

ARCE

ARCHITECTURAL ENGINEERING DEPARTMENT | COLLEGE OF ARCHITECTURE AND ENVIRONMENTAL DESIGN | SUMMER 2021

IN-PERSON LEARNING IT CONTINUES, WITH PRECAUTIONS



CAL POLY

DEPARTMENT HEAD'S MESSAGE

► Department Head Al Estes continues to dress for the pandemic. How many ARCE logos appear in this photo? The first reader who emails arce@calpoly.edu with the correct number will win an ARCE T-shirt and ARCE mask.

Standing Strong, Staying Productive

While some obstacles still lie ahead, Cal Poly will return to in-person classes this fall.

The pandemic did not prevent the annual publication of our magazine. In this issue, you will read about a program that stayed open to the maximum extent allowed and mitigated the risk of doing so.

We thank Simpson Strong-Tie for sponsoring this edition and donating so much to the improvement of our labs. We are extremely grateful to Computer and Structures Inc. and its founder Ashraf Habibullah for creating a new Structural Resilience Leaders Fund and being the first to extend an ARCE lab sponsorship for a third iteration. And finally, a huge thank you to the ARCE Advisory Board, which increased our Student-in-Need Fund tenfold. We completed the second iteration of the Parents Learn by Doing Fund and initiated the campaign for the John Edmisten Global Travel Scholarship Fund.

Virtual is not fun, but we managed to execute a National Science Foundation equipment grant, attain six-year accreditation status, host advisory board meetings, award scholarships, initiate a diversity-equity-inclusion plan and conduct a graduation. The students and the SEAOC chapter were just as creative as they conducted Structural Forum, sustained weekly speaker meetings, involved industry in their activities, and even managed a senior banquet.

This year we saw longstanding faculty members Jill Nelson and Pamalee Brady retire and start the Faculty Early Retirement Program. We expect to be hiring again soon. I am happy to report that Anahid Behrouzi received a richly deserved early tenure and promotion that will be effective in September.

This academic year will be one of recovery, resurrecting systems and activities, and starting to celebrate the 75th anniversary of this highly respected and venerable program.



ALLEN C. ESTES | Ph.D., PE (Va.) | DEPARTMENT HEAD



DEAN'S MESSAGE

College, ARCE Mark 75th Year



Dean Christine Theodoropoulos

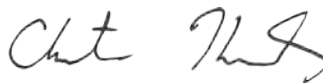
Seventy-five years ago, in the fall of 1946, Cal Poly welcomed 41 students to its new architectural engineering program. According to the university's 1948 Bulletin, the program was for "entering the engineering fields of architecture, building and construction." So began the College of Architecture and Environmental Design.

In the 1960s and '70s, as built environment education evolved to become more specialized, architectural engineering faculty founded the university's programs in architecture, landscape architecture, planning and construction.

Today we are proud of our nationally recognized programs in which student leaders become career-ready graduates who are making a difference. As we celebrate all we have achieved over three quarters of a century, it is time to reflect on where we were, where we are and where we're going. I invite you to join us.

This year a team of students will help me gather stories from our alumni, their experiences at Cal Poly and how Learn by Doing changed their lives. If you would like to volunteer to be interviewed or know someone with a good story to share, please reach out to me.

I hope that you are well and safe. Thank you for all your support.



CHRISTINE THEODOROPOULOS | AIA, PE | DEAN
COLLEGE OF ARCHITECTURE AND ENVIRONMENTAL DESIGN

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ON THE COVER

Architectural engineering (ARCE) majors Tara Reich (left) and Ellie Untalan are among the Cal Poly students who are back on campus, involved in hands-on learning in ARCE 106. Read about the ARCE Department's success in maximizing course offerings to keep students engaged on Pages 4-5.

THIS PAGE

ARCE seniors José Hernandez (left) and Truman Waller assess the concrete foundations and support columns they designed, built and installed in Poly Canyon as members of a five-student team. The work in spring and summer 2021 set the foundation for the building of a pavilion that employs tensegrity, an unusual design technique. Read about the project on Pages 16-17.

ARCE MAGAZINE

Your content contributions are welcome for this annual publication. Please contact Jamie O'Kane at 805-756-1314 or arce@calpoly.edu.

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As classes went virtual, ARCE Department offered in-person options

WHILE MOST OF the university — indeed, most of the world — shut down in 2020-21 in an effort to contain the COVID-19 pandemic, some students safely returned to in-person laboratory and activity classes offered in the fall, winter and spring quarters by Cal Poly's Architectural Engineering (ARCE) Department.

"While the California State University was primarily virtual fall 2020 quarter, the ARCE Department held face-to-face classes in slightly more than half of our courses," confirmed Department Head Al Estes. "After holding my breath all quarter, we remained fully operational — as did many other departments that opted to conduct some face-to-face classes — and we continued the effort through the winter and spring quarters. I am intensely proud of the ARCE faculty and what they were able to accomplish."

▲ **Top:** Students in ARCE 211 build models to enhance their understanding of 3-D forces and moments.

▲ **Bottom:** Freshmen in ARCE 106 weld two pieces of steel together and test it to failure.



▲ Students in Professor Craig Baltimore's ARCE 353 computer laboratory write matrix analysis programs.



For those students who chose to shelter at home, the ARCE Department provided a virtual accommodation for every face-to-face course.

"Students were able to seamlessly transfer back and forth between the modes of instruction as personal circumstances warranted," Estes explained. "Some courses had widely varied activities and required a different virtual solution each week. That posed the greatest challenge."

The unusual year necessitated imaginative, resourceful thinking on the part of the faculty.

"They used a creative combination of synchronous Zoom sessions, multiple cameras, video, external microphones, tripods, smart phones, digital tablets, computer simulations, document cameras, electronic grading and virtual competing to

pull this off," Estes said. "In addition to learning the equipment, we were still learning Zoom, Screencast-O-Matic and the Canvas course management system."

The department mitigated the risk of infection to the extent possible, which included enforcing social distancing protocols and sanitizing classrooms between classes. It worked.

"The combination of sanitation stations, signage, face masks, face shields, maximum ventilation and the green 'smiley face' entry system kept us from closing down one single face-to-face class," Estes said. "Most importantly, the students willingly participated and showed great responsibility."

"It was a lot of extra effort, but the students were grateful for whatever sense of normalcy we could safely offer during this difficult time," Estes said. ■

▲ Left: ARCE 444 students combine concrete and reinforcing steel inside a wooden form to create a beam that will cure and be tested to failure.

▲ Right: Freshmen Turner Milne (left) and Jake Poillucci participate in ARCE 106's K'nex exercise.

Creativity Does It

Student officers of Cal Poly's SEAOC Chapter rise to the challenge of designing and coordinating virtual activities to engage members

ARCHITECTURAL ENGINEERING (ARCE) senior Quinn Porter had his work cut out for him this year as president of Cal Poly's student chapter of SEAOC (Structural Engineers Association of California). With the campus mostly shut down due to the pandemic, Porter was forced to reimagine weekly meetings and other club activities.

"Many events were canceled, so we got creative," he said. "ARCE senior Michael Storti transformed our seventh week barbecue into a 'STORTI-thon,' leading the club in virtual games such as rock-paper-scissors and an ARCE trivia game."

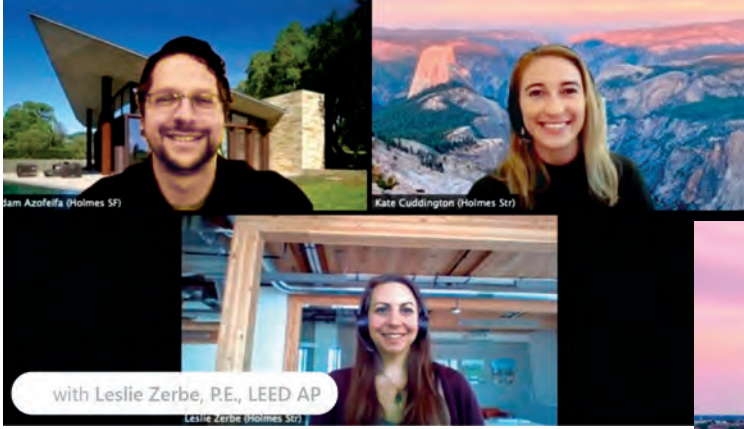
The weekly SEAOC meetings also went virtual, and industry professionals were invited to give career advice and to speak on various topics, such as projects they are working on, research and advances in industry.

Porter's main challenge was keeping club members engaged.

"It's hard to convince anyone to join yet another Zoom meeting focused on structural engineering since we already spend hours on Zoom talking about structural engineering," he said. "I've done my best to focus the meetings on topics that students wouldn't be hearing about in class."

▼ SEAOC President Quinn Porter operates part of the command center for the 2021 virtual Structural Forum.





"I learned that not everything is going to be a smashing success," Porter continued. "Our club was built to foster relationships between students, the industry and the department. This year many events had to be drastically changed. It wasn't always successful, but our club pushed forward, continuing to nurture the interactions that make SEAOC special."

The new format — and the challenges it created — also had its advantages. Porter added virtual quarterly industry roundtables involving a panel of professionals discussing a variety of topics.

"Our fall roundtable focused on how COVID-19 has affected the structural engineering industry," Porter said. "Our winter roundtable focused on resumes, cover letters and the job/ internship application process."

"I had to interact with many people. The communication skills I learned will help me greatly when I enter the workforce," Porter continued. "Our amazing SEAOC board receives little direction from the department. We're given the space to try new things and sometimes to fail. This experience has given me and our board members the confidence to step into the unknown and learn as we go."

Zooming in on field trips

As vice president of SEAOC, ARCE senior Tomlinn Cox was likewise challenged in her role, which included planning and coordinating the club's field trips.

"SEAOC usually hosts three trips a year," Cox explained. "We travel over a long weekend to a location and visit two to three offices and sites under construction. It took the club awhile to develop other effective activities."

Cox rose to the challenge. In one Zoom field trip, the students visited seven Northern California firms: Buehler Engineering, Degenkolb, Harris & Sloan, Lionakis and CYS in Sacramento; and MKM & Associates and ZFA Structural Engineers in Santa Rosa.



"We watched short clips about each firm and participated in activities that helped the students get excited about what life would be like if they worked there," Cox said. "Participants were put into random breakout rooms, allowing students of varying years to interact, much like they would have during the quarterly trips."

Cox learned a few things along the way.

"I learned that it's all in the details," she said. "I was determined to mix things up to showcase the firms the best I could. I worked hard to coordinate with company representatives to produce a video. It took a lot of research and brainstorming with my peers."

But it wasn't all work.

"Planning the virtual activities was enjoyable," Cox said. "I was able to be creative and work with others to produce games that would enhance the overall experience. It was also nice to connect with firm representatives." ■

▲ **Bottom center:** SEAOC Vice President Tomlinn Cox developed virtual activities, such as chats about projects with industry professionals. Among them:

▲ **Top left:** ARCE alumni Adam Azofeifo, Kate Cuddington and Leslie Zerbe, now engineers at Holmes Structures.

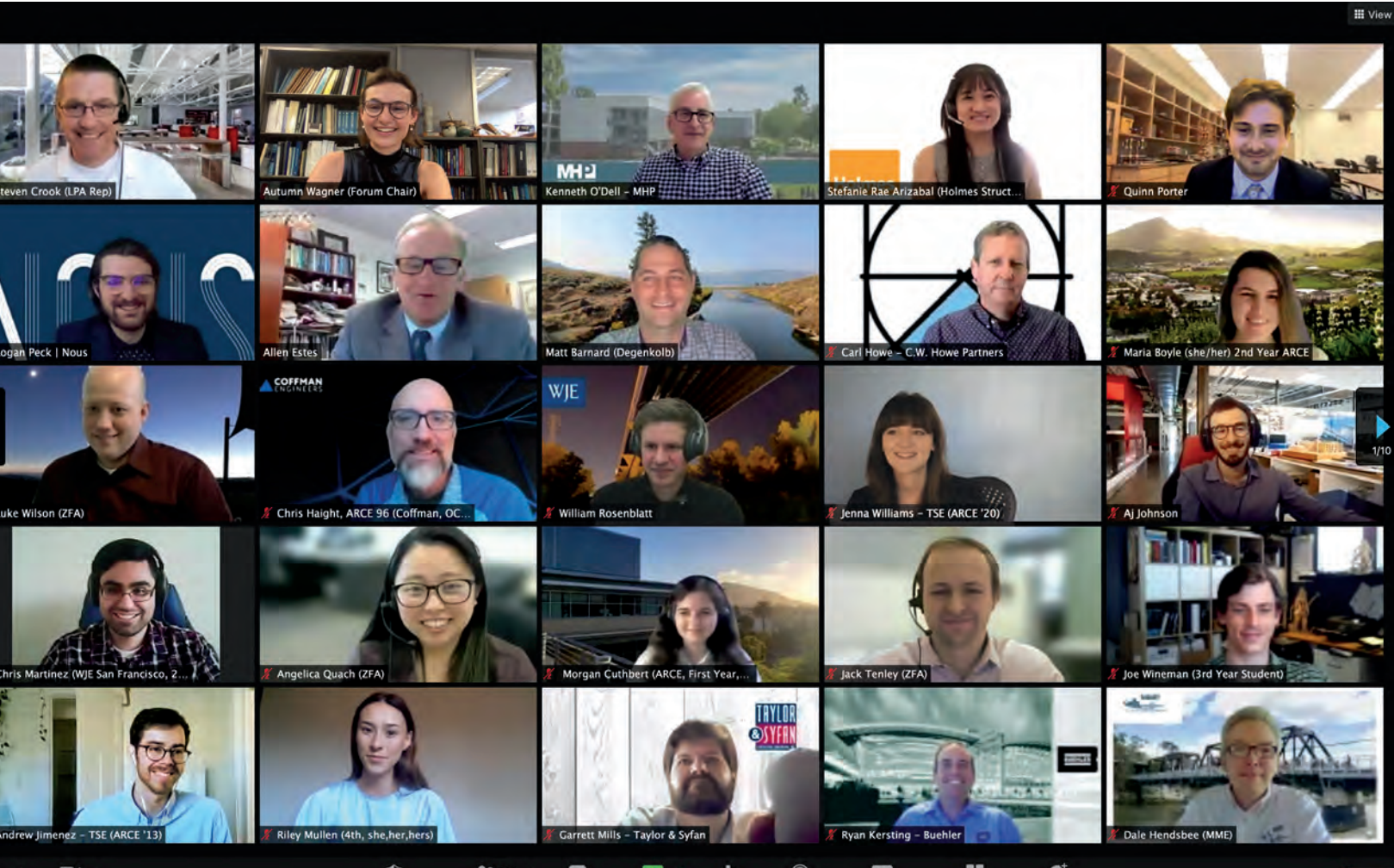
▲ **Top right:** Brendan Walsh of Buro Happold, who discussed the structural design of Mercedes Benz Stadium in Atlanta.

▲ **Bottom right:** Alumnus William Rosenblatt of Wiss, Janney, Elstner Associates Inc., who provided details about the re-engineering of the Air Force Academy Cadet Chapel in Colorado.

EVENTS AND ACTIVITIES

“Forum chair is one of the toughest leadership challenges that a student can face in the department, and the order of difficulty increased exponentially by having to switch to a virtual event. Autumn pulled it off beautifully.”

Department Head Al Estes



Successfully Adapted

The 31st Structural Forum goes virtual, attracting a record number of participants

IN SPRING 2020, when architectural engineering (ARCE) senior Autumn Wagner began planning the 31st annual Structural Forum for February 2021, she had no idea the COVID-19 pandemic would require the event to move to a virtual format.

"I had nine months to plan," said Wagner, chair of Structural Forum, an annual event put on by the student SEAOC (Structural Engineering Association of California) club. "I thought we would be holding it on campus. During fall, we realized it needed to go virtual."

"For the presentation portion, we used the Zoom webinar tool," Wagner said. "Because people were able to view it at home, we had almost 200 people attend. It was awesome."

Speakers included David Strandberg, principal and founding partner at Strandberg Engineering in San Francisco; Mira Olson, associate professor in the Civil, Architectural and Environmental Engineering Department at Drexel University in Philadelphia; and Christopher Downey, who has 32 years' experience in architecture. Downey has continued to work, even though he's been blind since 2008.

The career fair, offered on Zoom, included 47 companies, and more than

300 people attended the happy hour, which replaced the usual banquet.

"I was happy with the career fair turnout," Wagner said. "We had 50 breakout rooms, letting students meet virtually with representatives from small, medium and large companies."

Added Department Head Al Estes, "Forum chair is one of the toughest leadership challenges that a student can face in the department, and the order of difficulty increased exponentially by having to switch to a virtual event. Autumn pulled it off beautifully. The key, as with everything else this year, was managing the technology. The speakers were fantastic and the networking sessions were amazing — and we all hope we never have to do it again. My personal thanks to all of the companies who took a chance and joined us this year."

This year's theme, Building a Better Tomorrow, "symbolized the importance of transforming what we learn in class to meet future challenges in our lives and our professions," Wagner said. "I think the current climate has challenged many students to think beyond themselves, and I hope to emphasize the importance of this discussion and inspire the continuation of it in the future."

Wagner deemed the event a success. "It was great that so many students attended. It was especially nice because we haven't been able to connect in person, and it proves that there is a strong ARCE community outside of Zoom," she said. ■

◀ **Top:** Chair Autumn Wagner was delighted when guest speakers' Zoom presentations attracted nearly 200 attendees.

◀ Structural Forum participants socialize at a happy hour gathering on Zoom.

PARTICIPATING COMPANIES

Structural Forum is a student-run event hosted by the Cal Poly student chapter of SEAOC. The ARCE Department thanks the following 47 companies (listed alphabetically) for their generous support.

Advanced Structural Design Inc.
Ashley and Vance
Buehler Engineering
Bigge Crane and Rigging
Brooks Ransom
Coffman Engineers Inc.
C.W. Howe Partners Inc.
Daedalus Structural Engineering
DCI Engineers
Degenkolb Engineers
DLR Group
Englekirk Structural Engineers
Forell/Elsesser Engineers Inc.
Harris and Sloan
Holmes Structures
IDA Structural Engineers
John A. Martin & Associates Inc.
KNA Structural Engineers
KPFF Consulting Engineers
Kurt Fischer Structural Engineering
Lionakis
LPA Design Studios
Mackenzie
MHP Structural Engineers
Miyamoto International Inc.
MKM & Associates Structural Engineering
MME Civil + Structural Engineering
Mulhern + Kulp Structural Engineering Inc.
MWA Inc.
Nous Engineering
PCS Structural Solutions
RDH Building Science Inc.
Rinne & Peterson Inc.
Rutherford + Chekene
Salas O'Brien
Sideplate
Simpson Gumpertz & Heger
Strandberg Engineering
Structural Engineers Incorporated
Summit Engineering Inc.
Taylor & Syfan Consulting Engineers
Tipping Structural Engineers
Walter P. Moore
Watry Design Inc.
Wiseman + Rohy Structural Engineers
Wiss, Janney, Elstner Associates Inc.
ZFA Structural Engineers

A REAL-WORLD SCENARIO

Undergraduate Seismic Design Competition tasks interdisciplinary team with medical facility expansion to accommodate COVID-19 patients



A TEAM OF 13 Cal Poly architectural engineering (ARCE) and architecture students competed in the Undergraduate Seismic Design Competition, which was held virtually from January to April 2021.

The competition, sponsored by the Earthquake Engineering Research Institute (EERI), attracted over 350 students on 36 teams from universities around the world. Cal Poly's team efforts on the rigorous technical and communications deliverables resulted in an eighth-place ranking.

The problem statement was to expand healthcare patient capacity in Seattle — the intended competition host city — in response to COVID-19.

The ARCE team's deliverables (left and below) addressed the project's geotechnical conditions and site seismicity; structural analysis of the original hospital; facade design considering architectural impact, sustainability and cost; and designing a structural retrofit scheme.

Students were to conduct a seismic evaluation and then add 10 floors, along with any necessary retrofits, to an existing hospital building.

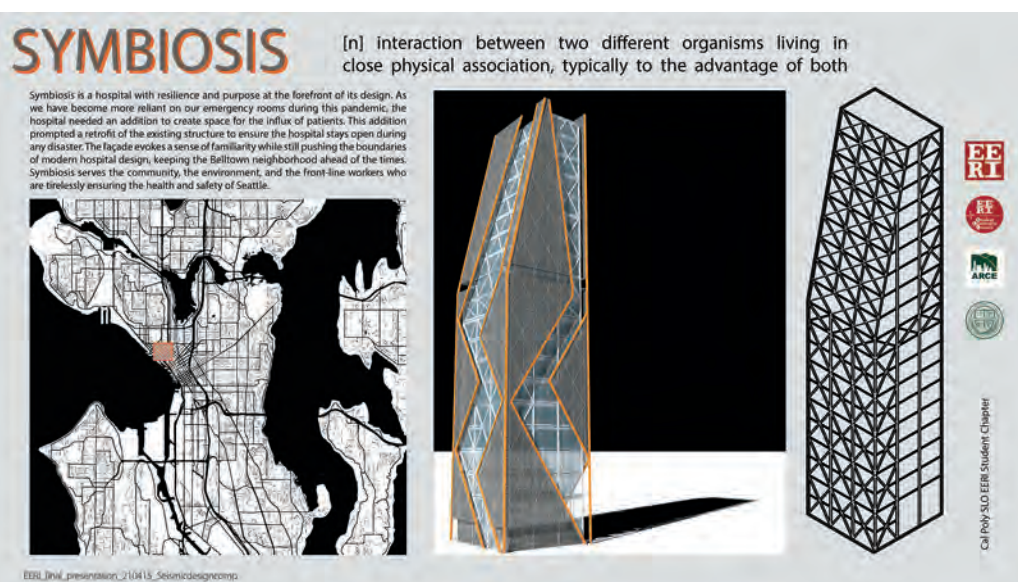
The team's virtual collaboration resulted in four professional reports: geotechnical conditions and site seismicity; structural analysis of the original hospital; facade design considering architectural impact, sustainability and cost; as well as design of a structural retrofit scheme. The team was also required to prepare a summary poster and oral presentation.

Cal Poly ARCE Associate Professor Anahid Behrouzi served as the team's faculty advisor. She commended the team, stating, "They worked tirelessly in the virtual environment to meet the rapid pace of many new challenging competition tasks. Each of the four deliverables had the scope of a course project, and in some cases, covered advanced topics beyond the team's undergraduate studies. It was a tremendous learning experience, and the students should be applauded."

The annual competition aims to promote the study of earthquake engineering among undergraduate students through a project that simulates the tasks of seismic design practitioners and to promote EERI activities among students and the general public.

Next year's competition is expected to be in-person and will be held in Salt Lake City from June 27-July 1. Cal Poly will be there.

The Architectural Engineering Department thanks John A. Martin & Associates as well as the Cal Poly Instructionally Related Activities program for their financial support of the EERI Undergraduate team. ■





SHAKING THINGS UP

The 2021 EPIC Earthquake Engineering Summer Camp may have been virtual, but there were plenty of hands-on activities

SINCE SPRING 2021, architectural engineering Associate Professor Anahid Behrouzi, alumnus Nicole “Nikki” Buck (M.S., Architectural Engineering, ’20) and graduate student Sarah Navias (Architectural Engineering, ’21) have been developing a new earthquake engineering and programming curriculum for Cal Poly’s Engineering Possibilities in College (EPIC) virtual summer program.

The EPIC program, first offered in 2007 as a half-day in-person summer camp for middle and high school students, aims to interest young students in engineering. The camp is especially geared for female, first-generation-college-bound, and underrepresented multicultural students.

More than 800 campers can choose from one of several weeklong residential sessions, each offering a variety of daily two-hour, hands-on labs on topics ranging from automated plant care to wearable health devices. The classes are taught by Cal Poly faculty and students in campus engineering facilities.

This year, because of pandemic restrictions, the camp was offered virtually. To aid those at home, Behrouzi

▲ Campers in the 2021 Engineering Possibilities in College (EPIC) virtual summer program got lessons in earthquake engineering, which included building projects with materials the camp faculty mailed to them.

and her team designed, fabricated and distributed mail-home engineering kits to over 120 campers throughout the U.S.

Under now-Emeritus Professor Pamalee Brady, the ARCE Department has been involved in the EPIC program since its inception. Brady, who had remained involved until 2017, introduced campers to structural engineering concepts and challenged them to design a steel truss bridge to carry highway traffic across a river using the online West Point Bridge Designer. To avoid bridge collapse with the lowest cost solution, campers had to consider strength, stability and material efficiency in their designs.

The camp’s virtual format was modified so that campers could select a topic area — in this case earthquake engineering — that they would explore two hours a day. That time was divided into lecture, discussion and hands-on activities. The students assembled a shake table, constructed a balsa wood structure,

implemented seismic upgrades, and collected data with an accelerometer.

“Our team had a very ambitious vision for the campers’ hands-on experience, and there was no off-the-shelf engineering kit to suit,” explained Behrouzi after successfully completing the five-week camp in July. “From prototyping and laser cutting the parts to packing each box for shipping, we did it all. It was only possible with Nikki and Sarah’s creativity, enthusiasm and determination.

“In the coming academic year, the team plans to publish the details of the EPIC camp session to build on K-12 outreach materials used to inspire the next generation of structural engineers who will undoubtedly be shaking things up,” Behrouzi continued.

The ARCE Department thanks the CSI Resiliency Fund for its generous support, and EPIC Program Directors Maria Manzano, Emma Della and Maddy McKay for their teaching expertise and logistical support in developing the curriculum and engineering kit.

For more information about the EPIC program, visit epic.calpoly.edu. ■



▲ Department Head Al Estes awards the Herbert Collins Scholarship to Elizabeth Claypool (top) and the Hans Mager Scholarship to Armando Castaneda Jr.

▲ **Bottom:** Lilla Vigh accepts the Carson Starkey Memorial Scholarship from her chosen surrogate department heads — her siblings.

2021-22

ARCE SCHOLARSHIP RECIPIENTS

Every year the Architectural Engineering (ARCE) Department awards scholarships to those standout students whose hard work and dedication has set them apart. This year a total of nearly \$87,000 was awarded to the following students:

COLLEGE OF ARCHITECTURE AND ENVIRONMENTAL DESIGN SCHOLARSHIPS

Garrett Barker (\$1,000) — Robin L. Rossi Award
Elizabeth Claypool (\$1,800) — Herbert Collins Scholarship
Kennedy Gomez (\$15,000) — Castagna Architectural Scholarship
José Alfredo Gonzalez Munoz (\$15,000) — Castagna Architectural Scholarship
Payton McGee (\$15,000) — Castagna Architectural Scholarship
Gilbert Muñoz (\$1,800) — Herbert Collins Scholarship
José Hernandez Ocampo (\$1,800) — Herbert Collins Scholarship
Faith Sharp (\$15,000) — Castagna Architectural Scholarship
Matthew Sloss (\$1,000) — Douglas James Martin Scholarship
Nicholas Tabarez (\$1,000) — Robin L. Rossi Award

ARCHITECTURAL ENGINEERING DEPARTMENT SCHOLARSHIPS

Will Adam, Ivan Cruz, José Hernandez Ocampo, Kasey Tatis-Flanagan, Truman Waller (\$3,000) — CYS Structural Engineering Eugene Cole Scholarship
Maria Boyle (\$1,500) — D'Abreau Family Foundation Scholarship
Grace Brekke, Jack Radovan (\$1,500) — KNA Structural Engineers Senior Project Scholarship
Hadiya Brown (\$1,500) — Fluor Foundation Architectural Engineering
Armando Castaneda Jr. (\$1,200) — Hans Mager Scholarship
Elizabeth Claypool (\$2,850) — Concrete Reinforcing Steel Institute Scholarship
Jonathan Herrera (\$1,000) — Paul F. Fratessa Memorial Scholarship
Kristofer Rickansrud (\$1,050) — Emanuele Barelli Structural Engineering Scholarship
Robert Rochel (\$1,500) — KPFF Consulting Engineers Scholarship
Natalie Silliman (\$1,000) — Forell/Elsesser Engineering Inc. Scholarship
Lilla Vigh (\$1,500) — Carson Starkey Memorial Scholarship
Claudia Zapata-Kraft (\$1,500) — John Labib and Associates Structural Engineers Scholarship

EXTERNAL SCHOLARSHIPS

Garrett Barker (\$2,000) — Structural Engineers Association of Southern California (SEAOSC) Scholarship
Maria Boyle (\$2,000) — Structural Engineers Association of Southern California (SEAOSC) Scholarship
Alexander Ameri (\$3,000) — Degenkolb Engineers Scholarship
Sarah Navias (\$5,000) — Structural Engineers of Northern California/Computers and Structures Inc. (SEAONC/CSI) Scholarship
Claudia Zapata-Kraft (\$5,000) — Structural Engineers of Northern California/Computers and Structures Inc. (SEAONC/CSI) Scholarship
Sara Engmyr (\$3,000) — Architectural Foundation of Santa Barbara Scholarship

OTHER HONORS AND AWARDS

Jenna Marie Williams was named the College of Architecture and Environmental Design Graduate Student of the Year.

Claire Leader and **Dolores Herrera**, both ARCE majors, and **Soham Patel**, Architecture, received the Best Diversity Paper award from the American Society for Engineering Education, Student Division.

Alumna Lilliann Lai (ARCE, '20) was awarded a MEXT Scholarship, which provides funds for five years to complete a doctorate at Hokkaido University, Sapporo, Japan. It is awarded through a competitive international process by the Japanese Ministry of Education, Culture, Sports, Science and Technology. ■



2021 graduates Dolores Herrera (left) and Sophia Ha (right) took the Order of the Engineer oath, with ARCE Department Head Al Estes officiating and their families looking on.

Pledging Allegiance

After the COVID-19 lockdown was lifted in spring 2021, a handful of graduates and their families visited campus for graduation and were inducted by the Architectural Engineering (ARCE) Department into the Order of the Engineer.

“This event celebrates the transition from college student to professional engineer and emphasizes the responsibilities that accompany this change,” said ARCE Department Head Al Estes. “In years past, the department conducted a formal ceremony that has been well attended by ARCE graduates and their families following commencement. However, as with many

activities in 2020 and 2021, the department was not able to host the larger, more festive gatherings due to the pandemic.”

As part of the induction, Estes places a stainless steel ring on the pinkie finger of each graduate’s working hand to signify their commitment to the engineering profession and duty to the safety of the public. The students pledge to “uphold the standards and dignity of the engineering profession and to serve humanity by making the best use of Earth’s precious wealth.”

The ARCE Department thanks Barrish-Pelham (Degenkolb) for continuing to sponsor the Order of the Engineer. ■



Al Estes places the stainless steel ring on Sophia Looney’s pinkie finger and congratulates Jorge Rios for taking the oath.

Invaluable Installations

NSF grant provides equipment designed to study seismic performance of structures

LAST YEAR ARCHITECTURAL engineering (ARCE) faculty member Anahid Behrouzi, who was recently granted tenure and promoted to associate professor, led an interdisciplinary effort that resulted in a National Science Foundation (NSF) grant of more than \$340,000 to purchase equipment designed to study the seismic performance of structures.

Since then, Behrouzi and team member ARCE Professor Peter Laursen, with help from the Sponsored Programs office, have ordered the equipment that is being installed in the College of Architecture and Environmental Design's (CAED) High Bay Lab.

Behrouzi and her team have consulted with Cal Poly Facilities Project Manager and alumnus Marcus Jackson (Construction Management, '07) to discuss building modifications to accommodate the equipment and to develop a construction schedule. The chiller and hydraulic pump were installed in late April; the actuators have arrived and installation and training will follow.

The equipment includes two MTS actuators that can be used to apply simultaneous lateral and gravity loads with higher force and displacement capacities than was previously possible in the lab, and the hardware and software to automate the system. MTS is a leading global supplier of test, simulation and measurement systems.

The dual-actuator system will be used collaboratively by students and faculty in the CAED and College of Engineering to better understand the earthquake response of structures. The lab and equipment will specifically enhance Learn by Doing for many students working on their senior and

◀ Cal Poly Facilities personnel drilled holes in the concrete wall of the High Bay Lab and connected the outdoor chiller unit to the rest of the equipment.



master's projects, as well as in design labs such as ARCE 451: Timber/Masonry and ARCE 372: Steel, which often culminate in a large-scale test.

"So far, they've poured a concrete pad and installed bollards for the chiller behind the High Bay Lab," Behrouzi explained. "They've also drilled holes to run conduit from the chiller to the hydraulic pump inside the lab and new electrical lines to power the equipment. We anticipate the actuators and computer controller will be installed in late August, with training on the system to happen in the fall."

This project has created new Learn by Doing opportunities for several students. Under the supervision and guidance of ARCE faculty members Michael Deigert, Laursen and Behrouzi, students created a computer model of

the former lab configuration and the new equipment to make it easier for researchers to plan their tests.

They compiled manuals for the department's existing data acquisition equipment and sensors, created a data repository for project reports from past experimental projects conducted in the lab, and designed and built multiple concrete footing blocks to tie into the lab's strong floor.

And this all took place during the pandemic.

These lab upgrades have been possible thanks to the help of ARCE students Reiley Akkari, a graduate student; Anders Johnson, a senior; Thomas Little, a senior; Adelaide Albro, a junior; and Taylor Cardinale, a graduate student.

"With the new equipment, faculty and students will significantly improve the caliber of their experimental research since the system enables efficient and precise loading control of our

structural tests, leading to greater data accuracy," Behrouzi said. "We will be able to produce research-quality results that can be published in journals and provide guidance to practitioners on seismic design and retrofit. With our new capabilities, we also aim to attract more industry-driven research projects."

Deigert added, "We owe special thanks to so many companies and individuals who have supported our efforts, including Simpson Strong-Tie for its donation of additional steel frames and hardware that was incorporated into the design of the concrete footings. Simpson Strong-Tie engineers, including alumnus Emory Montague (Architectural Engineering, '98), provided design recommendations for the footings and an updated design of our reaction frame."

Department Head Al Estes added, "I am ecstatic for this new equipment and grateful to Anahid for the leadership and effort required to turn this grant proposal into reality. It all feeds on itself. Some additional laboratory enhancements and resulting research and teaching opportunities are being funded by the CSI Structural Resilience Leaders Fund (*see story, Pages 30-33*), which was, in turn, inspired by this new equipment."

The team is also grateful for the assistance of Andrew Brown, administrative analyst in Cal Poly's Grants Development office in preparing the NSF grant proposal, as well as CAED Support Shop Manager David Kempken and CAED technicians Vince Pauschek and Tim Dieu for their extensive efforts preparing the lab to receive the equipment.

Team members include: ARCE faculty Behrouzi, Peter Laursen and John Lawson; architecture faculty Dale Clifford; Construction Management (CM) Department Head Jeong Woo and CM faculty Andrew Kline; and Civil and Environmental Engineering Department Chair Charles Chadwell. ■

▼ The High Bay Lab also has a newly installed hydraulic pump.





‘An Impossible Floating Structure’

Five architectural engineering seniors design and build a unique pavilion in Poly Canyon

TENSEGRITY. IT’S A BUILDING CONCEPT NOT commonly known outside the realm of architects and design professionals; however, five Cal Poly architectural engineering (ARCE) seniors aim to make the word — and technique — better known to students and the community.

Will Adam, Ivan Cruz, José Hernandez Ocampo, Kasey Tatis and Truman Waller used the unusual technique in the design of a pavilion they are building in Poly Canyon, an outdoor experimental laboratory for student-designed-and-built structures.

The term tensegrity, coined by Buckminster Fuller in the ‘60s, blends the words “tensional” and “integrity.” According to Adam, Fuller was a frequent visitor and lecturer on campus and even inspected the geodesic dome that Cal Poly students had built back in 1957.

“Tensegrity strives to create an impossible floating structure,” Adam explained. “To achieve it, we are using cables to suspend the pavilion mid-air, creating an axial stress-governed system. Within this design constraint, a 3D space truss becomes the form; tensile elements are at the forefront of the design.”

▲ Support columns stand ready to suspend the pavilion’s inner core.

The pavilion includes seating in the center so that visitors are first puzzled by the seemingly discontinuous load path. “Then we hope they come to understand and appreciate the large-scale tensegrity experiment,” Adam added.

Under the guidance and supervision of ARCE Professor Kevin Dong, the students are experimenting with removing a structure’s compressive elements. “Compression members are like columns in a building,” Adam explained. “The unique tensile load path is what gives the structure its tensegrity classification.”

After drawing sketches and building models of various ideas, Adam presented an idea to his teammates in fall 2020. “We built several models, finally settling on one,” he said. “I brought the general idea to the table, but Kasey had the practical and constructable design that we all agreed to build.”

Each student contributed specific skills and expertise.

The team is fabricating the entire structure in the College of Architecture and Environmental Design’s support shop. At press time, the concrete foundations had been poured, and the four



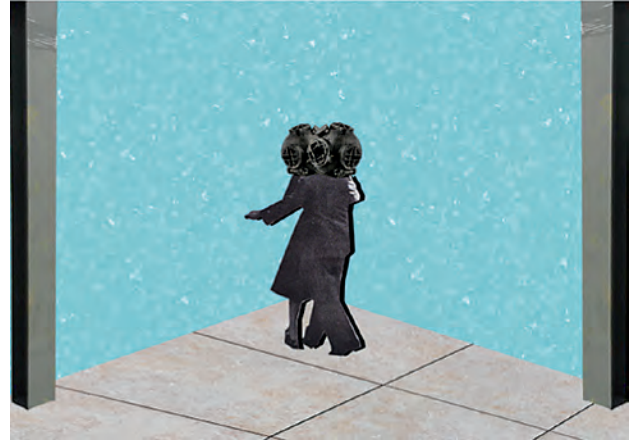
- ▲ **Top left:** Ivan Cruz (left) and José Hernández Ocampo study the team's building plans on their gridline-marked site in Poly Canyon.
- ▲ **Top right:** Will Adam (left) and Truman Waller assemble a frame for the roof of the pavilion.
- ▲ The team's renderings with design notes and building details.
- ▶ Students mix concrete for the columns' foundations. From left: José Hernández Ocampo, Truman Waller, Kasey Tatis-Flanagan and Ivan Cruz.

major support columns were in place. The completion of the structure and the turnover ceremony will take place in the fall.

"We took our knowledge of structures from academics and thoughtfully designed members that are now being built by the people who designed them," Adam said. "This is by far the most Learn by Doing we've done."

The ARCE Department thanks Devcon Construction, Tatis Construction, Tracy Kellum, Lynda Manaster, Jennifer Waller and Deanna Dech for their generous donations, which made the pavilion possible. Thanks also go to the CYS Structural Engineering Eugene Cole Scholarship and the CSI Structural Resiliency Leaders Fund for their generous support. ■





Boundless Creativity

Interdisciplinary design studio's new virtual format enables world-renowned experts, international students to attend

While the challenges of teaching an interdisciplinary fourth-year design studio online are numerous and varied, one positive aspect Architectural Engineering (ARCE) Professor Ed Saliklis discovered was the willingness of world-renowned experts to join Cal Poly students in a virtual studio.

"Zoom meetings made it easier to connect students and scholars around the world in ARCE 415: Interdisciplinary Capstone Project and ARCH 453: Interdisciplinary Senior Project," Saliklis said. "One game-changing difference in this studio is the wide swath of experts who found the time to participate virtually. I had an Eisenstein Scholar join our studio. The curator of MASSMoCA joined in as well as several practitioners, including world-famous Mark Sarkisian, who spoke about the importance of the Glass House," referring to Mies van der Rohe's uncompleted project known as the 50x50 House, created to address the challenge of well-designed, mass-marketed post-World War II housing.

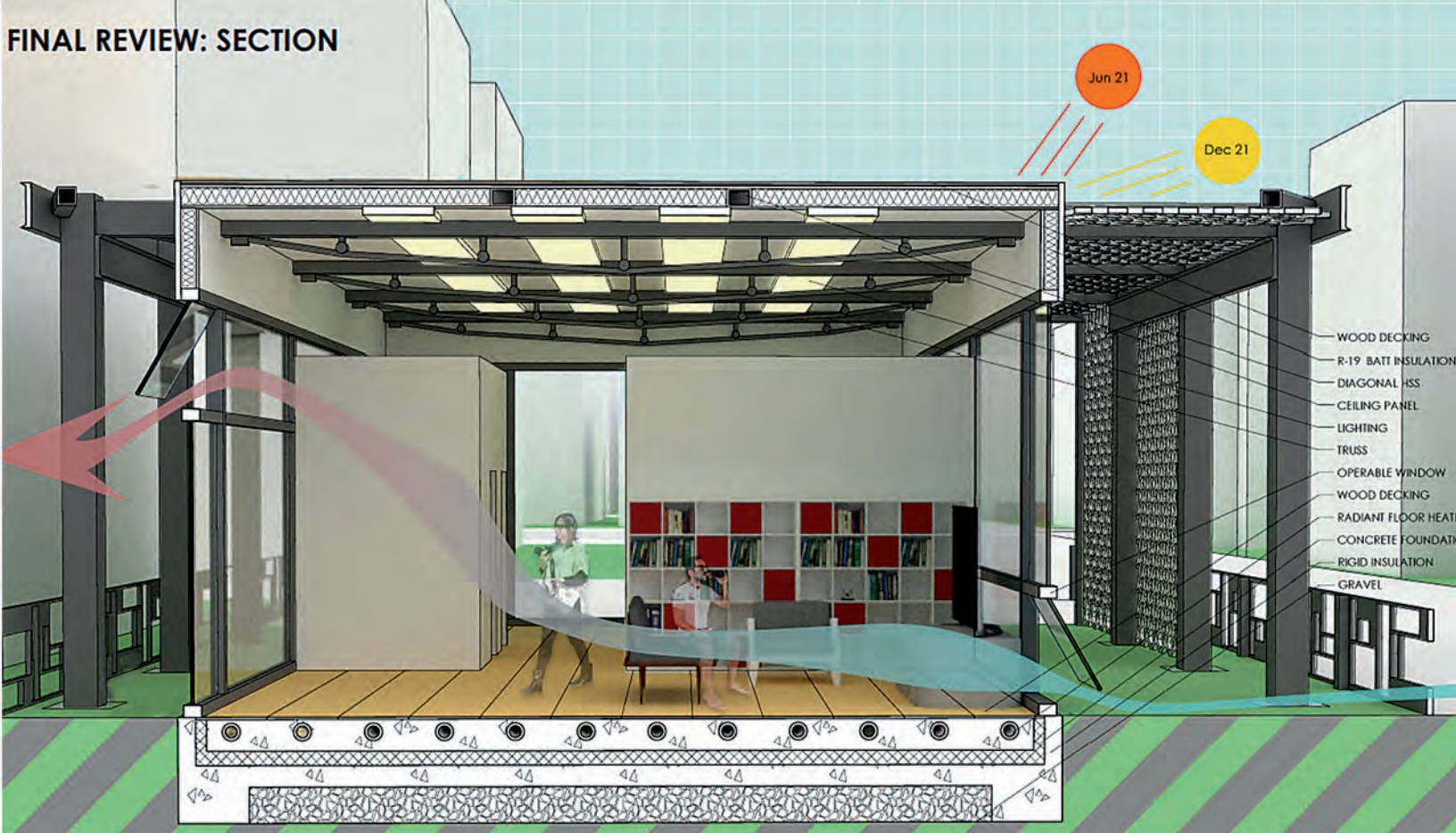


Another difference in this studio is the century-long list of literary, artistic and theoretical works that are linked to the Glass House. Students familiarized themselves with Yevgeny Zamyatin's 1921 dystopian novel "We," and they studied MacArthur Fellow Iñigo Manglano-Ovalle's MASSMoCA (Massachusetts Museum of Contemporary Art) 2009-10 installation "Gravity Is a Force to be Reckoned With," based upon Rohe's uncompleted project. Manglano-Ovalle joined the studio along with the world's preeminent structural engineer, Bill Baker.

The scope of the students' work included a reinvention of the unbuilt 50x50 House, including structural design, preliminary foundation design, and preliminary connection design of glass walls to steel mullions.

▲ **Top:** An exercise in conceptual design thinking had students creating artifacts that link directly to Mies van der Rohe's Glass House.

▲ Students reinvented the unbuilt Glass House, which involved structural design, preliminary foundation design and preliminary connection design of glass and steel.



“This first design module also included architectural design, how the space will be used, how people move in and out of the building, how the building is situated in the landscape, how the sun interacts with the building,” Saliklis said.

Students then studied wind loading and seismic loading in California. “Stiffness is paramount, as this is a glass house,” Saliklis explained. “This includes a deeper analysis examining how privacy is maintained, how the circulation of people in the space is enhanced, and how comfort of the occupants is addressed.”

In the “final fantasy” portion of the course, students are instructed to modify their structure in accordance with seldom-taught “conceptual design” thinking.

“Big picture ‘what-if’ scenarios were explored from their structural and architectural feasibility,” Saliklis said. “How might the house be redesigned as a single-family dwelling or a home for a single client? Conversely, how might the structure be part of a dystopian society in which glass walls are used to control and survey the population? How do these differing visions — one utopian, one dystopian — intersect in the creation of an artifact? The artifact may be in the form of a film, a soundscape or a

performance, either written or oral, but it links to the Glass House in a direct manner.”

The online experience was further enhanced spring quarter with the unprecedented full participation of architecture and civil engineering students at Vilnius Gediminas Technical University in Lithuania.

One provocative aspect of this newly designed course, according to Saliklis, is how deeply involved the engineers are in the architectural design and how deeply the architects are involved in the sizing and spacing of the structural elements.

“This is possible because Cal Poly architecture students have had 50 weeks of structural engineering courses at this point in their studies, and the ARCE students have had 30 weeks of architectural studio and at least 20 weeks of concrete and steel design studios,” Saliklis said. “When jurors and guest critics come into my studio, they are unable to tell which student is studying architecture and which is studying engineering.

“The 100-year scope of the project brings an unprecedented intellectual framework to an interdisciplinary studio,” Saliklis continued. “This is not just Learn by Doing, it’s ‘Do by Learning.’” ■

▲ Reinventing the Glass House led students to examine issues of privacy, circulation through the space and the comfort of its occupants.

WELCOME TO CATCHING UP With Alumni, a new section that will be a regular feature of this publication.

“We were thrilled that so many of our alumni submitted news for this inaugural edition,” said Architectural Engineering (ARCE) Department Head Al Estes. “We expect this will grow to become one of our most widely read and popular sections, and we urge all ARCE alumni to send us their news, whether it be a career or a personal milestone.”

All alumni listed earned B.S. degrees in architectural engineering unless otherwise noted.

1970s

Edward Knowles ('76) won the Mario J. Bertolini Leadership and Innovation Award in recognition of his outstanding character as a precast concrete professional. The award was announced during the 2021 PCI Convention in New Orleans. Knowles, a licensed professional engineer, is vice president of Walters & Wolf Precast in Fremont, California. After graduating, he worked for a structural engineering firm in San Francisco. In 1979, Knowles joined Lafayette Manufacturing Inc. as a design engineer and was promoted to chief engineer, operations manager and ultimately vice president. In 1994 Walters & Wolf acquired Lafayette Manufacturing. In the early 1980s, Knowles was involved in developing and promoting glass-fiber-reinforced concrete (GFRC) panels. He worked on the GFRC panel design technology and helped develop the steel-stud framed panel system. He was involved in the production of the first GFRC steel-stud framed panel in San Francisco. Knowles has made numerous contributions to the advancement of research, the PCI body of knowledge and plant certification.

Richard M. Stegner Jr. ('77) designs passenger railway locomotives for SNC-Lavalin, a Canadian-based engineering company. Stegner lives and works in Boise, Idaho. He is a licensed professional engineer in California, Idaho and Illinois.



CATCHING UP WITH

ALUMNI

1980s

Consuelo Crosby ('85), a licensed civil engineer, launched the “Life Lnx” podcast in July, available on Apple Podcasts, Spotify and Amazon Music. The podcast was a “definite Learn by Doing experience that has been exhilarating,” she wrote. “From being the only true female freshman to graduate ARCE in 1985 to being the first female engineer hired in a San Francisco firm of 40 men, I’ve experienced the challenges for women and BIPOC (Black, Indigenous, and other People of Color) to stay strong in their identity in the STEM (science, technology, engineering and mathematics)

▲ Consuelo Crosby has developed a podcast that encourages living as one’s true self and practicing equity, inclusion and diversity.

fields. Earning my master’s degree in communication management from USC gave me the expertise to develop the podcast and encourage others to live their true selves and broaden the reach of equity, inclusion and diversity in every industry, with confidence and living life large. Forever #CalPolyProud and grateful for the challenges and lessons that got me here!”

► **ARCE Professor Emeritus Abe Lynn** is a licensed professional engineer at Degenkolb.

Abe Lynn ('86), a licensed professional engineer and Cal Poly professor emeritus of architectural engineering, is now an associate at Degenkolb Engineers. "After graduation, I worked for four years in construction management before returning to grad school and earning my master's and doctorate degrees from UC Berkeley in civil engineering," he said. "I then taught in the ARCE program for 18 years, before transitioning back to the private sector."

Philip Teyssier ('86; M.S., '87) is president of Atomic Investments Inc. He is a licensed civil engineer, contractor and commercial pilot. He worked in San Luis Obispo for Fred Schott from 1987-89, then in October 1989, started at Bentley Engineering in San Francisco. "I've worked on some interesting projects, such as Opus One Winery, and assignments at Lockheed and NASA at Ames Research Center in Mountain View, California," he said. "I had my own firm with my brother, Ralph, a structural engineer in San Francisco. I moved to San Diego and have been working in commercial property management since 1994."

Randall A. Howard ('87) works for J.S. Held. He worked as a structural design engineer in San Francisco and Seattle for six years, then transitioned into forensics. "Most of my career has been in the southeast U.S., Texas to Virginia," he said. "I have worked on numerous large and small forensic assignments, including an air-supported fabric roof over a stadium, sinkholes, building collapses, fire losses, termite damage and wood rot, construction defect matters and water-intrusion issues. My increased practice has led to interaction with attorneys via deposition and trial testimony as well as assisting them with appraisals, mediations and arbitrations. I hope to retire in a year or two and go fishing with my granddaughter!"

Lori L. Williamson ('87) is a civil engineer with the city of Monterey, California. She has been working in engineering, design, construction management, public works



◀ **Photo 2:** Lori L. Williamson works as a civil engineer for the city of Monterey.

◀ **Photo 3:** Dirk Bondy, with his wife, Kristen, is president/owner of Seneca Structural Engineering Inc.

◀ **Photo 4:** John W. Kamb works for the U.S. Forest Service as a ropeway engineer, inspecting ski lifts and ziplines.

◀ **Photo 5:** Pantaleon D. Rivera III is a senior construction manager at MNS Engineers.

and building code enforcement since she graduated. She worked 20 years for the city of Shafter and has been with Monterey for eight years. "For the past two years, I have been the chief building official for Monterey," she said. "I married ARCE classmate Peter Chavez ('86) 28 years ago. He is self-employed, running a local residential engineering business. We have two daughters; one recently graduated from high school, the other will be a senior in high school in the fall."

Dirk Bondy ('88) is president/owner of Seneca Structural Engineering Inc. in Laguna Hills, California, specializing in post-tensioned concrete design.

John W. Kamb ('89) has worked almost 20 years for the U.S. Forest Service as a civil-structural engineer in Vermont and New Hampshire. He moved to Colorado in 2019 to take a new position as a ropeway engineer inspecting ski lifts and ziplines with a team of four other engineers on forest lands across the U.S. "I'm also involved in American National Standards Institute and American Society for Testing and Materials standards writing related to ropeways," he wrote, "and I represent the Forest Service on the Colorado Passenger Tramway Safety Board. The Forest Service is a challenging and rewarding place to be an engineer, and I love it!"

1990s

Pantaleon "Torch" D. Rivera III ('93), a licensed civil engineer, is senior construction manager at MNS Engineers. He retired from the U.S. Navy in 2004 and from Caltrans in 2021. "I'm finishing my career at MNS Engineers Inc.," he said. "Life is good!"

CONTINUED ►



◀ CONTINUED FROM PAGE 21

Heather Wethington ('95) wrote, "After more than 20 years of working for others, I launched Wethington Engineering Inc. Our home base is in Paso Robles, California, and we are happy to serve clients throughout the Central Coast. Our focus is on providing structural engineering services for the residential sector."

2000s

Elizabeth Kenyon ('07; M.S., '09) is a project engineer with BL Harbert International LLC, currently working in Bangkok, Thailand. She has experience working with public and private sector clients in the United States (California, Florida and New York), the Caribbean (Haiti, Trinidad and Tobago, and Colombia), and Asia (Thailand, Myanmar and China). She implements solutions for disaster relief projects, capacity building projects and construction projects, as well as private sector business development, media development and business operations.

Anna Lang ('01) is a research analyst at Miyamoto International. "I was a consulting engineer for about two years after getting my bachelor's degree," she wrote. "I got involved in international work, studying post-earthquake response in Haiti, India and Mexico. I also got interested in larger-scale disaster prediction, modeling and response. I earned my doctorate from UC San Diego in 2014 so that I could make a broader impact. I completed a postdoctorate in remote sensing to aid our catastrophe models. Now I'm working with Miyamoto International; half my time is spent on disaster preparedness in developing countries and half on research in applying advances in technologies to aid disaster prediction — machine learning to identify soft story structures! Cool stuff!"

Steve Patton ('04) is a senior associate in the San Carlos, California, offices of ZFA Structural Engineers. He is a licensed professional engineer and structural engineer. "The Cal Poly ARCE program set me up for a successful career in structural

▲ **Structural and licensed professional engineer Steve Patton (left) is a senior associate at ZFA Structural Engineers in San Carlos, California.**

engineering," he said. "By teaching academic topics and reinforcing lessons with hands-on lab projects, the department prepared me extremely well for success in my graduate studies. The ARCE Department also gave me a full 'toolbox' of engineering knowledge that made me ready to be a productive part of my company my first day on the job by not only focusing on the purely academic side of engineering but also by teaching a healthy dose of applicable everyday engineering principals and how they apply in practice. Thanks to all my fantastic professors who opened their office doors in the 'hallway.' Most importantly, if it wasn't for Cal Poly, I never would have met my beautiful wife, also an ARCE alumna!

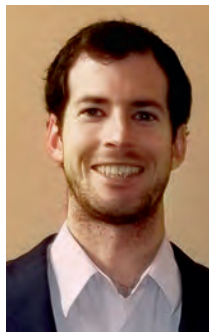
Colby Larson ('08) is a captain in the U.S. Army Corps of Engineers, serving as an engineer company commander in Iraq supporting operations against

ISIS. He earned his fundamentals of engineering and project management professional license. Larson has four combat deployments as a U.S. Army engineer officer — three to Afghanistan and one to Iraq. “Each deployment has been unique and challenging,” he wrote. “My ARCE background has been a critical factor in my success. Not just the hard science of our profession but the way the curriculum emphasized the ‘whole engineer’ concept with design-build. I’ve helped design-build joint operations centers, forward operating bases and combat outposts; I’ve conducted bridge assessments and blast and impact analysis for vehicle-borne improvised explosive devices and other enemy threats to critical infrastructure. The skills, knowledge and instructional methods I received from the program have set me beyond my engineer peers in the Army.”

2010s

Loren Galarza ('10) works as a mechanical design engineer for Lansmont Corp., designing mechanical shock and vibration equipment. He writes: “When I graduated, I couldn’t land an opportunity doing structural engineering design — or anything related — due to the recession. However, a local mechanical engineering outfit was in need of a CAD drafter, specifically using AutoCAD. At Cal Poly, I had learned how to use AutoCAD and was quite proficient with it, so the company took a flier on me, knowing that I was trying to find gainful employment doing structural design. I was only going to be here three months, which has turned into eight years! The ARCE program is great at instilling a design-based ideology, which is very helpful since I am still very much designing with steel, aluminum and other nonstandard materials. The Learn by Doing attitude has served me greatly and is something I’ll keep doing for the entirety of my career.”

Jeff Thompson ('10), a licensed professional engineer, began a new position in project management for design and construction projects with the National Park Service at its Denver Service Center office. Projects include a seismic



- ◀ **Left:** Jeffrey Hine is a licensed professional engineer at IMEG in San Francisco.
- ◀ **Right:** Chris Martinez is a small, unmanned aircraft systems pilot at Wiss, Janney, Elstner Associates.

Associates in El Segundo, California. She credits the ARCE program for providing her with an excellent basic structural engineering-specific education, a vast network of fellow graduates who are everywhere in the industry and an opportunity to come back and teach. “It’s been one of the highlights of my life,” she said. “ARCE at Cal Poly really is the best program out there. It teaches you how to learn and how to ‘crank!’”

Jeffrey Hine ('14) is a licensed professional engineer at IMEG in San Francisco.

Tyler Pizarro ('17) writes: “Cal Poly equipped me with the practical knowledge I needed to jump right into the industry. The program is unparalleled due to extremely knowledgeable and experienced faculty.”

Chris Martinez ('17; M.S., '18) is a small, unmanned aircraft systems pilot working for Wiss, Janney, Elstner Associates Inc. “I have been with WJE since I graduated and have since been promoted,” he wrote. “I have had the fortunate opportunity to hang off many buildings — using both rope and swing stages — and to fly drones to get varying perspectives of houses, coasts and even a Buddhist temple. I plan to get my professional engineer and architect’s licenses within the next five years. I have been able to work on two national parks’ projects — on Alcatraz and a hotel in Yosemite — and on some historic landmarks throughout the Bay Area. Ironically, my first hike in a national park will be at Zion rather than Yosemite.”

Editor’s Note: These items have been edited for brevity and clarity. Please limit future items to 100 words and do not use acronyms or abbreviations. High-resolution photos (300 pixels per inch) are welcome. Please include caption information, including IDs. ■



Jeff Thompson and Ewa Bugdol married in spring 2021 in Colorado.

rehabilitation of the Visitor Center at Crater Lake National Park, wharf repair at Alcatraz Island, and two housing projects in Alaska. Thompson was married this spring to Ewa Bugdol in a small ceremony in Colorado. They planned to hold a religious ceremony in Poland in summer 2021.

Courtney McKee (nee Nicholas) ('12), a licensed professional engineer, is working as a project engineer at John Labib &



CLASS OF '65 Reunion Fun

FIFTEEN GRADUATES FROM the Architectural Engineering (ARCE) Class of '65 gathered over a weekend in July 2021 for a three-day reunion.

Organized by alumnus Dave Cartnal, the multi-day event included a reception and dinner at the San Luis Obispo Country Club on Friday, a reception and dinner at alumnus Nick Watry's house in San Luis Obispo on Saturday and a farewell brunch at the Madonna Inn on Sunday.

With spouses, widows of two classmates and former Dean of the College of Architecture and Environmental Design Paul Neel — mentor and advisor to the class — a maximum capacity of 32 people attended the party.

The Class of '65 has been particularly supportive of the John Edmisten Global Scholarship Fund (*see story, Page 27*). The scholarship honors emeritus faculty member Edmisten, a member of the Class of '65, who had attended many reunions.

"The Class of '65 is special," said ARCE Department Head Al Estes, who joined the group at Watry's house. "I have had the honor of attending four of their reunions — three more than any other class. I use their 50th year reunion as tangible proof for today's incoming students that they will develop friendships in this program that will last over half a century.

"The alumni and guests were such fun to be with," Estes continued. "I invite all ARCE classes to follow their lead." ■



◀ **Top:** Sharing a laugh (from left): Sue Foley, Patti Paschall, Carl and Pamela Schubert.

◀ Gloria and Brian Cameron arrive with refreshments for the special occasion.

▼ **Attendees** (from left): Rich Gutschow, Gil Labrie, Brian Cameron, Bob Crosby, Vic Khachooni, Jim Sanders (behind Khachooni), David Cartnal, Department Head Allen Estes (seated), Ralph Bradshaw, Nick Watry (in back), Carl Schubert (seated), Steve Paschall, Neil Rains, Bruce Beckett and Dick Foley.





FACULTY NEWS

National Recognition

Anahid Behrouzi wins two major awards; earns tenure, promotion

ARCHITECTURAL ENGINEERING (ARCE) faculty member Anahid Behrouzi, a relative newcomer to Cal Poly, was honored with two major national industry awards in 2021: The American Concrete Institute's (ACI) Walter P. Moore Jr. Faculty Achievement Award and the Earthquake Engineering Research Institute's (EERI) Younger Member Award. In addition, Cal Poly has awarded her early tenure and promotion.

The ACI Walter P. Moore Award recognizes new faculty members for excellence and innovation in teaching concrete design, materials or construction. Eligible professors must have taught undergraduate-level concrete-related courses while also demonstrating technical competence, high character and integrity, and other evidence of merit.

The EERI Younger Member Award honors early-career members who have made outstanding contributions to the institute and the pursuit of its objectives



▲ Anahid Behrouzi was recognized for excellence and innovation in teaching concrete-related courses.

in the early stages of their career — especially contributions

that have improved opportunities for and increased the impact of younger members in the EERI.

"I have been involved with EERI and ACI since nearly the beginning of graduate school, where I have been fortunate to build friendships with so many mentors who have guided me in technical and education arenas," Behrouzi said. "I am honored that the board of directors of these entities feel that I have made a positive impact in earthquake engineering and the concrete industry."

In recognition of Behrouzi's exceptional university service, dedication and work ethic, Cal Poly has awarded her early tenure and promotion to the rank of associate professor beginning fall quarter 2021. Early promotion is extremely rare and is reserved for only the highest performing faculty members.

"Cal Poly has had a significant role in what I have been able to accomplish as an educator and researcher," she said. "Department Head Al Estes, the faculty and staff have always been at my side, helping me chase new dreams. Our alumni and supporters are the most passionate cheerleaders, who co-advise projects and help drive new ventures. There are so many people to thank."

Estes added, "This is a terrific honor for Anahid. She has excelled in teaching, scholarship and service, while receiving national-level recognition. We are all very proud of her, and she is totally deserving of these accolades." ■



Paying Tribute

Remembering alumnus and Professor Emeritus John Edmisten

The 2020 edition of ARCE, the Architectural Engineering Department's annual publication, included an obituary and a "call for remembrances" for alumnus and Professor Emeritus John Edmisten (Architectural Engineering, '65), who passed away Aug. 26, 2020, at the age of 86. Edmisten had taught in the department from 1968-94, including a stint as department head in 1993. These are excerpts taken from some alumni's favorite memories of him.

Micheal Krakower (Architectural Engineering, '75) wrote: John used to end many lectures saying: 'If there are further questions, you can find me lurking in the stacks (of the library).' When students were worried about taking the eight-hour Engineer in Training exam, John said: 'You will attend, and you will enjoy it or else.' When a difficult test was coming up, he would often say: 'Attach a \$20 to the back of your responses, and it will be given due consideration.' Years later, when I mentioned to him that my structural engineering practice had been selected to do the seismic retrofitting at SLO'S Mission, John's advice was: 'Don't screw it up.'

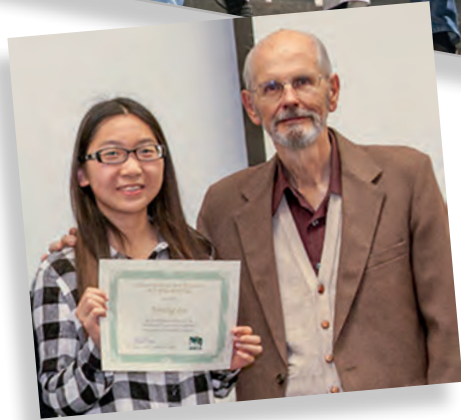
Bob Renard (Architectural Engineering, '75) wrote: John Edmisten, Jake Feldman and Satwant Rihal are in a three-way tie as my favorite and most influential Cal Poly instructors — back when calculators were new.

▲ **Left:** John Edmisten (left) with Department Head Al Estes and Vic Khachooni (ARCE '65).

▲ **Right:** Yvonne and John Edmisten.

Arthur Chan (Architectural Engineering, '87) wrote: John was my favorite professor. We had a comfort in communicating with each other; I never felt hesitant to ask him to clarify a point. I enjoyed his communication style — measured and patient — never brusque or loud. His eyes lit up as he recalled that in his younger days, he would put on his zoot suit before a night out. I imagine that you are young again, John, and wearing your zoot suit as you dance with your beloved Yvonne.

Lane Bader (Architectural Engineering, '87) wrote: I remember him giving us a take-home mid-term exam in our Timber Design class, and he had us sign a statement about completing the exam on our own without consulting other students. I think he was trying to



JOHN EDMISTEN GLOBAL TRAVEL SCHOLARSHIP ESTABLISHED

To honor his distinguished career, the Architectural Engineering (ARCE) Department has embarked on a campaign to raise a minimum of \$50,000 this year in support of the John Edmisten Global Travel Scholarship.

"I was touched by the outpouring of tributes to John when he passed away last August," said ARCE Department Head Al Estes. "He had a profound effect on the students he taught for over a quarter century. This scholarship is intended to celebrate his contributions."

The scholarship is also aimed at addressing another challenge: to provide the funds to allow students who lack the financial means to participate in global educational experiences.

"ARCE students have increasingly participated in exchange programs, humanitarian trips and our successful Lithuania summer program," Estes said. "The endowed John Edmisten Global Travel Scholarship will enable students who lack financial resources to participate year after year in these life-changing opportunities. The scholarship is a start toward making these programs more equitable and inclusive."

Those who would like to donate should make their check payable to the Cal Poly Foundation and designate it for the John Edmisten Global Travel Scholarship. Mail checks to the Architectural Engineering Department, Cal Poly, 1 Grand Avenue, San Luis Obispo, CA 93405-9701, or donate securely



online at <https://bit.ly/edmisten-scholarship> or by scanning this QR code. For more information, please contact arce@calpoly.edu.

impress upon us the integrity of being an engineer. Our profession is devoted to doing the right thing — not taking shortcuts. John was trying to instill that in us, even as students.

Edward Ong (Architectural Engineering, '75) wrote: John was more than a professor; he was a mentor and friend. I learned so much from him. With John's guidance and encouragement, I earned a master's degree from UC Berkeley. With his recommendation, I secured a teaching assistant position there. It was a privilege and an honor to know John and his wife.

Paul A. Farmer (Architectural Engineering, '78) wrote: John was an exceptional human being. My strongest memories are of creating our senior project in the shop and in Poly Canyon. Whenever I see pictures of the project and the changes, it makes me smile from ear to ear.

▲ **Top left:** John Edmisten (front row, center) attends a previous Class of 1965 reunion.

▲ **Bottom left:** Edmisten awards a scholarship to ARCE major Jiaming Liu in 2016.

▲ **Center:** Edmisten's students show their appreciation with a "Super Hero" card.

▲ **Right:** Alumnus Edward Ong (second from left) with faculty (from left) Satwant Rihal, John Edmisten and Jake Feldman.

Richard C. Holden (Architecture, '72) wrote: As the fall 1969 quarter started, we were excited to finally get our own lab. We were called to the Engineering West Patio, where Dean George Hasslein informed us that our third-year design lab would be the back of the Gallery. We received \$50 and a roll of duct tape to tape the Gallery dividing wall shut and construct our space. The lab had a graduation rate of almost 100% and a similar licensing rate. I hope John realized how important he was to us, not only as our instructor, but also as a friend. ■

Fond Farewells

Professor Brady, Associate Professor Nelson retire with emeritus status

PAMALEE BRADY

Architectural Engineering (ARCE) alumna ('79) and Professor Emeritus Pamalee Brady retired from full-time teaching at the end of summer 2020, capping a 22-year-career at Cal Poly.

After graduating from Cal Poly, Brady earned an M.S. degree in civil engineering from UC Berkeley in 1980 and later earned a doctorate in civil engineering from the University of Illinois, Urbana-Champaign, in 2004.

She has taught across the spectrum of the ARCE curriculum, including the structural systems courses, materials courses, an advanced structural elective in reinforced concrete, and a graduate writing and research class associated with the ARCE graduate program.

Department Head Al Estes said he was particularly “sorry to see our longest-standing faculty member retire. Pamalee was the conscience of the department, always looking out for those in need. She has a heart of gold.”

Brady believed in K-12 outreach and demonstrated that through her sandcastle program and her sustained participation in the Engineering Possibilities in College (EPIC) program, Estes said. “She also accompanied students to Lithuania for the ARCE summer program and joined the Structural Engineering Students for Humanity on a trip to Nepal.”

“The students are the most enjoyable aspect of teaching; their interest and curiosity and dedication are very motivating,” Brady said. “This has been a wonderful profession for me. It’s been rewarding, and it pushed me to grow in many ways. I have learned much about teaching from the students, and I am so happy for the many wonderful graduates we have and how they are making an impact on the world.”

Brady plans to return to teach part time, engage in artistic pursuits and travel.



Professor Pamalee Brady

“I have learned much about teaching from the students, and I am so happy for the many wonderful graduates we have and how they are making an impact on the world.”

Professor Pamalee Brady



“Jill was instrumental in starting our upper-division interdisciplinary design studios. We all talk about interdisciplinary opportunities, but Jill helped translate them into reality.”

Department Head Al Estes

JILL NELSON

After a dozen years of dedicated service to Cal Poly’s ARCE Department, Associate Professor Emeritus Jill Nelson retired in 2020 and looks forward to traveling, reading and “doing as little as possible.”

Nelson earned her B.S. degree from the University of Nevada at Reno and her M.S. degree from the University of Washington. She arrived at Cal Poly after more than two decades of working in the structural design industry and started her new career having never taught before.

“As a practitioner, I taught a variety of design courses in basic steel, timber and masonry,” Nelson said. “I also taught the Steel Design Lab and the Timber Design Lab, as well as versions of the Interdisciplinary Design Studios with professors from the Construction Management, Architecture and Landscape Architecture departments.”

Estes added, “Jill was instrumental in starting our upper-division interdisciplinary design studios. We all talk about interdisciplinary opportunities, but Jill helped translate them into reality. She’s a licensed professional engineer and structural engineer in Washington and California; however, I think she was even more proud of her LEED certification, which she brought into the classroom at every opportunity.”

Nelson was a champion of sustainability and resiliency and received three California Vital Infrastructure Grants totaling over \$434,000 to consider the 24,000 state-owned buildings that are vulnerable to earthquakes.

“Jill developed a systematic approach to prioritize infrastructure based on critical function, vulnerability and continuity of operations,” Estes said. “We will miss her frank interactions, her passion for teaching and her doodling during faculty meetings.” ■



Past, Present and Future

ARCE Advisory Board proves virtually productive in 2020-21, but looks forward to resuming its traditional in-person meetings

THIS YEAR THE Architectural Engineering (ARCE) Department Advisory Board met virtually via Zoom in the fall and spring, but that didn't halt progress on a number of significant issues, including supporting the Student-in-Need Fund.

"One of the biggest casualties of the pandemic was the on-campus advisory board meetings," said ARCE Department Head Al Estes. "Still, the board addressed multiple substantial topics, such as the 2021 accreditation visit, incorporating the lessons learned from virtual learning, how the pandemic is changing the design industry, the ARCE Diversity-Equity-Inclusion Action Plan, good ideas from peer institutions, and building the ARCE faculty of the future. Most importantly, the advisory board embraced the ARCE Student-in-Need Fund, and through generous board member donations, increased the fund from \$2,000 to \$22,000.

"My thanks to Margaux Burkholder, who has completed her appointment as

▲ **Left:** ARCE Advisory Board members and ARCE faculty enjoy pre-pandemic chats. From left: Professor Michael Deigert, board members Randy Collins and Professor Emeritus Abe Lynn, and Professor Peter Laursen.

▲ **Right:** ARCE major Jerry Luong (left) discusses his pre-pandemic lab testing work with advisory board members Steve Pelham (center) and Ron LaPlante.

chair and will now serve as past-chair," Estes continued. "Best wishes to Damon Ho, who will serve as chair beginning with the fall 2021 meeting. I miss the Thursday night dinners and the all-day Friday meetings and look forward to resuming them in the fall. We made the most of our virtual meetings and kept the board engaged in supporting the department. I am grateful to them all."

Advisory board members — Ron La Plante from the Division of State Architects; Steve Patton, ZFA Design Group; Elisa Suarez, Rivian; and Marc Guberman, Foster + Partners — are rotating off as they complete their three-

year terms. Evan Reis has agreed to serve a second three-year term to facilitate a closer connection between the ARCE Department and the U.S. Resiliency Council, which Reis founded.

In addition, the department extends a hearty welcome to the members who started their terms in spring: Peter Sokoloff, Foster + Partners; Mehran Pourzanjani, Saiful Bouquet Structural Engineers; Janiele Maffei, California Earthquake Authority; and Amber Freund, RISA.

Board members in the middle of their terms include: Margaux Burkholder, Walter P. Moore; Steve Pelham, Barrish-Pelham (now Degenkolb); Matt Melcher, Lionakis; Randy Collins, FTF Engineering; Liz Mahlow, Nous Engineering; Abe Lynn, Degenkolb; David Cocke, Structural Focus; Damon Ho, Simpson Strong-Tie; Lori Ann Stevens, Turner Construction; and Sharon Gookin, Fluor Corp.

"We are grateful to all our board members for their service, advice and wisdom," Estes said. ■

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CSI President and Founder Ashraf Habibullah

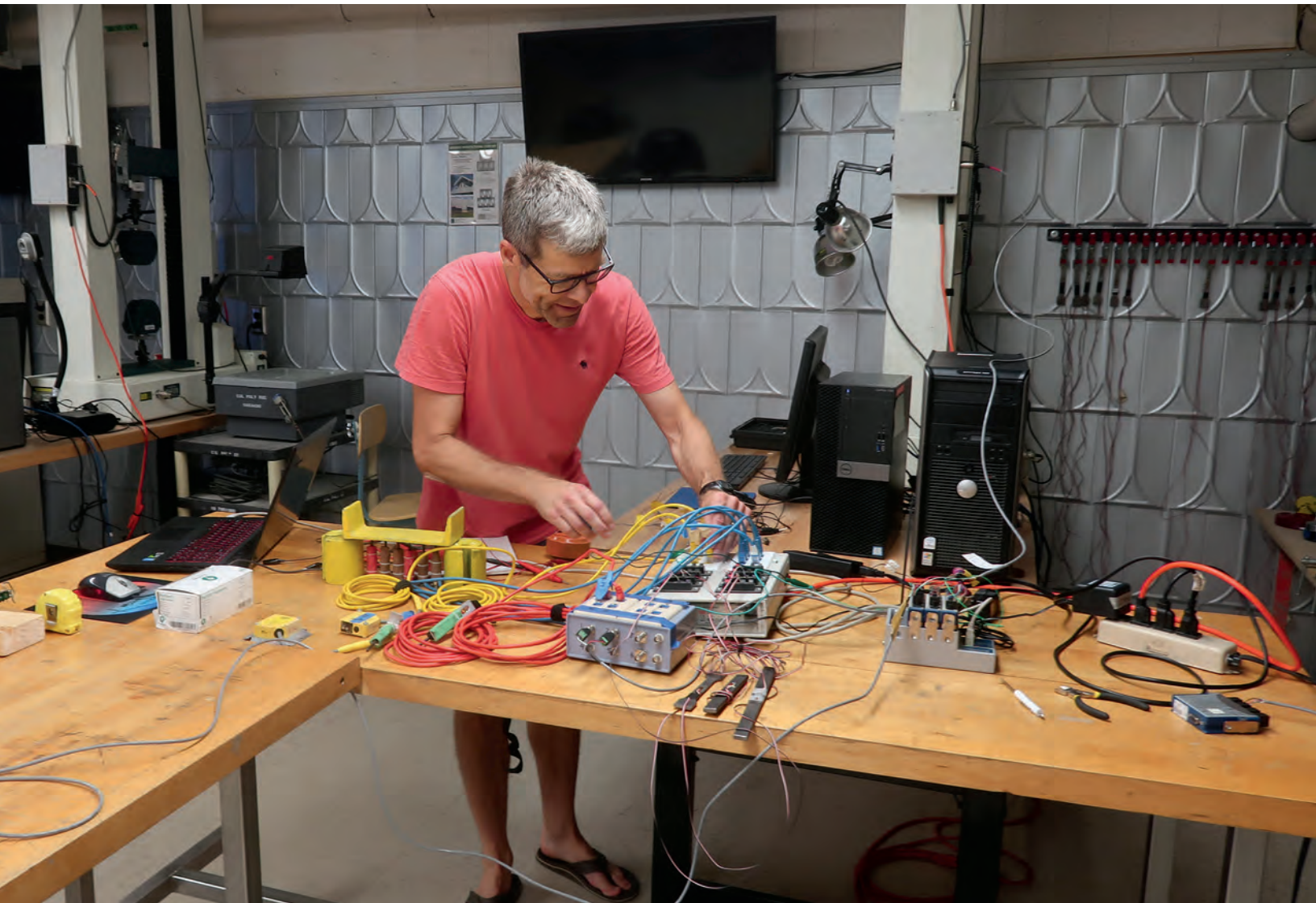
GRANTS AND DONATIONS SPUR ARCE PROJECTS TO NEW HEIGHTS

THE 2020-21 ACADEMIC YEAR — marred by a global pandemic — was made brighter for the faculty, staff and students in the Architectural Engineering (ARCE) Department, thanks to a number of grants and donations, including a transformational gift from Ashraf Habibullah, president and founder of Computers and Structures Inc. (CSI).

“Ashraf has come through for the ARCE program yet again,” said ARCE Department Head Al Estes. “In February, he signed a three-year, \$300,000 gift agreement with the College of Architecture and Environmental Design to support faculty and student scholars to become structural resilience leaders through research, co-curricular activities, off-campus experiences, professional development, publications, curriculum development and more.”

In proposing the gift, which will be made in \$50,000 increments twice yearly, Christine Theodoropoulos, dean of the College of Architecture and Environmental Design (CAED), said Habibullah's gift would “ensure our students, faculty and collaborators have the support they need to undertake innovative projects and

◀ Professor Michael Deigert (left) and senior Thomas Little install a reaction frame. The CSI Structural Resiliency Fund will support experiments and additional lab enhancements, such as new lab equipment.



engage with professional and global communities while making meaningful contributions in the field of structural engineering and beyond.”

Estes added: “Despite a pandemic when most others were shut down, the ARCE Department faculty and students submitted grant proposals and immediately started work on a variety of projects. Since we were already conducting in-person laboratory classes, receiving equipment for an NSF equipment grant and executing an array of senior and master’s degree projects, it followed naturally that we were able to move quickly and take immediate advantage of Ashraf’s gift.

“Ashraf has been incredibly supportive and generous to this department,” Estes continued. “He has funded students’ expenses while they travel the globe on humanitarian missions, sponsored a computer lab, spoken at Structural Forum and invited us to his incredible parties. He has an exciting vision for

▲ Professor Peter Laursen is writing software, installing load cells and improving data acquisition to enhance the capabilities of four Tinius Olsen testing machines.

the structural engineers of the future, and it is today’s Cal Poly ARCE graduates who will help implement it.”

In yet another grand show of support, CSI renewed its sponsorship of ARCE Department’s CSI Computer Lab.

“Ashraf was the first person to sponsor a lab in 2010 and has renewed that commitment another two times,” Estes said. “This third commitment is to sponsor the laboratory for another five years with a gift of \$10,000 per year during that time. The ARCE Department and I could not be more grateful as Ashraf continues to champion this program.” ■

PROJECTS MADE POSSIBLE BY CSI STRUCTURAL RESILIENCY LEADERS FUND

The following projects totaling \$90,000 are currently underway and are being supported by the CSI Structural Resiliency Leaders Fund. All projects involve active participation by students. “Such gifts have allowed the Architectural Engineering Department to continue to function and thrive in this unprecedented year of upheaval and uncertainty,” said Department Head Al Estes.

Ultra Low-Tech Construction of Ultra High-Tech Shells (\$14,000) — Ed Saliklis

Equilibrium Without Statics — A K-12 Approach (\$2,000) — Ed Saliklis

An Interdisciplinary Approach to Thin Shells (\$9,000) — Ed Saliklis and Clare Olsen (Architecture Department)

Integration of Two New Tinius Olsen Universal Testing Machines in the ARCE Curriculum (\$8,000) — Peter Laursen

New Data Acquisition System for Structural Testing (\$19,000) — Peter Laursen

Seismic Stiffness of Wood Shear Walls with Openings (\$8,000) — Michael Deigert

Tensegrity Project in Poly Canyon (\$4,000) — Kevin Dong

CAED High Bay Lab Reaction Frame for Structural Testing (\$10,000) — Michael Deigert

Retrofit of Pre-1980s Reinforced Concrete Structural Walls (\$7,500) — Anahid Behrouzi

Preserving the Legacy of Pioneering Female Engineer Eve Hinman Ph.D. (\$3,750) — Anahid Behrouzi

Earthquake Engineering Outreach via 2021 Virtual Cal Poly EPIC Summer Camp (\$1,000) — Anahid Behrouzi

EERI Seismic Design Competition Team (\$2,500) — Anahid Behrouzi

Diversity, Equity and Inclusion in Structural Engineering Curriculum (\$1,250) — Anahid Behrouzi



- ▲ With assistance from senior Thomas Little, Professor Michael Deigert inspects anchor bolt and rebar placement prior to placing concrete foundations.
- ▶ Senior Anders Johnson grinds steel in support of foundations for shear wall testing.





By Emory Montague, P.E., S.E. | Director of Engineering
Simpson Strong-Tie | ARCE 1998

WHILE SIMPSON STRONG-TIE is a familiar name around Cal Poly and in the construction industry, not everyone is aware of its 65-year heritage or its ongoing commitment to advancing the industry through innovative structural engineering solutions and partnerships with academia.

For decades, Simpson Strong-Tie has maintained an active relationship with Cal Poly's architectural engineering (ARCE) program, providing products for ARCE student research projects, sponsoring its design lab, and donating equipment to the High Bay research and testing lab. In 2010, the company helped fund the opening of the Simpson Strong-Tie® Materials Demonstration Lab to provide ARCE students with a hands-on learning environment to support Learn by Doing.

Since it created its first structural connector for wood applications in 1956, Simpson Strong-Tie has remained grounded in the Nine Principles of Business laid out by its founder, Barc Simpson. Those principles include relentless customer service, high-quality products and risk-taking innovation.

Following these principles, the company has continued to expand its product offerings and explore new markets within the building industry, putting its passion for problem-solving

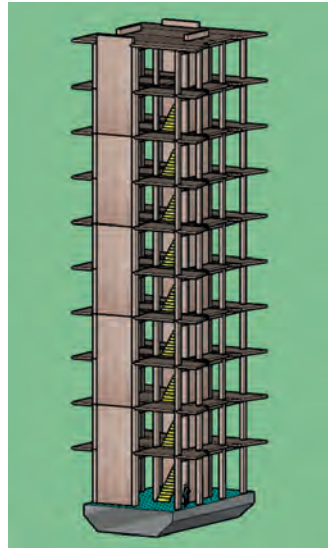


into a variety of construction types. Three examples are their advances in connections for structural steel, fiber-reinforced polymers (FRP) for strengthening concrete, and connectors and fasteners for mass timber.

A recent structural steel project for the Fremont Union High School District was erected using 29 moment frames and 58 Yield-Link® moment connections designed to absorb damage in a seismic event. This met the contractor's

▲ **Left:** Simpson Strong-Tie Territory Manager Tyrone Streeter installs joist hangers with students in pre-pandemic ARCE 106. From left: Aidan Hughes, Streeter, Sara Wong, Ryan Khieu and Tom Sesin.

▲ **Right:** The High Bay Lab features frame members donated by the company for test-specimen support.



specifications for an all-bolted solution requiring “little to no field welding.”

According to Simpson Strong-Tie Senior Engineer Brandon Winter (ARCE, '05), “This was our first Division of the State Architect school project utilizing Yield-Link for the complete lateral system.”

Cives Steel Co., the fabricator, called it “the fastest and easiest moment connection to go through our shop.”

Last year, Simpson Strong-Tie also completed full-scale tests of FRP applications to both wood piles and concrete columns. For the concrete application, they were consulted by the project designers, who needed to retrofit square concrete columns for a seven-story UC San Francisco building where one column face was inaccessible.

According to Field Engineer Alex Daddow (ARCE, '13), the Simpson Strong-Tie engineering team applied two layers of its FRP fabrics to the exposed sides of the column and FRP anchors on the fourth face. Multiple specimens were tested, using both glass and carbon fabrics, alongside control specimens. The FRP-strengthened columns all demonstrated “significant increase in shear capacity and ductility,” Daddow reported.

Another test Simpson Strong-Tie is participating in is the NHERI Tall Wood Project, an NSF-funded effort to validate a resiliency-based seismic design methodology for mass timber using Simpson Strong-Tie products in the tallest wood building

AN ALUMNI-RICH COMPANY

Cal Poly ARCE alumni employed by Simpson Strong-Tie include Brandon Chi ('98), Keith Cullum ('07), Alex Daddow ('13), Scott Fischer ('97), Damon Ho ('99), Rachel Holland ('05), Emory Montague ('98), Mary Nunneley ('09), Marlou Rodriguez ('98) and Brandon Winter ('05).

ever dynamically tested: a 10-story (112-foot) mass timber building on the UC San Diego shake table.

“It should accelerate code acceptance of high-rise mass timber in the U.S.,” said Simpson Strong-Tie Senior Research and Development Engineer Scott Fischer (ARCE '97).

Barc Simpson was a great believer in the value of education, and Simpson Strong-Tie support for ARCE and other research projects is a way of both giving back and looking forward. Many of the company's employees are ARCE alumni and are grateful for the professional education they received. One of them, Damon Ho (ARCE, '99), now serves on the program's ARCE Advisory Board. Other alumni regularly participate in an annual workshop for current ARCE students.

By nurturing the next generation of design professionals, Simpson Strong-Tie realizes it's developing future colleagues and industry partners, thereby advancing the company's mission to help people design and build safer, stronger structures. ■

▲ **Left:** The Simpson Strong-Tie® Materials Demonstration Lab at Cal Poly enhances ARCE students' hands-on learning environment.

▲ **Top center:** The Simpson Strong-Tie Yield-Link® moment connection — a bolted, replaceable moment frame solution for a building in the Fremont Union High School District.

▲ **Bottom center:** Simpson Strong-Tie is a design partner and material supplier for the NHERI Tall Wood Project, which will be tested in 2022.

▲ **Right:** Simpson Strong-Tie tests an FRP-strengthened concrete column at its Tyrell Gilb Research Laboratory in Stockton, California.

PREVIOUSLY PROFILED COMPANIES, IN ORDER OF MOST RECENT:

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Rockin' A Tradition

Stoked that COVID restrictions had loosened up, Architectural Engineering (ARCE) Department beachcomber and Professor Cole McDaniel led a dawn patrol into the surf on Morro Strand State Beach in early June 2021. The mission: to rock the annual student-faculty tradition of ripping waves together before commencement. The Neoprene-clad seniors and educators immersed themselves in a hang-loose vibe of buoyant camaraderie, their longboards carving and trimming the waves — and wiping out.

From left: Will Adam, Autumn Wagner, Quinn Porter, Department Kahuna Al Estes, Rob Garland, Ryan Thornton and Professor Cole McDaniel.