

SANTA CLARA UNIVERSITY

ENGINEERING NEWS

School of Engineering

DEAN'S MESSAGE

It's hard to believe Spring Quarter is already here. Newly admitted students came out to get a glimpse at campus-life during Preview Day. Our Seniors are hard at work preparing for their Senior Design Conference presentations, and we are all looking forward to all of the end-of-the-year events and celebrations. The entire campus just celebrated our 10th Anniversary of the Annual Day of Giving with record-setting numbers. Thank you to everyone who generously donated to help ensure we continue to *Engineer with a Mission!*

In other exciting news, we are proud to share that Dr. Maryam Khanbaghi (Electrical and Computer Engineering) is a recipient of one of the National Science Foundation's prestigious CAREER awards. We are excited to celebrate this accomplishment with her.

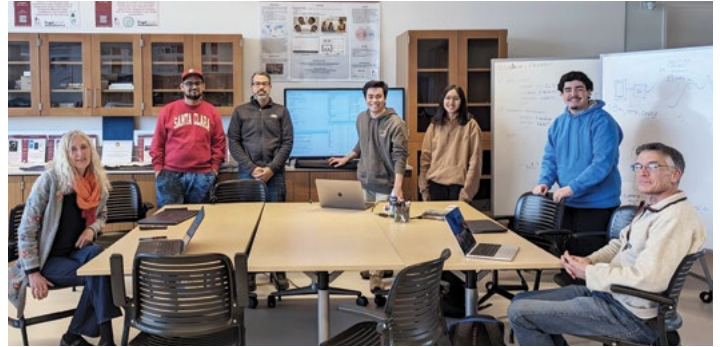
Also this quarter, we were privileged to host several industry visits, including a tour of our SCU IoT Lab with Arista Network's CEO Jaysree Ullal '86. See the photo below for a glimpse of her visit.

In this issue of Engineering News, you can read about our upcoming 35th Anniversary of The Order of The Engineer (pg. 5), our current and past faculty awards for Teaching Excellence (pg.6), Senior Design Project spotlights (pg. 2 & 3), and so much more. Enjoy!



Elaine P. Scott, Ph.D. | Dean
School of Engineering

"NICAAGUA": MOBILE WEATHER MONITORING FOR RURAL RESILIENCE AND SUSTAINABILITY



The Team from L to R: Iris Stewart-Frey (Environmental Science), Gautam Chitnis '23 (Graduate student, Computer Science and Engineering), Allan Báez Morales (Frugal Innovation Hub), Turner Uyeda '24 (Civil, Environmental and Sustainable Engineering), Briana Guingona '25 (Environmental Studies), Alex Avila '24 (Civil, Environmental and Sustainable Engineering), and Ed Maurer (Civil, Environmental and Sustainable Engineering).

What if we told you that a mobile application is changing the game for rural communities in Esteli, Nicaragua? Developed by students and faculty in SCU's Frugal Innovation Hub (FIH) in partnership with the Department of Environmental Sciences on behalf of the Association of Nicaraguan Social Development (ASDENIC), NicaAgua empowers farmers and communities by providing them with an advanced weather monitoring system. The primary objective of this innovative project is to give farmers and the community an advanced tool for predicting weather conditions accurately, leading to better decision-making and improved outcomes. The application, which was first implemented in 2020, is essential to the community's well-being, as their livelihoods depend on agriculture, and precise weather forecasts are critical to their success.

The NicaAgua app was developed through software engineering, machine learning, and community-based participatory research to provide local farmers with valuable weather and climate information. While the app's data can be overwhelming, the team actively aims to ensure it is user-friendly and helpful to the community. The app offers live weather data from local stations, forecast data at a community level, and simplified data visualization to aid farmers' decision-making. ASDENIC sends customized alert messages using the app, ensuring timely and relevant information for each community. NicaAgua aims to positively impact farmers' adaptability to climate change and increase productivity. The team continues to refine the weather pattern prediction application and remains committed to collaborating with the community for the app's success.

With the community's dependence on agriculture, the continued success of the NicaAgua application is crucial to the community's well-being. Crops such as coffee, maize, beans, and vegetables, rely heavily on rainfall and accurate predictions are necessary for farmers to grow their crops successfully. Additionally, the community's water supply also comes from these rains. They have a system in place where they catch water

Continued on page 3

THE ORDER OF THE ENGINEER

Link # 101
Santa Clara University
35th Anniversary | June 6, 2023

See [page 5](#) for details.

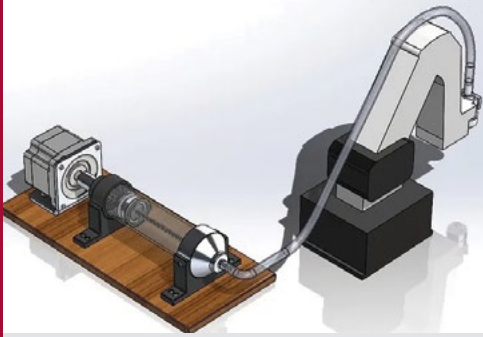


ENGINEERING WITH A MISSION

SENIOR DESIGN PROJECTS: A SHOWCASE OF INNOVATION AND COLLABORATION

ROBOTIC ARM EXTRUSION END EFFECTOR

Meet the interdisciplinary team of seniors tackling a critical issue in fields ranging from construction to medical devices, mass production, and highly detailed work. The group, comprised of seniors Nico Figueroa (Mechanical Engineering), David Blouin (Electrical and Computer Engineering), Nick Viamin (Electrical and Computer Engineering), and Savannah Hunt (Mechanical Engineering) under the advisement of Professors Andy Wolfe and Peter Woytowitz, came together to address the challenges associated with using materials such as ceramics and cement. Their Robotic Arm End Effector is designed to specialize in extruding highly viscous materials.

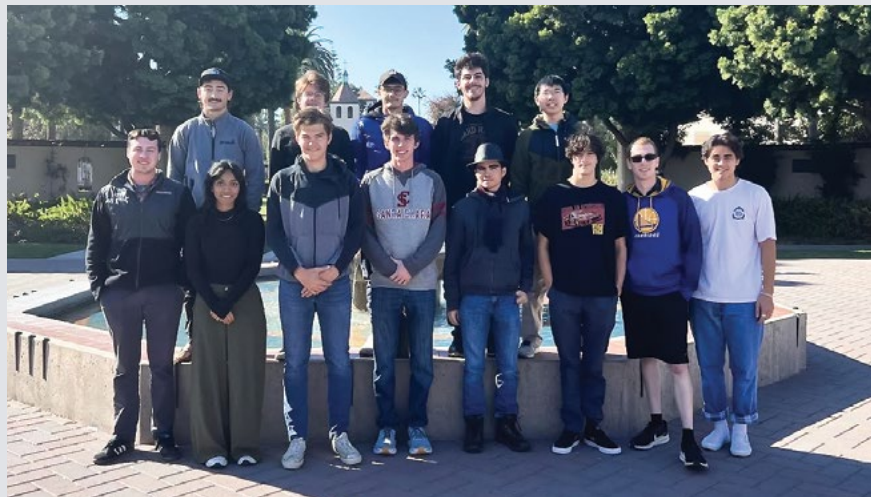


The Robotic Arm End Effector works by dispensing the material in a precise and controlled manner. The arm can be programmed to follow a specific path, ensuring the material is dispensed accurately. The end effector also includes a number of safety features to protect workers from exposure to toxic materials. The team believes that their Robotic Arm Extrusion End Effector has the potential to innovate the way that problematic substances are dispensed. They believe it can significantly impact various industries by reducing exposure to hazardous materials leading to better working conditions. The team continues to study and test the technology. Check out their project live in Interdisciplinary Session 1 during the Senior Design Conference.

DESIGN, BUILD, FLY COMPETITION

Meet the mechanical engineering team of eight seniors, including Julian Brown, Peyton Clark, Victor Bueno Garcia, Jonathan Kleinman, Kyle Lam, Gabe Shedid, George Simon, and Keaton Viadro, under the advisement of Professor Mohammad Ayoubi. They are embarking on a project to overcome the technical challenges of designing and building an unmanned aircraft within a year, aiming to compete in the American Institute of Aeronautics and Astronautics (AIAA) Design, Build, Fly Competition in 2024. The competition, centered around the theme of "Electronic Warfare," involves aircraft staging, surveillance, and jamming. The team must design an aircraft that can fly along a predetermined path and complete specific challenge criteria, including turns and loops.

The team is divided into two groups, CFD Aerodynamic Design and Structures and Controls. The ultimate goal of this project is not only to compete in the competition but also to reinforce students' knowledge and personal development, aligning with the strategic vision of Santa Clara University of educating the whole person. Each team member plays a vital role in competition in order to achieve a common goal. The project allows the students to learn teamwork, leadership, and collaboration skills, helping them grow professionally and as individuals. If you would like to learn more about this project, check out their live presentation in Mechanical Engineering Session 1 during the Senior Design Conference.



PEDESTRIAN BRIDGE FOR INNOVATION & DISCOVERY



The Pedestrian Bridge for Innovation and Discovery is an impressive senior design capstone project created by a civil engineering team consisting of Dylan Stegman, Jake Porter, and Matt Hale, who were advised by Professor Reynaud Serrette. The project involves a partnership with the Children's Discovery Museum in San Jose, which aims to create an innovative bridge and foundation connecting the Guadalupe River to the museum's main entrance. The team's objective is to design a bridge that is not only environmentally sustainable and accessible but also educational, with the aim of inspiring future generations of engineers.

In order to achieve their goal, the group approached their design with a strong emphasis on sustainability. The bridge's design incorporates timber arches, which are known for their strength and durability and are more sustainable than traditional steel or reinforced concrete. In addition, the bridge's deck is made of glass, allowing visitors to see its inner workings and appreciate its intricacies. The bridge is intentionally exposed, enabling people walking across it to view its components, and generating interest in civil engineering.

Through the innovative use of interactive plaques, the bridge is meant to engage the public and to increase interest in the field of engineering. These plaques provide information about the bridge's design, construction, and its environmental impact. Overall, the Pedestrian Bridge for Innovation and Discovery project is an exemplary effort that demonstrates the power of innovation, sustainability, and education in shaping the future of civil engineering. This collaborative effort is intended to provide a valuable learning experience for the team. The team will be producing a partial design, which will be showcased at the Civil, Environmental and Sustainable Engineering Session 3 during the Senior Design Conference.

Continued from page 1

on the hills at the center of their communities, and there are tanks connected to springs that can support an entire village. Therefore, accurate, localized weather predictions are vital in ensuring that the community's agricultural practices and water supply remain sustainable.

The Frugal Innovation Hub is dedicated to creating innovative solutions that positively impact society through engineering expertise and social awareness. Their NicaAgua initiative exemplifies their commitment to sustainable and effective humanitarian solutions. The NicaAgua weather monitoring system empowers communities to adapt to changing weather patterns and mitigate risks associated with extreme weather events. Their work is a model for addressing global challenges through collaboration and innovation.

If you are interested in supporting this project, contact the team at fiH@scu.edu.

COME SEE THESE PROJECTS AND MORE AT THIS YEAR'S SENIOR DESIGN CONFERENCE!

Can't make it in person?

» [Enjoy the presentations virtually](#)

INGENIUM: SCU'S FIRST PH.D. STUDENT ORG

The School of Engineering is delighted to introduce the first-ever Ph.D. student organization on campus: Ingenium Ph.D. Club. The organization was established on Dec. 5, 2022, by a group of passionate Ph.D. students who wanted a space to connect, collaborate, and support one another in their academic pursuits. The organization also supports students preparing for their preliminary exams, a critical milestone in their Ph.D. journey. The club chose the name Ingenium as it perfectly encapsulated its focus on creativity and innovation. The inspiration for the name came from the Latin word "ingenium," which translates to "natural talent" or "cleverness." Their goal was to select a sophisticated and unique name that represented the club's values.

Ingenium is currently led by Manizheh Zand, a board member of the organization and an Electrical and Computer Engineering Ph.D. student. Dr. Maria Kyrarini and Father Dat Tran, both Electrical and Computer Engineering faculty members, encouraged Manizheh and her colleagues to establish the student organization. With 65 active Ph.D. students, Ingenium is



rapidly expanding its network and has become a viable resource in the School of Engineering. By fostering a supportive and inclusive environment, Ingenium is empowering Ph.D. students to reach their full potential academically and professionally.

If you would like to connect with Ingenium, email ingenium-group@scu.edu.

25 ACTIVE
ENGINEERING
STUDENT ORGS

<https://www.scu.edu/engineering/studentorgs>



THE ESSENTIAL ROLE OF STUDENT ORGANIZATIONS IN SCU'S SCHOOL OF ENGINEERING

With a total of 25 student organizations in the School of Engineering alone, it's evident that these groups are an essential part of university life, playing a crucial role in shaping the overall college experience for students. Student organizations offer students opportunities to explore and pursue their interests beyond the classroom and connect with like-minded people. Daniel Mendoza '21, now a graduate student in Electrical and Computer Engineering, emphasizes the importance of student organizations at SCU, particularly for students who feel marginalized by mainstream college culture. "These organizations can even be the primary reason why a student continues down their educational path. I've heard from many people that without the relationships they formed at the Society of Hispanic Professional Engineers (SHPE), they would not have had the motivation and support to pursue STEM." Similarly, Mendoza's experience with the Latinx Student Union (LSU) allowed him to explore his identity and be around people he could relate to. Without these two communities, he believes he would have felt much more alone at SCU and may not have ended up where he is today. Terrin Cramer '23 (Electrical and Computer Engineering) found that joining the Institute of Electrical and Electronic Engineers (IEEE) student organization during the pandemic was invaluable: "During the pandemic, socializing with my peers was a real challenge. SCU's student organizations

provided the opportunity to connect with others despite the Zoom environment. I met amazing people and found my home here at SCU through IEEE. Student organizations hold a special space here on campus, allowing for personal connection where classes fall short; they are essential for the Bronco Family."

Along with fostering a sense of community, student organizations are an essential component of university life as they enrich their learning experiences. They provide students opportunities to connect with industry, learn new skills, and grow as individuals. This year alone, student organizations have brought out speakers from Google, Microsoft, NASA, and Intuitive Surgical. They have held professional workshops on resume building and interviewing, and skill workshops such as soldering and machine learning. Shane Wibeto, Assistant Dean for Undergraduate Student Services, says, "What they are doing is extremely important and serves a greater purpose. By providing workshops on topics such as resume building and emerging technologies, they enhance the learning experience for students and equip them with new skills that will serve them well in the future." Overall, student organizations play a vital role in making SCU a unique and special place by providing students with opportunities to learn, grow, and connect with others, enhancing the campus community.

ORDER OF THE ENGINEER: A SYMBOLIC TRADITION IN ENGINEERING ETHICS

Thirty-five years ago, on May 24, 1988, a new tradition was introduced to Santa Clara University. The Order of the Engineer Link #101 was established by Dr. Sukhmander Singh, Professor of Civil, Environmental and Sustainable Engineering, Professors Emeriti, Dr. John Finnemore, and Dr. Ian Murry. Our SCU chapter link represents one of sixteen links in California and is the third link established in the state. Every year, the SCU Link welcomes applicants from the area and beyond who have received their engineering degrees from ABET-accredited universities or are Professional Engineers. Prior to the pandemic, the ceremony drew over one hundred participants each year, and we aim to restore those figures. The Order was created in the United States over fifty years ago to promote “pride and responsibility in the engineering profession, to bridge the gap between training and experience, and to present to the public a visible symbol identifying the engineer.”

Dr. Singh was exposed to the Order while teaching a Code of Ethics in Engineering course in Canada. Singh’s prior exposure inspired him to start a Link of the Order upon his arrival at Santa Clara University. “As an engineer, we are committed to holding the responsibility, safety, integrity, and service to the public,” said Dr. Singh. His commitment to this standard helped drive his ambition to establish the SCU chapter. However, before being able to create the chapter, Singh, Murray, and Finnemore needed to take the oath at the University of the Pacific. Initiation into the Order has attendees undertake the Obligation of the Engineer, receive a certificate, and are presented with a stainless steel ring to wear on the little finger of their dominant hand. Singh recalls the process taking around two months to get the chapter approved and spending several years educating and building interest in what the Order stands for.

The Order of the Engineer, recognized nationally, emphasizes the importance of ethics in the engineering profession. This code of ethics binds those who take the oath and wear the ring. It symbolizes unity, reminding engineers of their shared responsibility and commitment to “serve humanity by making the best use of Earth’s precious wealth.” This commitment aligns with the School of Engineering’s mission of building “an engineering community that inspires and develops engineering leaders of competence, conscience, and compassion – entrepreneurial thinkers who will build a more just, humane, and sustainable world.” As such, the Order of the Engineer represents an important step in promoting ethical behavior and ensuring that our Bronco engineers act in the best interest of humankind.



First published Order of the Engineer article in “The Santa Clara,” May 25, 1989. Photo courtesy of SCU Library Archives.



2014 Order of the Engineer Ceremony. Photo by Adam Hays Photography.

IF YOU ARE INTERESTED IN TAKING THE OATH, WE ENCOURAGE YOU TO ATTEND THIS YEAR’S ORDER OF THE ENGINEER CEREMONY ON TUESDAY, JUNE 6.

► <https://scu.edu/engineering/the-order>



THE IMPORTANCE OF TEACHING EXCELLENCE

Every year, Santa Clara University and the School of Engineering recognize faculty who have made significant strides in teaching excellence and curriculum innovation. Faculty who meet these accomplishments may be honored with the School of Engineering Teaching Excellence Award, the University's Brutocao Award for Teaching Excellence, or the Brutocao Award for Curriculum Innovation. These accolades are crucial in recognizing our faculty's efforts to explore innovative teaching methodologies, which ultimately result in improved learning outcomes for our students. These best practices elevate the standard of education throughout the School of Engineering, promoting a culture of excellence in teaching and learning.

SCHOOL OF ENGINEERING TEACHING EXCELLENCE AWARD

This prestigious award recognizes a full-time faculty member who has dedicated at least five years of teaching service at Santa Clara University and has received nominations from both students and faculty. The award recipient is chosen based on their consistent demonstration of excellence in teaching, exceptional teaching evaluations, reputation as a mentor to students, and notable curriculum development. In recognition of the high caliber of past recipients, we would like to highlight some of our recent honorees below.

» 2022-2023 Honoree

Bill Lu Associate Professor, Bioengineering

Dr. Bill Lu is an exemplary teaching scholar who has significantly contributed to developing new bioengineering curricula. Students consistently praise him for his dedication, inspirational teaching style, and willingness to provide support. With a unique qualification of holding both an M.D. and Ph.D., he has provided invaluable guidance to pre-med students throughout the medical school application process. He is also an enthusiastic mentor who provides exclusive research opportunities to students. As a result of his mentorship, several students have co-authored peer-reviewed journal publications and became co-inventors of patents under his NIH-funded research projects. Lu's exceptional commitment to curriculum development, teaching, and mentoring students throughout their academic journey is truly remarkable.



» 2021 - 2022 Honoree

Laura Doyle Lecturer, Civil, Environmental and Sustainable Engineering

"Dr. Laura Doyle is a champion of bringing equity into the classroom." This comment is representative of all the changes Laura Doyle has made to eliminate the disadvantages that students from underrepresented engineering groups face. Her creation of labor-based grading motivated students to focus on learning and mastering skills. She was part of the founding team that created SWIRL at Santa Clara University, which allowed students who underperformed on midterms to shine. Doyle's teaching approach empowers each student's unique and individual learning styles and timelines. One of her colleagues noted that "Her efforts have been a model that others have copied. Dr. Doyle has challenged and inspired us to continue our own growth as educators."



PREVIOUS HONOREES

2005-06	Timothy Healy
2006-07	Silvia Figueira
2007-08	Timothy Hight
2008-09	Christopher Kitts
2009-10	Nam Ling
2010-11	Reynaud Serrette
2011-12	Frank Barone
2012-13	Drazen Fabris
2013-14	Aleksandar Zecevic
2014-15	Darren Atkinson
2015-16	On Shun Pak
2016-17	Yi Fang
2017-18	Prashanth Asuri
2018-19	Hisham Said
2019-20	Tonya Nilsson
2020-21	Michael Taylor
2021-22	Laura Doyle
2022-23	Bill Lu

CHECK OUT ALL OF THE 2022-2023 SCHOOL OF ENGINEERING FACULTY AWARD WINNERS

► <https://www.scu.edu/engineering/faculty--staff/faculty-awards/>



SCU Brutocao Awards:

The Brutocao Family Foundation annually recognizes exceptional educators with two prestigious awards: the Brutocao Family Foundation Award for Curriculum Innovation and the Louis and Dorina Brutocao Award for Teaching Excellence. The School of Engineering has had a remarkable track record of receiving both awards in the last three years.

BRUTOCAO AWARD FOR TEACHING EXCELLENCE

The Louis and Dorina Brutocao Award for Teaching Excellence recognizes outstanding faculty who promote intellectual curiosity and active learning; model and foster intellectual rigor and honesty and a zest for learning; develop connections between course material and life outside the classroom; are available to students, attentive to their needs, and enjoy the teacher-student relationship. This award honors those teachers who, over a period of years, have made a real difference: those who have served as exemplars in the Santa Clara Jesuit tradition of service, who have challenged their students in ways that have forced them to look at the world afresh, who have exerted a major influence over the intellectual and moral development of their students, who have, in short, made an imprint that is still felt in some way years after graduation.

» 2020 Honoree

Tonya Nilsson Vice-Chair and Senior Lecturer, Civil, Environmental and Sustainable Engineering

Dr. Tonya Nilsson received scores of nomination letters from students and alums that describe unforgettable learning experiences. They used memorable terms like “mentor,” “gold star standard,” “inventive,” and “queen of real-world applications.” Students valued her classes, where everyone was challenged and respected. She supported students of diverse backgrounds, providing unique mentorship experiences that changed their lives. These accounts exemplify the work honored by the Brutocao Award, with one department colleague stating that Dr. Nilsson is the most talented, dedicated, and generous instructor they have ever known.



Brutocao Award for Curriculum Innovation:

The Brutocao Family Foundation Award for Curriculum Innovation recognizes faculty who have improved the quality of education at Santa Clara University through significant innovations in pedagogy or curriculum development--particularly when those innovations affect a significant number of students--and who have exhibited general excellence in teaching.

» 2022 Honoree

Prashanth Asuri Associate Professor, Bioengineering

Dr. Prashanth Asuri takes an entrepreneurial and multidisciplinary approach, creating innovative courses that respond to students' needs and the Silicon Valley industry. His courses help students apply their learning to real-world contexts and build skills that prepare them to be young leaders. Industry leaders are often invited to their classrooms and have championed grants and fellowships for first-generation students. He also founded the Healthcare Innovation and Design Program, a space for students and faculty to collaborate on healthcare challenges.



» 2021 Honoree

Aleksandar Zecevic Professor, Electrical and Computer Engineering

Dr. Aleksandar Zecevic has led curricular innovations in the School of Engineering for a decade by integrating science, technology, and theology. He created two popular courses: “Chaos Theory, Metamathematics, and the Limit of Knowledge: A Scientific Perspective on Religion” and “Information, Quantum Computing, and Complexity: The Beauty of Nature and the Nature of Beauty.” He also initiated an “Ethics Across the Curriculum” program with three capstone design course modules. As a result, students find his classes thought-provoking and reflective, with unexpected learning opportunities that raise profound questions about existence.

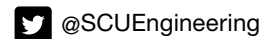
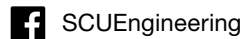




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The Jesuit University in Silicon Valley

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EDITOR'S NOTES: ACKNOWLEDGING ERRORS IN THE FALL 2022 ENGINEERING NEWSLETTER

Dear Readers,

As the saying goes, "To err is human." Mistakes are a natural part of the learning process and growth, and as humans, we all make them. However, it's how we respond to those mistakes that truly defines us. While our communications team strives to provide accurate and reliable information in our articles, we recognize that we are not infallible. That is why we believe that being transparent about our mistakes is essential.

In the spirit of transparency and accountability, we would like to address several errors that appeared in our previous newsletter. We apologize for any confusion or inconvenience caused by these mistakes.

Firstly, we would like to acknowledge an error in the naming of a research award recipient. In our article "2022 Faculty Research Awards," we named the incorrect PI for the August 19 award and have corrected it to Maryam Mobed-Miramadi. We deeply apologize to both professors and our readers for this mistake.

Secondly, we would like to clarify a factual error in the introductory paragraph of the article "IEEE Fellow: A Prestigious Elevation for the Few" regarding IEEE Bylaw I-305.5. The sentence that reads "only one-tenth of those are selected" is incorrect. The correct statement should have been "one-tenth of one percent of the IEEE voting membership on record as of 31 December of the year preceding." We apologize for any confusion this error may have caused. Also, we regret the error in counting the number of SCU School of Engineering faculty recognized as IEEE Fellows. In the last sentence of the same paragraph, we stated that Andy Wolfe was the fifth faculty member to be recognized, which is inaccurate. Upon further investigation, we have found that Andy is actually the eighth, if we include two late faculty members, Shu Park Chan and Samiha Mourad, and one emeritus professor, Drago Siljak. We apologize for omitting the contributions of these esteemed colleagues and recognize their deserving achievements.

Lastly, we regret that data was left out of a pie chart in our article on 2021-2022 Enrollment. The Graduate Enrollment by Programs chart did not accurately represent Mechanical Engineering and therefore threw off the percentage for Engineering Management and Leadership. We apologize for any confusion or misinformation this may have caused. We have updated the article with a corrected version of the chart and will take steps to ensure that all visual aids in our articles accurately represent the information we are presenting.

We take our commitment to accuracy and transparency seriously and are taking steps to prevent similar errors from happening in the future. Thank you for your understanding and continued support.

Sincerely,

Nicole Morales

Director of Marketing and Communications
Engineering News Editor