsaw puzzles, and a late night pajama party with breakfast and karaoke, the panel was organized by faculty members On Shun Pak and Maryam Mobed Miremadi in close collaboration with engineering student organizations.

Panelists shared anecdotes and personal recollections of their own paths and struggles, and how they deal with stress, adversity, and Imposter syndrome—feelings of inadequacy that persist despite evident success. They also shared resources for places students can turn to for help and tips for using your voice if feeling excluded and for maintaining balance, even with a heavy engineering course load.

Far from being a one-sided discussion, questions from the packed house gave a glimpse into what most worries our students, providing added value for both faculty and peers who might otherwise have felt their struggles were theirs alone.
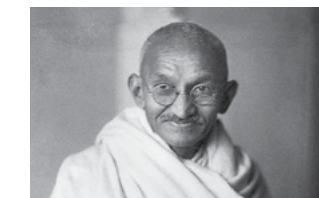

Photo by Heidi Williams

BRINGING HIS WHOLE SELF TO WORK
Career Center Award for Grad Student
Computer science and engineering M.S. student Manas Prakash Sadhwani, who won an award from SCU's Career Center for how he will bring his whole self to work, cites a diverse set of influencers that shaped his approach to working with others.
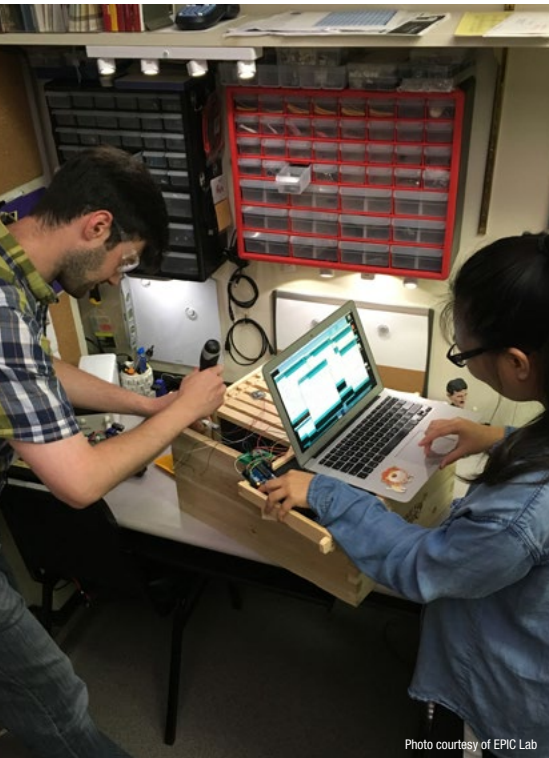
Read more

INFLUENCERS

| Mahatma Ghandi | Dr. Martin Luther King, Jr. | SCU's Gender and Engineering Course |

AN EPIC EFFORT TO HELP BEEKEEPERS

Photo courtesy of EPIC Lab

Prof. Navid Shaghaghi and Liying Liang working on assembling sensors in a hive box

Ethical, Pragmatic, and Intelligent Computing is everything to computer science and engineering lecturer and researcher Navid Shaghaghi. His EPIC Lab was created to advance the use of Ai and IoT technologies to benefit humanity. Earlier this year, the lab was abuzz with work on HiveSpy, a labor-saving apiary monitoring system.

Beekeepers must check every frame of every box daily or risk losing their harvest and hives. If frames fill up, a biological reaction triggers swarming: a process in which the majority of the adult bees fly off to create a new hive elsewhere and leave behind the larvae of the next generation which eat the collected honey.

"Currently available systems weigh the entire box, which doesn't address the labor issue, as the beekeeper still needs to check each frame daily. And to prevent swarming, cruel tactics such as removing the queen's wings or imprisoning her within the hive are practiced. HiveSpy monitors the weight of each frame, so only the full frames need to be checked. In finding a labor-saving solution, we also solved the threat of swarming," Shaghaghi beamed.

Coming up with a smart, ethical, and economical solution for weighing each frame individually wasn't easy for Shaghaghi's undergraduate and graduate students, but after a year of iteration, they've devised a plug-in system of 3D printed beehive ledge extenders equipped with stabilizers, sensors, and circuitry. They even built their own large-scale 3D printer to prototype it. When campus activities return to normal, HiveSpy will be tested on SCU's own beehives.

EWB 5K FOR $5K
SCU Engineers Without Borders' student chapter raised $5,000 in their 3rd Annual Virtual 5K for $5K run last February. More than 75 runners hit the pavement or the trail to raise money for life-changing projects for SCU EWB's partner community in Rwanda.
More about SCU EWB here.

EVENTS AND ACTIVITIES
Off-Campus Engineering Projects
Guest Speakers

Social Events:
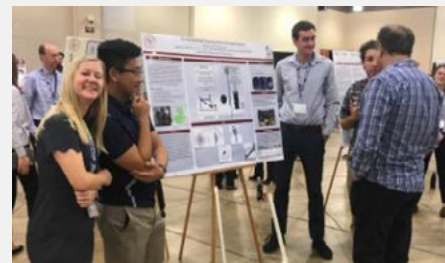Kickball tournament…Fundraisers and Outreach Opportunities

EPICS EXPO SHOWCASES STUDENT HUMANITARIAN PROJECTS
Students from Santa Clara University and San Jose State University showcased their engineering projects created to solve environmental and social problems in Silicon Valley— and beyond at the second annual Engineering Projects in Community Service (EPICS) Expo earlier this year.

During the Expo, students networked with corporate and nonprofit representatives, and participants presented student-led, technological solutions-based projects. SCU presented 12 posters and 4 business pitches. The Frugal Innovation Hub and SJSU were both awarded $10,000 from the EPICS in IEEE program to continue their work on humanitarian-based projects and each received a certificate of special Congressional Recognition from Rep. Ro Khanna.

The EPICS Expo is a collaboration between Santa Clara University's Frugal Innovation Hub, SJSU's EPICS program, and EPICS in IEEE.

4 Business Pitches 12 Posters

$10,000 Grant

1 Special Congressional Recognition Certificate

Photo courtesy of Hydroponics Team

Pre-social distancing, teammates in SCU's Forge Garden with their hydroponic system. From left: Andrew Feldmeth, Alex Estrada, Carson Edgerton, Claire Pavelka, Andrew Jezak, Katya Fairchok

A SUSTAINABLE LEAP FORWARD

The perfect Frugal Innovation Hub project fulfills three objectives: it is replicable, sustainable, and students gain technical professional experience serving a real client. A hydroponic garden designed in partnership with a South African high school satisfies all three goals with bonus points for being led by a STEM team of biology, environmental science, and engineering students, many of whom are part of SCU's year-long research course, Engineering World Health.

Working with one of the seven Leap Science and Maths Schools providing free education in high-need communities, the team's design uses kitchen greywater as input water for a soilless farming hydroponics system. The system has beds for growing both leafy and rooted vegetables, and includes a retractable shading structure to prevent scorching. The team also created an educational component of lesson plans and activities on hydroponics, biology, biochemistry, ecosystems, and climate change that can be adopted by the six other South African schools.

Over the course of several weeks earlier this year, SCU students met via videoconference with Raphael Mukachi, principal of Leap 5, to determine expectations and learn what materials were on hand for building the system. Their design makes use of discarded pipe, an old tub, and other locally-sourced materials, and they scavenged SCU's campus to build their own prototype in the university's Forge Garden. They also held weekly group chats with Leap students, engaging them as plans evolved.

In June, the plans and curriculum will be turned over to Leap 5, and the graduating seniors will take with them improved collaboration and communication skills and the experience of a lifetime.

250+ ♥ 🌐
Humanitarian Projects Around the World Since 2011

Frugal Innovation Hub 2020 Senior Design Projects:

Cervical cancer detection system
Kenya

Medical device for pediatric height measurement
USA

Human-centered electric prosthetic hand
India

Paper-based test for donated breast milk
Developing nations

Cultural preservation for Nez Perce Tribe
USA

Offline video streaming app
Uganda

Disaster relief communications
USA

Tour guide app
Galápagos Islands

Greywater-fed hydroponics system
South Africa

Solar-powered heating and shower system
Kenya

Weather forecast and water quality data distribution
Nicaragua

Well water purification system
Guatemala

Flood monitoring system for City of San Jose
USA

A BIG PICTURE ENGINEER

AS AN EXECUTIVE FOR REAL ESTATE AT GOOGLE, ROSHAN MEHDIZADHEH CORSIGLIA '06, M.S. '07, OVERSEES MULTI-BILLION DOLLAR PROJECTS AND MILLIONS OF SQUARE FEET.

Photo courtesy of Roshan Mehdizadheh Corsigliano

As a new hire, she led all sustainability initiatives for the Asia Pacific region. Next, she developed a building information modeling program for the conglomerate. "I was interested in long-range impact for the lifecycle of our buildings. I wanted to optimize and create efficiencies that would extend beyond the construction phase, so I investigated the potential for utilizing 3D models that link to building-related data," she said.

Ro now has responsibility for multiple areas. Her patented 3D visualization software is deployed on all of Google's new ground-up developments, and her patented cloud-based project delivery system allows projects to track cost, schedules, and manage risk while maintaining consistency across a broad spectrum of development projects.

"I love learning and contributing to something," said the All-American swimmer who twice trained for the Olympic trials, in 2004 and 2008. "Working in teams on projects, and collaborating across disciplines and functions is energizing. If there's something I don't understand, I'm never satisfied until I figure it out. I've been to many academic institutions and SCU is by far the most academically stringent place I have been. The sense of community combined with academic rigor set me up to be successful in my career from there on out. One of my proudest accomplishments is graduating from Santa Clara and it has given me a seat at many tables with the technical background I came away with."

ALUMNI PROFILE — ROSHAN MEHDIZADHEH CORSIGLIA

B.S. Civil Engineering
Santa Clara University

M.S. Civil Engineering
Santa Clara University

M.S. Urban Development and Planning—Real Estate
Johns Hopkins University

Ph.D. Civil and Environmental Engineering
Stanford University

2019 Silicon Valley's
Top Women of Influence

2019 San Francisco Business Times
Woman of Influence

All American Swimmer

2 Patents

GRADUATE PROFILE

Laura Rivas Yepes

Bioengineering

A desire to provide solutions for improving access to medical care led Laura Rivas Yepes from Colombia to Silicon Valley and SCU. As a graduate researcher in the Microfluidics Laboratory, she is advancing wearable technologies and her work has led to an internship, an invitation to participate in an industry acceleration program, and a patent!

Photo by Heidi Williams

"Doing research here can lead to ideas that end up in patents! It's not always super easy to know how to find the research projects that are here, but if you are proactive, you can find them. If you have an idea, find a professor with expertise in that field and talk about it. A lot of people think the professors' office hours are just for getting help with homework problems or concepts covered in class, but at Santa Clara the professors are very willing to discuss a wide range of topics and to help you get the most out of your time as an SCU graduate student."

UNDERGRADUATE PROFILE

Shani Williams

Computer Science and Engineering

Shani Williams is active in SCU's National Society of Black Engineers, is an organic chemistry lab technician, team member and safety officer of the Women's Rugby Club, and last summer she spent 10 weeks as a paid researcher, developing an ultrathin, wearable microfluidic sensor that measures how the skin reacts in connection with particular movement.
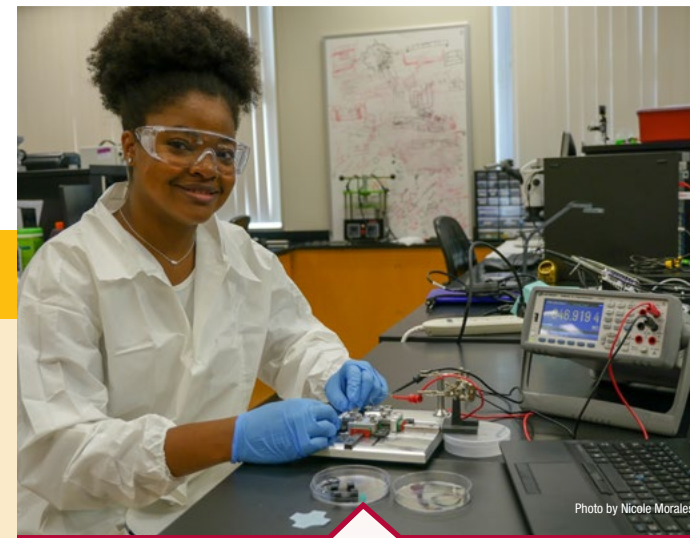

Photo by Nicole Morales

"I want to take advantage of as many opportunities as I can to learn about other fields of bioengineering. This summer I learned about wearable microfluidics; for senior design I will be focusing on using machine learning to make sure radiation treatments are segmented to the proper organs to reduce further cancer," she said. Whatever she takes on, Shani gives it her all. "My grandmother has this saying she always shares," she continued, "'If a task is once begun, never leave it till it's done. Be the labor great or small, do it well or not at all.' That stays with me. That's my motto."

29%
Undergraduate Female Enrollment

35%
Graduate Female Enrollment

30%
School of Engineering Female Faculty

50%
Computer Science and Engineering Female Faculty

GIVE TO SCU ENGINEERING
scu.edu/engineering/give

PRINTED ON RECYCLED PAPER

TRUST IN A HYPER-CONNECTED WORLD

Silicon Valley cybersecurity experts and SCU ethics and computer science and engineering faculty talk shop.

HERE'S WHAT THEY HAD TO SAY.

Photo courtesy of Beach House Media

From left: Ahmed Amer, SCU Computer Science and Engineering; Imran Hajimusa, Exponent; Jarrett Kolthopff, SpearTip; Ranjeet Khanna, Wipro; Yuhong Liu, SCU Computer Science and Engineering; Irina Raicu, SCU Markkula Center for Applied Ethics

When the Association for Community Growth – Silicon Valley (ACGSV) was putting together a panel of cybersecurity experts from SpearTip, Exponent, and Wipro to share insights with their group of C-suite leaders, they reached out to Santa Clara University. Computer Science and Engineering Associate Professor Ahmed Amer was tapped as moderator, and his department colleague Assistant Professor Yuhong Liu, and Markkula Center for Applied Ethics Director of Internet Ethics Program Irina Raicu, were invited as panelists. Following are some key takeaways from the evening:

- Organizations are woefully unprepared for intrusion events that will happen.

- It takes on average 55 days to detect that a network has been compromised.

- The majority of security breaches are caused by human error; we need to do human factor testing.

- When you connect everything together, the security level is not decided by the most secure point, it is decided by the most vulnerable point; so, security needs to be built into smart device operating systems, not added on.

- Corporations in the United States are collecting far too much data and are not securing it; we need to hold corporations and regulators accountable.

- Companies should perform a data inventory of what kind of data exist, whose responsibility it is to manage it, how it is shared, and have risk management plans in place.

- Universities need to have courses covering different aspects of security in relation to computer networks, operating systems, programming languages, and beyond.

Quick synopsis video:
acgsv.org/computing-trust-security-in-a-hyper-connected-world-keynote-highlights/