

InSights

A PUBLICATION OF THE COLLEGE OF ENGINEERING,
COMPUTER SCIENCE, & TECHNOLOGY

CALIFORNIA STATE UNIVERSITY, LOS ANGELES



EXPERIENTIAL LEARNING

THE FUTURE IS NOW

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The Power of Learning by Doing —
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DEAN'S PERSPECTIVE

Dear Friends,

Welcome to our latest issue of InSights. As I reflect on last year and the recent graduates of the ECST class of 2018, I'm struck by how important hands-on learning experiences are to the success of our students. Collectively, this past year, our students participated in 12 different competition teams, more than 50 capstone senior design team projects, and multiple internships. And that's just some of the opportunities they've taken advantage of.

Experiential learning has always been an important component of our curriculum. When ECST was smaller, faculty offered many hands-on learning opportunities with very few external resources. Today, however, we're a much larger institution, and creating these opportunities requires more intentionality. This issue of InSights highlights some of our efforts to build more opportunities for experiential learning into ECST curriculum as well as into extra-curricular programs, including:



Emily Allen, Ph.D.

- **Going Deep with the RoboSub Competition** (pg. 2), a shining example of one of our competition teams.
- **The Victoria “Vicki” Alegria Tracy Memorial Scholarship Fund**, created in honor of alumnus John Tracy's mother, is helping make many of these experiences possible, as told through the stories of two student winners (pg. 7).
- **The Future is Now: Experiential Learning at ECST** (pg. 10), highlights examples of how we're bringing more hands-on learning experiences to ECST, from our EcoCar competition team to our LAUNCHPAD summer program for high school women.
- Take a peek inside our plans for a modern, dedicated, state-of-the-art learning environment in **Making Space for Innovation** (pg. 17).

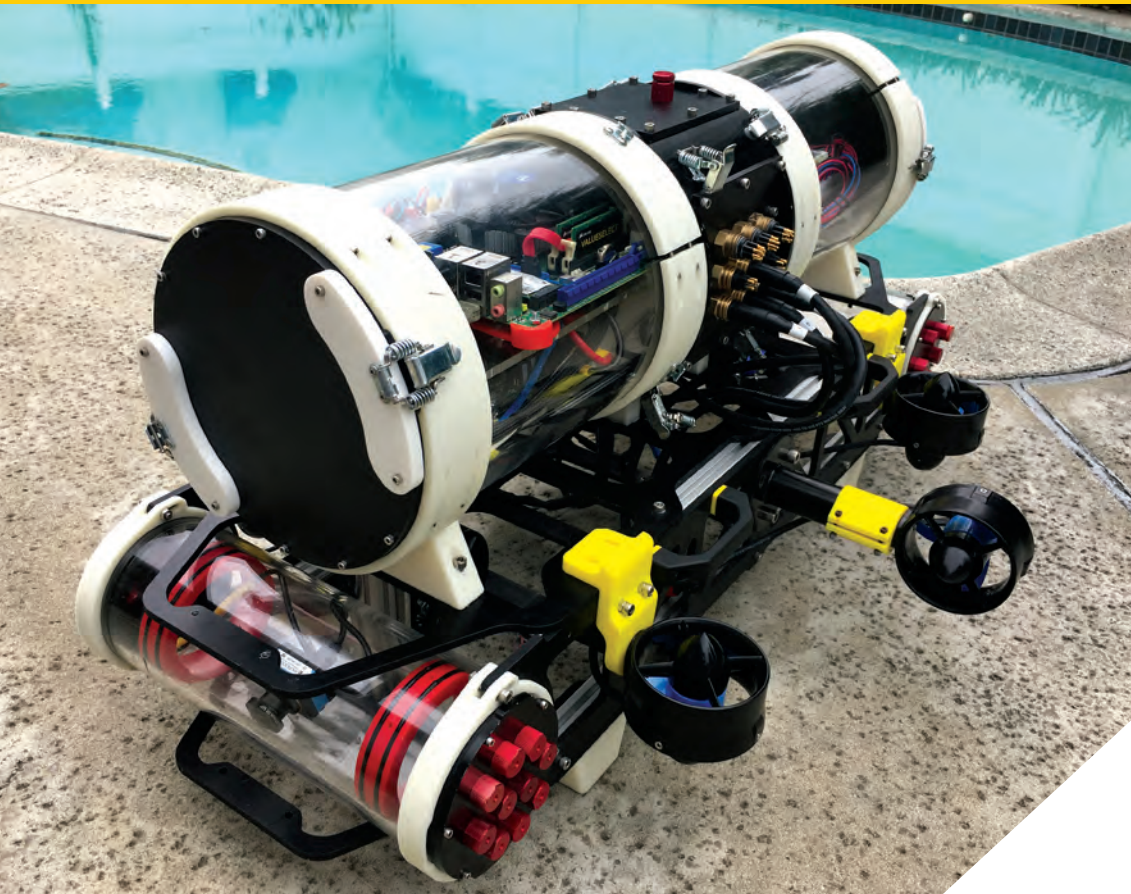
To give a nod to our feature story, the future is here—and I'm excited to say, it's active, interactive, and collaborative. Cal State LA recently launched its first Capital Campaign, “We are LA.” With the generous help of our friends and alumni, we can think bigger than ever before. What can we accomplish next?

A handwritten signature in black ink that reads "E. Allen".

Emily Allen, Ph.D.

Dean

College of Engineering, Computer Science, and Technology



THE POWER OF LEARNING BY DOING: **GOING DEEP WITH THE**

Behind the Engineering Building, after the swim team has wrapped up for the day and the cleaning crew has come and gone, a submarine makes its way into the Cal State LA swimming pool. It's there to test, to train, and to someday beat out the competition. Other schools may find this strange, but it's par-for-the-course at Cal State LA, thanks to the dedicated RoboSub team.

The U.S. Office of Naval Research (ONR) has provided Engineering, Computer Science, & Technology (ECST) with a \$580,954 three-year grant that is part of a larger strategy to help replenish the talent pipeline of STEM professionals at various Navy system command centers in California. The grant comes at a time when approximately 50 percent of the U.S. Navy's workforce is eligible for retirement.

The grant includes funding for several courses as well as for the RoboSub competition, which engages students during their junior



ABOUT THE ROBOSUB COMPETITION:

RoboSub is an international student team competition to design and build autonomous robotic submarines that must complete a series of difficult underwater tasks.

The underwater vehicle demonstrates its autonomy by navigating through an underwater course to touch buoys, navigate a channel, drop a marker, fire torpedoes, retrieve an object, and finally surface and release the object.

ECST's RoboSub's name:

EAGLE 1

ECST's RoboSub's nickname:

BETSY

Sponsor:

U.S. OFFICE OF NAVAL RESEARCH

Faculty Advisor:

**Assistant Professor HE SHEN,
Mechanical Engineering**



ROBOSUB COMPETITION

and senior year to apply a multi-faceted skillset—including computer science, mechanical engineering, and electrical engineering—to design and build an autonomous underwater vehicle (AUV) for an international competition against many other university teams, including schools such as USC, Cal Tech, and Cornell.

“It started with just me and five students in a room,” says Professor Mark Tufenkjian, Civil Engineering, and the Principal Investigator on the ONR grant. The first year, the team learned a lot from just observing the competition. “We talked to other teams, shared ideas, and collaborated with one another.”

Last year was the team's first year competing—and they **made it to the semi-finals on their first try!**

This year, the RoboSub competition is one of the capstone senior design projects. The team consists

of ten students in mechanical engineering, electrical engineering, and computer science, all working together to win the competition.

Led by Diego Santillan, who graduated May 2018, and is staying on for a Master's degree, the team works together to apply their know-how to the complex interdisciplinary problems that arise when building an AUV. The success of the team depends on everybody being highly resourceful and collaborative in how the group collectively confronts challenges and comes up with creative solutions.

“I transferred to Cal State LA, and I went straight to the engineering department on my first day and asked to join a project,” Santillan said. “I was told I needed to learn the basics first, and so I did. One year later, I came back—I was ready.” Santillan ultimately has his sights set on a career with the Navy, NASA, Tesla or SpaceX.

GOING DEEP WITH THE ROBOSUB COMPETITION

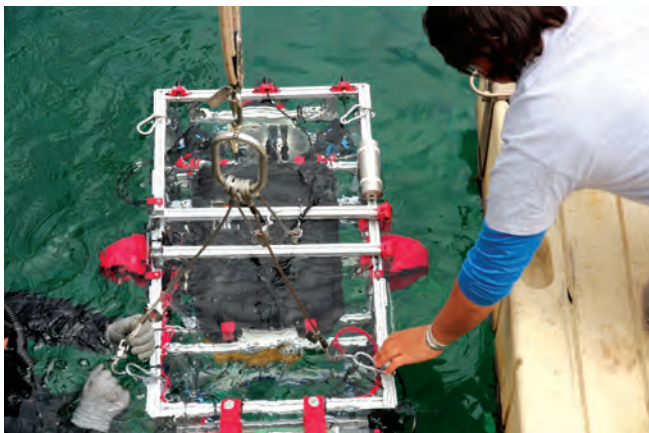
Continued from page 3

Learning by Doing

RoboSub faculty advisor, Assistant Professor He Shen, Mechanical Engineering, who has a background in robotics, explains his role in the competition, “I don’t teach—we work and learn together to find the solutions.” The whole purpose of the competition, according to Shen, is getting students to learn how to learn by solving practical challenges they’d never confront in the classroom.

The team meets several times a week to brainstorm their design, construct the AUV in the machine shop, and test it in the Cal State LA swimming pool. As part of Senior Design, students are getting more than just a few credits towards their degree. “They’re learning a tremendous amount that cannot be replaced with classroom learning,” Tufenkjian explains.

“It’s almost like an apprenticeship program.” He continues, “We want them to get involved early, so we don’t lose the core knowledge of the group every graduation.”



“Balancing all the coursework and extracurriculars may be difficult at times, but being on the RoboSub team is one of the most rewarding things I’ve done,”
Sidra Gibeault, EE, expected 2020.

It’s also about growth—growing skills, developing the team, and getting better. The students also get exposure to people and organizations they may not have otherwise. For example, Santillan recently spoke to an Antarctic scientific team to learn about how they use AUVs to monitor the rate at which glaciers are melting. “I’m getting exposure to so many great jobs and careers,” he explains.

Sidra Gibeault, an Electrical Engineering major scheduled to graduate in 2020, has been on the RoboSub team for one semester. “I think being involved in clubs and activities on campus makes you more desirable to companies post-graduation because you gain skills that are more specialized through hands-on experience.” Gibeault, who serves as the lead for onboarding new team members, also explains, “It also gives you experience working on teams, communicating your ideas, and collaborating with people outside your field.”

... And More Learning

While it takes a lot of time and preparation to get to competition week, the biggest learnings come out of the trials and tribulations of the competition itself.

“Students are troubleshooting around the clock—competition during the day and testing at night—to figure out why this is working and not that,” says Tufenkjian. The competition requires all of the disciplines to come together and figure out the solution. “It’s a fantastic, real-world learning experience—complete with stress and pressure to deliver.”

Santillan chimes in: “It’s also a lot of fun!” ●

ADJUNCT FACULTY SPOTLIGHT:

A PASSION FOR LEARNING DRIVES JOHN SHAMMA'S COMMITMENT TO STUDENT SUCCESS

Since 1999, John Shamma has been a vibrant part of the Cal State LA fabric. Honored with the university's Outstanding Lecturer award in 2015, Shamma has continued to be a leader in bringing project-based learning into the College of ECST. His Civil Engineering senior design project teams work alongside local agencies (such as LA Metro, LA County Department of Public Works, and HDR Engineering) to complete real-world infrastructure engineering project designs that have twice been awarded the National Council of Examiners for Engineering and Surveying Award.

"Truthfully, I learn just as much as my students every year," said Shamma. "Every project is different, so I love the challenge of figuring out how to coach the students through the problem-solving and real-world applications of their work."

Shamma was born and raised in Jerusalem, where he lived with his parents and three siblings. He began working for his uncle (an engineer) when he was 13 years old, fostering a life-long love of engineering. In 1982, Shamma moved to the United States and attended Pasadena City College.

In 1984, Shamma started attending Cal State LA as a student in Civil Engineering. At Cal State LA, he became involved with the American Society of Civil Engineers and became the Captain of the Concrete Canoe Team, eventually leading the team to a first-place win. Shamma also served on the Associated Students Inc. Board and the Student Union Board at Cal State LA. He remembers the times he spent as a civil engineering student at Cal State LA as being among the best of his young life.

In 1991, Shamma completed his second Master's in Environmental Engineering at the University of Southern California. It was during this period that Professor Kim first invited Shamma back to Cal State LA to lecture and eventually begin teaching undergraduate classes.

Now, decades later, he enjoys teaching and mentoring students more than ever.

"I'm continually inspired by the diversity of viewpoints among my students. Their passion for learning keeps me energized and engaged – and learning myself!"



MORE ABOUT PROFESSOR JOHN SHAMMA

Shamma's work experience spans three decades working for the Metropolitan Water District of Southern California (MWD). He is currently the Facility Planning Unit Manager overseeing Metropolitan's Facility Planning Team, Hydraulics Engineering Team, and Substructures Team.

Prior to his current responsibilities, he served as Project Engineer for the Inland Feeder Water Conveyance System's Arrowhead Tunnels Project from 1993–2005, a project instrumental in lessening the effects of the last drought on residents of Southern California.

A registered Professional Civil Engineer in California, and member of the Engineering Honor Society, Chi Epsilon, Shamma completed a course of study in Engineering Management at the California Institute of Technology's Industry Relations Center.

Shamma is an active member of the Los Angeles Section of the American Society of Civil Engineers where he organizes technical meetings and seminars. He has also published numerous technical papers in his area of expertise and made presentations at various industry conferences and conventions.

Teaching and mentoring students are Shamma's primary passion along with hiking, collecting coins and stamps, and playing and watching tennis, especially with his two children.

Shamma believes that students must practice applying the principles he teaches while they are in school before they enter the job market. "Experiential learning, like what we do in senior design, really prepares them for what employers will be expecting."

Over time, he has seen this approach help more and more of his students graduate and find success in the engineering field. In fact, he says the most rewarding part of his job is seeing past students serving the community through applying exciting, innovative engineering to the world around us. ■

ALUMNI SPOTLIGHT

THE IMPACT OF THE VICTORIA ALEGRIA TRACY MEMORIAL SCHOLARSHIP FUND

Victoria “Vicki” Alegria Tracy didn’t have the chance to go to college. But she knew her children could be successful if they had her support. This passion of hers was the inspiration behind the Victoria Alegria Tracy Memorial Scholarship Fund, created in her honor.

Over the last 15 years, the fund has granted scholarships to nearly 50 students—almost \$400,000 total.

Vicki was very proud that her son, John J. Tracy went to minority-serving institutions—and this scholarship fund helps others achieve their academic dreams within that same setting.

“I’m a very average person,” said John, who received his Master’s degree in Physics from Cal State LA in 1981. “I’m Hispanic and went to California state universities, and the only reason I became an executive at Boeing is because I worked hard to get there.”

John is the retired Chief Technology Officer and Senior Vice President of Engineering, Operations & Technology of The Boeing Company, where he worked until mid-2016. In this role, John worked directly for the CEO and led a team of 110,000 employees.

John credits his mother, Vicki, with much of his success. Vicki was raised in a working class Hispanic community where people worked hard to build a better life – and she wanted the



John J. Tracy, '81



Vicki pictured with two scholarship award winners

best for her children. From a very early age she would talk to them about the importance of education. John remembers his mother taking him on field trips to show him different careers and workplaces.

When John was maybe five years old, his mother took him to a Coca-Cola bottling plant. John remembers watching several workers whose sole job was to watch the bottles go by on the conveyer belt to make sure they were full. After watching this for a while, Vicki took him to a vault within the plant where they stored the secret formula for Coca-Cola. There, John met a chemist. He remembers his mother telling him that if he wanted a job like the chemist, he’d need to study very hard.

The Victoria Alegria Tracy Memorial Scholarship Fund helps Vicki’s legacy to live on. “My mother was happy as long as the scholarship went to a kid who needed it, and wanted to do well,” John explained.



John’s mom called him “mihijo” which means “my son” in Spanish.

ABOUT VICTORIA “VICKI” ALEGRIA TRACY

Vicki was born in Los Angeles in 1924 and raised in Boyle Heights, a working-class neighborhood. She grew up in a Spanish-speaking household with immigrant parents. From a very young age, she was known by others as a great persuader and connector of people. After graduating from high school, she worked as a bank teller where she met John Wesley Tracy. They married in 1948 and had two children – the youngest was John J. Tracy.

At age 50, after raising her two children, Vicki entered the workforce again as a property manager. For the next 35 years, she worked her way up to managing millions of dollars in real estate for investors. She finally retired at age 85. “She was smart and worked very hard,” John recalled.

Alexis Rios, Mechanical Engineering

2017 Victoria Alegria Tracy Memorial Scholarship Winner

Alexis Rios grew up in El Monte, CA and was the first in his family to go to college.

“It was a struggle—learning how to adapt, filling out college applications, applying for scholarships, and managing funds,” Rios explained. “I hope the journey for my little sister is smoother than it has been for me.”

Rios had many people in his life who encouraged him to go to college, including his parents. His mom is good at math but never had the opportunity to further her education, and his dad is very handy and taught him how to use tools. “I started getting interested in learning how things work from my dad,” Rios said.

Today, Rios is well-acclimated to college and is part of many clubs and activities, including the Society of Hispanic Professional Engineers (SHPE), American Society of Mechanical Engineers (ASME), and the Mad Scientist lab focused on renewable energy and helping people with disabilities.

Last summer Rios interned with the Federal Aviation Administration in Washington D.C. The 10-week summer

program was the first time Rios had lived outside of California.

Rios learned he won the scholarship when he was in D.C. “I opened up the email and it said Congratulations!” He continued, “I was in shock, ecstatic.”

“This scholarship pushed me to work harder every day. It feels good to know that someone out there believed in me and wanted to help,” Rios said.

When Rios graduates from college and starts his own career, he hopes he is able to give back to his community and help support other students who want to go to college. When asked what he wants to do after graduation, Rios said, “To be completely honest with you, I’m not quite sure yet...” Rios is still learning about what careers exist out in the world, but hopes to pursue a Master’s degree after graduation.



Adriany Cocom, Computer Science

2016 Victoria Alegria Tracy Memorial Scholarship Winner

Adriany Cocom’s path to Computer Science was influenced by her mom, who was diagnosed with rheumatoid arthritis while she was in high school.

“My mom had to stop working and couldn’t do a lot of things she used to do,” Cocom remembers. Cocom’s mom credits her tablet computer for her recovery, which she used to communicate with her family in Belize - it wasn’t as hard on her hands as books and the telephone. Cocom witnessed the impact the tablet had on her mom—and realized she wanted to help others through technology.

When it came time to choose a college, Cocom needed to keep costs in mind. She is the oldest of four children, all of whom are around the same age. After Cocom chose Cal State LA, her siblings followed suit. All four of the Cocom siblings are currently enrolled at Cal State LA—two at ECST in computer science, and two majoring in animation.

The scholarship helped Cocom take care of her bills so her parents could focus on supporting her siblings. Apart from helping her financially, the scholarship also helped Cocom feel like she had someone in her corner.



“I just really want to give my gratitude toward the people behind the scholarship.” She continues, “It may not seem like a lot, but it made a world of a difference to me—mentally, financially, and it encourages me to keep going.”

Cocom most recently interned at CBS in the IT department. She credits the scholarship for giving her the confidence to apply for the internship. At CBS, Cocom learned she didn’t want to work in corporate IT, but she looks at the experience as a success because it made her realize what she really wants to do: pursue a career in AI or big data after graduation.

Cocom’s mom is still her biggest fan. She’s doing better now and can’t wait for her graduation. “My mom always says, ‘It’s not a success until you graduate.’” ■

NEW FACULTY: FIRST IMPRESSIONS

We welcomed three new faculty members to ECST (Fall 2017)



DR. JOHN PETRIE, PHD

Civil Engineering

Area of expertise:

Water Resources Engineering, Environmental Hydraulics, and Sediment Transport

Previously: Faculty positions at Washington State University and Virginia Commonwealth University at Qatar; PhD in Civil and Environmental Engineering from Virginia Tech; BM in Jazz Performance from New England Conservatory



DR. JEFFREY SANTNER, PHD

Mechanical Engineering

Area of expertise:

Combustion, Thermodynamics, Fluid Mechanics, and Energy

Previously: Post-doc at Argonne National Labs; PhD in Mechanical and Aerospace Engineering from Princeton University, BS Engineering from Swarthmore College



DR. JOHN CHRISTOPHER BACHMAN, PHD

Mechanical Engineering

Area of expertise:

Electrochemistry, Batteries, Fuel Cells, Supercapacitors, and Education

Previously: PhD in Mechanical Engineering from MIT; BSME, MSME from UC Davis

Q: WHY DID YOU CHOOSE TO COME TO ECST?

A: "I am passionate about undergraduate engineering education. ECST is the perfect place for me to focus on preparing students to be confident and competent future engineers." – *Dr. John Petrie*

"I came to Cal State LA to focus on teaching, and to enjoy beautiful Southern California." – *Dr. Jeff Santner*

"As a teacher, I wanted to go to the place where I could have the largest impact on students. ECST has an amazing group of faculty, staff, and students looking to help each other learn." – *Dr. Chris Bachman*

Q: HOW WOULD YOU DESCRIBE THE ECST COMMUNITY TO SOMEONE UNFAMILIAR WITH THE COLLEGE?

A: "Home to many exciting research and educational opportunities with strong ties to the local communities." – *Dr. John Petrie*

"Close, friendly, hard-working, and motivated." – *Dr. Jeff Santner*

"Very diverse and has a lot of unique perspectives all working together to help each other learn." – *Dr. Chris Bachman*

Q: AS A NEW MEMBER OF THE FACULTY, WHAT ARE YOU HOPING TO BRING TO ECST?

A: "I hope to bring strong disciplinary knowledge in environmental fluid mechanics and provide a safe, inspiring environment for future water resources engineers to learn." – *Dr. John Petrie*

"Academically, I bring expertise in combustion – coursework, experiments, and simulations." – *Dr. Jeff Santner*

"I hope to bring a passion for motivating and helping our students learn the skills needed to be scientists and engineers. Make the college a fun and exciting place to work and learn." – *Dr. Chris Bachman*

Q: WHY DO YOU THINK IT'S IMPORTANT FOR STUDENTS TO SEEK OUT EXPERIENTIAL LEARNING OPPORTUNITIES AT ECST?

A: "Experiential learning can provide the skills for students to gain employment and begin successful careers." – *Dr. John Petrie*

"Experiential learning is important for students. Learning a topic from multiple points of view – mathematical, conceptual, and experiential – gives a deep, thorough understanding of a topic. Although it may take more time and effort to seek out experiential learning, it is necessary to completely understand and internalize a topic." – *Dr. Jeff Santner*

"Students should seek out experiential learning because it is the best way to prepare yourself for what you will do after college. It is also the most fun way to learn." – *Dr. Chris Bachman* ●

Faculty joining in 2018-19 will be featured in our next issue of *InSights* magazine.

MEET BLAKE CORTIS, ECST'S JACK-OF-ALL TRADES



ABOUT BLAKE CORTIS

POSITION: Staff Technician

As our fabrication guru, Cortis is at the heart of many of our senior design projects, competition teams, and faculty projects and research.

Cortis, a staff technician, is responsible for helping students and faculty build and fabricate their most complicated projects. He earned his Bachelor's degree in Industrial Technology from Cal State LA.

"We're not training machinists — we're focused on teaching the best engineers, designers, and managers, but to do that well, our students need to understand what it takes."

Cortis also teaches "Introduction to Metal Working," which teaches basic machine tool use. ●




"Blake has taught me how to use many of the machines in the labs, including the vertical mill, the lathe, bandsaw, and hydrogen station. He's always encouraging, offers advice, and is willing to lend a helping hand."

— Sergio Conteras, Industrial Technology, '18

(Above) Pictured from left to right: Sergio Conteras, Clarissa Hidalgo, Rebecca Li, Blake Cortis





*“For the things we have to learn before we can do them, **we learn by doing them.**”*

— Aristotle

The future is **EXPERIENTIAL LEARNING** **NOW**

“Students choose majors in engineering, computer science, or technology because they want to make the world a better place. And they want to make it better themselves, with their own hands. Theory is never enough for engineers – we want to put it to the test. The more we can enhance student classroom learning with real-world, hands-on design and build experiences, the more our graduates will be able to contribute to building a better world.”

— Dean Emily Allen

Taking a walk around Cal State LA, it’s easy to see how invested our students are in their learning. They’re in the library devouring textbooks, in the University Student Union taking notes, and sitting outside Starbucks quizzing each other before exams. But more and more, our traditional beliefs about learning are evolving.

At ECST, learning is no longer confined to the classroom or to the library. Instead, it’s students gathering around the Cal State LA swimming pool to watch their deep-sea robot take an experimental dip, an off-road vehicle whizzing around a closed parking lot, or a 100% eco-friendly car, high on jack stands, with a group of students troubleshooting beneath it.

This shift to more experiential learning is critical to our students’ success – both in the classroom, and after graduation. For this reason, we are committed to pushing the boundaries of experiential learning in every

*"I hear, I know. I see, I remember.
I do, I understand."*

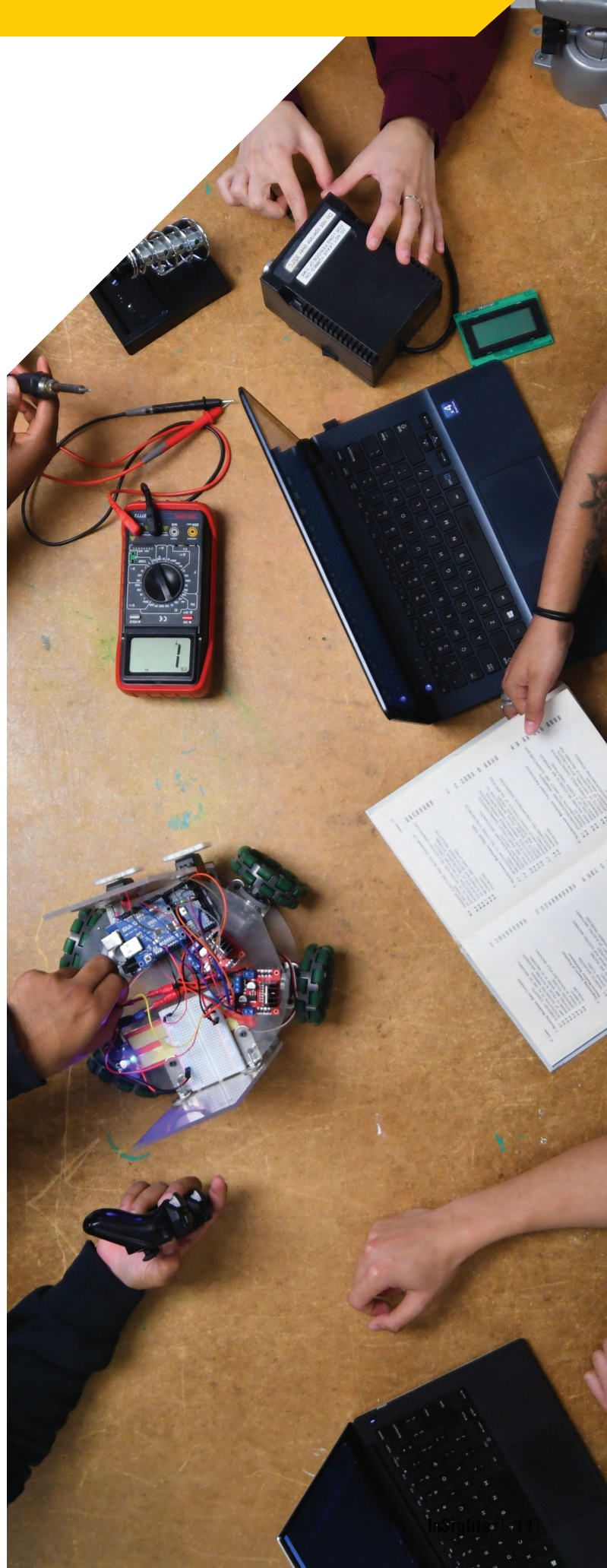
— Confucius

AT ECST

pocket of education. From robotic competitions to developing spaces for student experimentation and innovation, we're rapidly growing and evolving beyond the classroom.

On the race track or in the water: Learning is going beyond the lab

Lab work is a critical part of ECST learning. However, today's students are also encouraged to venture beyond the lab and gain hands-on learning experiences elsewhere – through internships, competitions, research with faculty, and service or community-based projects. These experiences allow students to investigate and respond to real-world challenges, accelerate learning, and gain both "soft skills" and technical experience.





Baja SAE

THE INCREASING VALUE OF "SOFT SKILLS"

According to a 2016 National Association of Colleges and Employers (NACE) survey, employers are most often seeking job applicants who have the following attributes: leadership skills, the ability to work in a team, communication, and problem-solving skills. Experiential learning gets students practicing these soft skills right away as a core part of their education.

One way students are inspired to learn outside of the lab comes through competitions like the student-led Baja Society of Automotive Engineers (SAE).

Baja SAE challenges engineering students to design and build an off-road vehicle that will survive the severe punishment of rough terrain and in some competitions, water. The team must work together to discover and resolve technical challenges in designing, testing, building, and optimizing performance.

When asked about what makes the Cal State LA Baja SAE team unique, both the students and faculty advisors refer to the family-like feel of the diverse, dedicated team. "Most Cal State LA students are from Los Angeles, so we really see them here year-round, spending time together both working on the vehicle but also sharing meals, doing homework, and just generally figuring out how to help each other learn and work as a team," said Professor Chris Bachman, faculty advisor to the Baja SAE team.

Luis Fernandez, Captain, Drivetrain and Front Suspension Lead, has been working with the team for three years and spends more than 35 hours each week managing and building the ECST team's vehicle. He graduated from Cal State LA this year and is moving to Indiana to work for Cummins, a job opportunity he attributes to his participation in the Baja SAE competition.

"If it wasn't for Baja, I wouldn't have had multiple job offers. During interviews, hiring managers have loved hearing about the successes and the pitfalls of the Baja SAE experience. And with being a captain specifically, they appreciate hearing about my team management skills and how I teach and lead the next generation of Baja students," Fernandez says.

*Every year, our ECST competition team designs and builds a new vehicle from the ground up and travels to compete against hundreds of universities at the international **Baja SAE** competition.*





ECST's competition teams are unique for their tight-knit relationships and the family-like support system they create.

EcoCAR 3 is another example of a Cal State LA competition team that thrives on teamwork. EcoCAR 3 challenged 16 university teams to redesign a 2016 Chevrolet Camaro by applying new technologies and innovations to make it into a hybrid car. Teams had four years (2014-2018) to harness those ideas into the ultimate energy-efficient, high-performance vehicle. In particular, our team was the only team to select a police interceptor application, providing first-responder fleets with an option for a fuel efficient vehicle.

EcoCAR 3 faculty advisor, Professor David Blekhman, considers competitions like EcoCAR 3 to be essential to the upward mobility of our students by providing opportunities for lower-income and diverse students to get hands-on experience and be seen by high-profile project sponsors.

“Our team is primarily minority students and many are the first generation attending college, so to be seen by companies like GM and potentially be offered \$80,000 or \$90,000 starting salary jobs is really exceptional,” Blekhman said. “The hands-on experience they get at EcoCAR 3 is really what gives them that opportunity.”

Opportunities to solve real-world problems

In addition to competitions, one way ECST students experience learning outside of the lab is through the Capstone Senior Design program. Since 2008, this program has partnered with industry to offer students the opportunity to solve real-world problems. Working in small teams with a technical liaison from the sponsor and a faculty advisor, students solve complex challenges using the concepts and theories they’ve learned in the classroom.

Students work together to develop potential solutions, test and troubleshoot, and successfully implement their designs. Upon completing the Capstone Senior Design project, students have a better understanding of the real-world challenges many businesses face and are better prepared to enter the workforce.

EcoCAR 3



CAPSTONE SENIOR DESIGN USE CASE

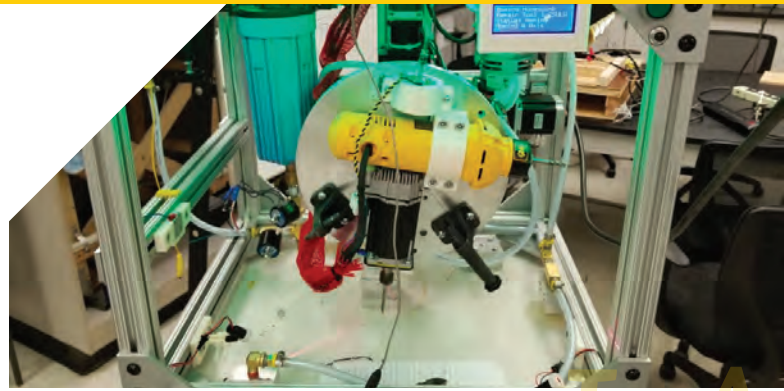
Boeing Automated Honeycomb Repair System

6 students on the project team

10 minutes it now takes the Honeycomb Repair System to make repairs

4 to 6 hours it previously took the Honeycomb Repair System to make repairs

2 student hired by Boeing



Capstone LA

Experiential learning throughout the student lifecycle

While seniors and graduate students have historically enjoyed more project-based work, like the Capstone Senior Design program, traditional beliefs that students must master the theoretical *before* they practice applying it is considered outdated thinking.

Today, ECST is among many colleges finding ways to introduce experiential learning into the earliest days of a students' classroom experience. Our new first-year courses, Computer Science 1010 and Engineering 1500, provide students with their first opportunity to engage in design thinking and make something that works.

CS 1010 was a traditional lecture-heavy course but now includes a brief lecture, followed by labs that focus on real-world applications, like coding, writing software applications, programing languages, and problem solving. "We've seen an increase across the board in students'

confidence in this subject matter. If I can get students to find computer science interesting and fun—that's success to me," says Assistant Professor Zilong Ye, Computer Science.

In ENGR 1500, freshmen get hands-on experience from the start designing and building a remote-controlled submarine. Labs include fundamentals on circuits, computer-aided drafting, density, and viscosity. For example, one lab focuses on designing a 3D-printed remote-controlled submarine propeller.

In ME 2030: Introduction to Mechanical Design, a new sophomore course piloted last year, Professor Bachman introduces the design process, along with computer-aided drafting and manufacturing processes. Last semester, the class culminated in designing and building an experiment to measure the thrust of the 3D-printed propellers, designed by the freshman ENGR 1500 students — a crossover between the freshman and sophomore curriculum.

A new generation of learning

This change in thinking isn't limited to how current ECST students learn. It's also part of a seismic generational shift. The generation entering college today is referred to as Generation Z—born from 1996-2010—and the first generation to grow up with smartphones and social media at their fingertips.

Like the generations before, Generation Z is characterized by a unique set of factors, like a **shortened attention span** and increased ability to multi-task, due to growing up in a mobile world. Cue the new "attention economy" where attention is seen as a scarcity, undoubtedly disrupting our traditional learning and education methods, and making way for new styles, approaches, and tools.



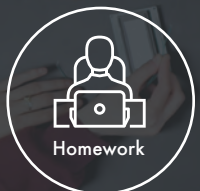
According to a study by Microsoft, researchers surveyed 2,000 participants in Canada and studied the brain activity of another 112. The results were astonishing—the human attention span fell from 12 seconds in 2000, to just 8 seconds in 2013.

TRADITIONAL CLASSROOM

"FLIPPED" CLASSROOM



LECTURES



Homework

ACTIVITIES



Classroom

Bachman "flipped" the classroom in ME 2030 to help increase student engagement. A "flipped" classroom refers to the inversion of traditional learning. In a "flipped" classroom instruction and theory happen outside of the classroom via video instruction, while applications and projects take place during class.



(Above) High school students Cardina Siliezar, Karelly Mercado and Alexia Sambrano construct an airplane during LAUNCHPAD. Photo by Aurelia Ventura, courtesy of LA Opinion.

LAUNCHPAD MESA

Engaging the students of tomorrow through experiential learning

ECST is also focused on offering hands-on learning opportunities to students before they even step foot on campus. In 2017, ECST introduced LAUNCHPAD, a two-week summer program that introduces women high school students to the fields of engineering and computing. The program's success hinges on using experiential learning to get prospective students interested in STEM careers.

LAUNCHPAD students meet with women industry professionals, participate in competitions, practice hands-on data science and coding, make cell phone robots, and perform environmental testing. Students leave the program with a deeper understanding of how different engineering disciplines work together, and how ideas are transformed into tangible solutions and innovations that make the world a better place.

Adriana Aldana, who participated in LAUNCHPAD's pilot program, said she had never felt more supported or motivated to pursue a career in engineering than she did during LAUNCHPAD. "I felt empowered, ready, and excited," Aldana said. She is attending Cal State LA this fall to pursue a degree in mechanical engineering.

The statewide MESA program (Mathematics, Engineering, Science Achievement) is another program that offers experiential learning opportunities to students before they enter College. ECST works directly with MESA middle- and high-school teachers to provide support for activities and STEM competitions for students from educationally disadvantaged schools.



Adriana Aldana is joining ECST this fall

Participating in MESA reinforces California math and science standards through hands-on projects and group learning and inspires students to pursue STEM majors in college.

LAUNCHPAD and MESA are part of ECST's Acceleration Initiative, a series of four programs designed to support STEM success at key points throughout a student's academic journey. Cohort programs, academic workshops, mentoring, competitions, and summer-bridge programs all contribute to the strong development of students beginning in middle school and continuing through their freshman year in college.

Looking beyond today

Perhaps the most exciting part of experiential learning at ECST is the future. As the world continues to shift, what possibilities exist for our students? How can we find even more ways of experiential learning that spark new insights and unlock potential?

At ECST's Teaching and Learning Academy, a group of professors meet throughout the year to discuss these questions. During a full-day seminar in the fall, and a monthly brown-bag program, new and experienced faculty get together to learn about and explore experiential learning models while sharing best practices, new learnings, and trends.

The thinkers & doers of the future will need to strike the right balance between technical skills and soft skills, theory and application. At ECST, we believe experiential learning is the path that will take us there. ●

THANKING DAN ROBERTO FOR NEARLY 30 YEARS OF SERVICE

“I’ve been a machinist my entire life. I was building slot cars, mini bikes, and go-carts from the time I was 13 or 14 years old,” Dan Roberto remembers.

Dan always thought his machine building and mechanical interests were just a hobby, and never thought about pursuing them as a career. After he started taking psychology classes at Cal State LA, he quickly realized his passion was to build things with his hands, and bring designs to life.

Dan started working as a technician for ECST on July 1, 1988, where he served as a talented machinist and a welder for nearly 30 years. “I taught students how to use the equipment on a daily basis.” Over the years, Dan was instrumental in bringing students’ ideas to life in various competitions and senior design projects. If a student could think it, Dan could make it!

A tale of two brothers

Dan was introduced to building through his older brother, Dick Roberto, who served on the faculty at ECST for 38 years, from 1966 to 2004. “My brother was a Renaissance man who could work in any media. I was always following [my brother] around and helping him... he got me into all sorts of things,” Dan recalls.

The Roberto brothers had no idea that their careers would take similar directions. Both brothers worked at Cal State LA and collaborated on many projects together over the years.

Dan says, “We were a natural match: he, the designer, and me, the builder.”

Winning collaborations—and races!

The Roberto brothers’ first collaboration came in the late 70s—Dan welded ECST’s first mini baja car in his spare time between night school, studying, and his job rebuilding engines at Southern California Edison. The car beat out 35 other universities’ entries from across the globe. Worried it was just beginner’s luck, the team went back to compete in subsequent years—and win many times over.

Among the Roberto brothers’ many crowning moments was the sweeping win by the Solar Eagle III, a solar-electric powered



The Solar Eagle III crossing the finish line with the checkered flag.



car, designed, built, and tested by ECST students and staff to compete in the Sunrayce in 1997. “I’ve always been in awe of my brother. We’re a good team—there isn’t anything he can design, that I can’t make,” Dan shares.

“I’d get a stack of prints from him in the morning, and I’d be cutting materials all day long as fast as I could.”

No plans for slowing down

Dan’s official retirement date—February 1, 2018—coincided with his birthday. To celebrate, he and his girlfriend threw a big party at their new home in Pasadena—complete with live music played by friends (think Jimmy Buffet and Janis Joplin) to commemorate the event.

Retirement does not mean Dan will take things slower. He’s focusing his full efforts on his gearbox manufacturing company that he started with a former ECST teammate. Their gearboxes have given Honda, the dominant manufacturer, a run for its money, thanks to their superior performance. Dan’s cars won the last two Grand Prix, and competitors started to take note. “They were tired of their gear boxes breaking... that’s when ours really started to sell,” Dan beams.

“Dan’s been a key member of our technical staff for years, helping our competition teams and senior projects with his expertise, and teaching many students his craft.” says Dean Emily Allen. ECST will miss you and we wish you the best of luck, Dan! ●

IN MEMORIAM

We said goodbye to long-time Cal State LA employee Colleen Yoshida, who passed away on February 22, 2018.



Colleen gave 32 years of service to Cal State LA and spent the last nine years as a staff member at ECST, most recently as the cheerful face of the college front office. We miss her and cherish her memory.

MAKING SPACE FOR INNOVATION

BRINGING EXPERIENTIAL LEARNING TO LIFE IN A STATE-OF-THE-ART FACILITY DEDICATED TO DESIGN, INNOVATION, AND IMPLEMENTATION



All great colleges and universities have libraries – a quiet place to read, study, and soak in concepts and theories. But where do students go to apply those concepts, experiment with what they’ve learned, and bring theories to life alongside their peers?

The answer in today’s modern learning environment is a space for all students dedicated to just that: hands-on learning and building.

Today, we have many “innovation spaces” across ECST. Faculty and students have carved out multiple shops and labs to build, test, and explore.

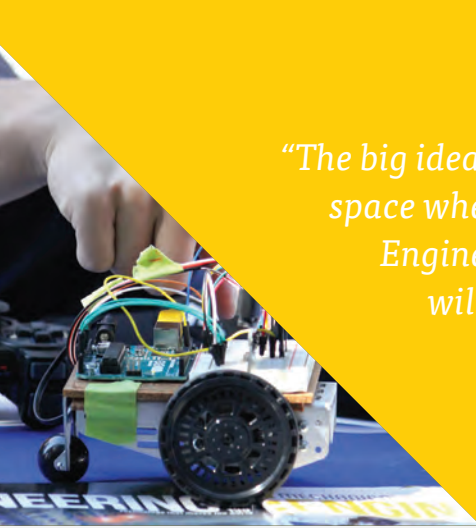
Our vision for tomorrow is to support the growth and interconnectedness of these spaces through a dedicated, state-of-the-art innovation space. The space will accommodate three key tenets of experiential learning at ECST:

1. **Curricular programs** (Capstone Senior Design and course projects)
2. **Co-curricular programs** (clubs and competitions)
3. **Research projects** (testing, building, innovation, and personal exploration)

We’re calling this environment our MakerSpace. The name might change as we continue the design process, but the ultimate goal will not.

“Currently, there’s no formal program for students to learn how to operate and care for machinery in a hands-on way, so even though MakerSpace is something we as faculty are helping build, it’s really meant for the students to own and carry into the future,” said Blake Cortis, ECST technician and a major contributor to the MakerSpace vision.





“The big idea here is to give students a space where they can work with their hands. Engineers design, test, and make things that will be used. The design is always better if you understand how the thing is made.”

– CHRIS BACHMAN, ASSISTANT PROFESSOR

This space will fuel:

CONNECTION. The space is welcoming, inviting, and accessible to the Cal State LA community.

COLLABORATION. Moveable whiteboards, open floor plans, and on-site student shop stewards encourage group genius.

INNOVATION. Space and tools to think and try, then try again.

EFFICIENCY. Equipment and tools are updated and well-maintained, with plenty of workbenches and storage. Reduce duplication of resources around the building.

SUSTAINABILITY. An ecofriendly design, maintained by students, faculty, and staff to ensure its long-term sustainability.

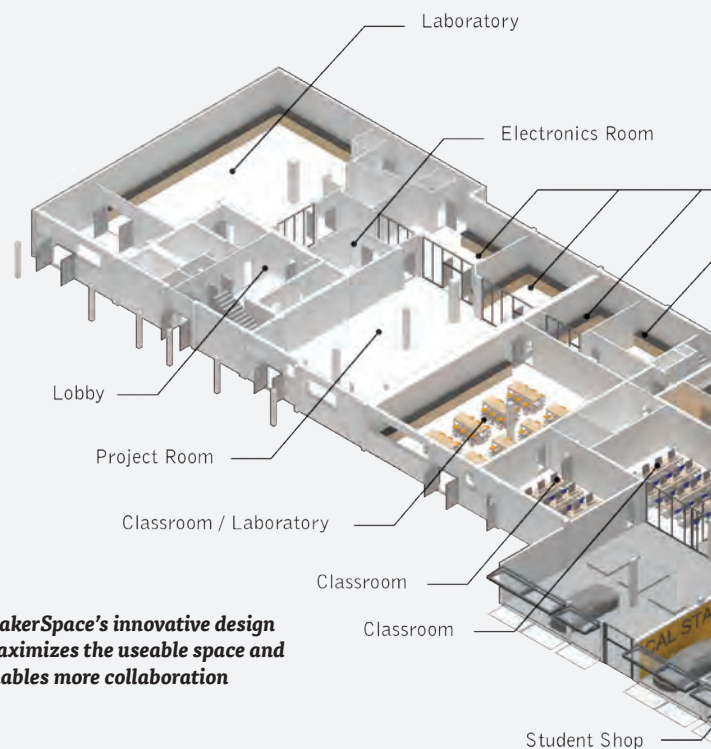
In fact, much of this work is already happening. Even while we seek a major donation to renovate our existing space, we are rearranging and re-dedicating existing equipment and space to accommodate more hands-on instruction.

Edgar Marroquin, an Industrial Technology major and experienced machinist, is helping create the MakerSpace, even though he will graduate before the vision is fully realized. “Right now, we have machinery that is spread out or in need of repairs or maintenance but until the MakerSpace was imagined, no real plan for how to make use of what we have and figure out what else we need. The vision is to have more students like me training other students on how to use and care for both our current and future machinery.” Marroquin said.

Once the MakerSpace is completed, it will provide more space for more students to learn by doing, driven by the learning that comes from designing, building, and testing innovative engineering projects.

Great Design Drives Great Results

At Cal State LA, we know that the spaces in which we work greatly influence the work that we do,



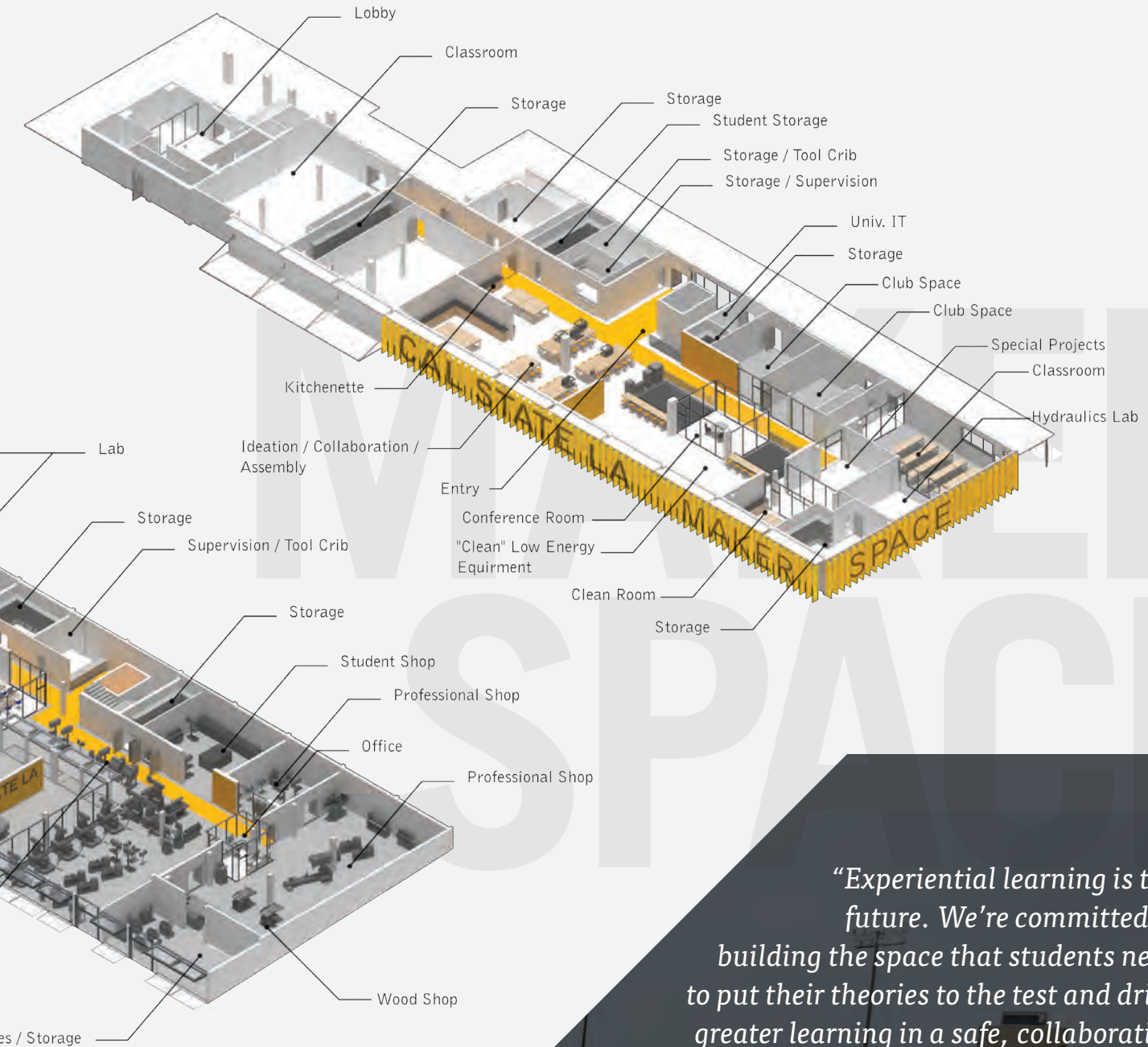
MakerSpace’s innovative design maximizes the useable space and enables more collaboration

so the MakerSpace is designed to be innovative in and of itself to drive and inspire student progress.

MakerSpace will optimize the available area by logically grouping types of work and equipment together (high-energy vs. low-energy / “clean” vs. “messy”) and incorporating the best technology available, including everything from 3D printing to building cars.

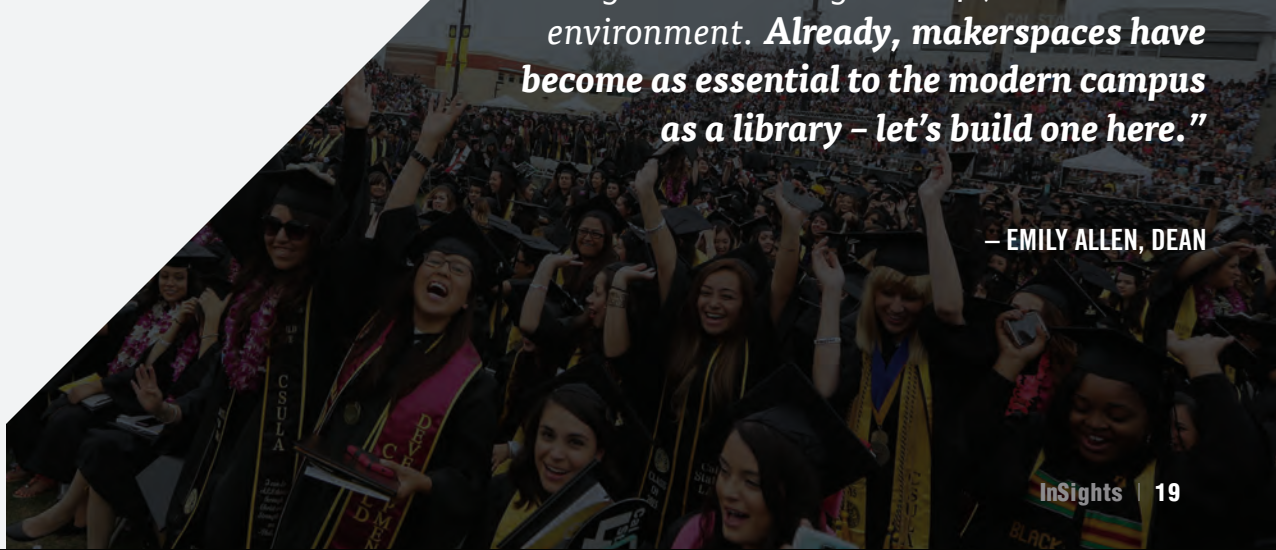
The space will also be designed to support collaboration in every detail, including movable whiteboards, open floor plans, and on-site advisors and technicians.

Having a state-of-the-art physical space dedicated to “making” and innovation – by all students and in all disciplines – will accelerate our mission to drive a culture of innovation and experiential learning. ●



*“Experiential learning is the future. We’re committed to building the space that students need to put their theories to the test and drive greater learning in a safe, collaborative environment. **Already, makerspaces have become as essential to the modern campus as a library – let’s build one here.**”*

– EMILY ALLEN, DEAN



FACULTY ACCOMPLISHMENTS

Faculty Research Awards (since Fall 2017)

Hassan Hashemian (CE)

"Ladders of Opportunity," California Department of Transportation (Caltrans), **\$400,000**

Tona Rodriguez-Nikl (CE)

"2017-2018 University Transportation Center for Underground Transportation Infrastructure," Colorado School of Mines (Prime: US Department of Transportation), **\$236,000**

Arezoo Khodayari (CE)

"2017-2018 Evaluation of Metrics and FAA Tools for Climate Impacts from Aviation," University of Illinois (Prime: FAA/ DOT), **\$32,000**

David Blekhman (Tech)

"H2Ride Hydrogen Shuttle Bus Demonstration Project," California Energy Commission CALSTART, **\$234,000**

Mauricio Castillo (Tech)

"California Apprenticeship Initiative New Innovative Programs," LAUSD-California Community College Chancellor's Office, **\$25,634**

Mehran Mazari (CE)

"Second Strategic Highway Research Program (SHRP2) Education Connection," U.S. Department of Transportation (FHWA), **\$8,000**

Arturo Pacheco-Vega (ME) with Jim Kuo, Ni Li, Chris Bachman, and Jeff Santner

"CREST Supplement: Center for Energy and Sustainability at Cal State LA," NSF, **\$100,000**

Mohammad Pourhomayoun (CS), with Mehran Mazari (CE) & Hassan Hashemian (CE)

"Traffic Monitoring for Pedestrian and Cyclist Safety Using Deep Learning and Artificial Intelligence," Mineta Transportation Institute and Caltrans, **\$75,000**

Yong Ba (Chem) with Arman Pazouki (ME)

"Acquisition of a Rheometer for Research and Research Training at CSULA," NSF-MRI, **\$271,589**

Dave Raymond (ME)

"Duong v. Pratt: Biomechanical Injury Assessment," Friedenthal, Heffernan & Brown, LLP, **\$9,762**

Hassan Hashemian (CE)

"National Summer Transportation Institute," Caltrans, **\$79,200**

Zilong Ye (CS)

"2018-2019 Predix CSU Hackathon Challenge," CSU Fullerton (Prime: General Electric), **\$10,000**

Navid Amini (CS)

"Project EyeSee: Mobile Assistive Technology for Hemianopic Patients," Vodafone Americas Foundation, **\$133,000**

Marina Mondin (EE)

"LSC Center for Coatings Research," NSF (PHY LIGO RESEARCH SUPPORT), **\$161,406**

Emily Allen

"ECST Makerspace Funding to Increase URM Student Access to Engineering Design and Fabrication Space," Pasadena Community College, **\$150,000**

Mehran Mazari (CE)

"Dwight David Eisenhower Transportation Fellowship Program," U.S. DOT (FHWA), **\$32,500**

SAVE THE DATE

Saturday, November 3, 2018 • 6-9 p.m. PDT

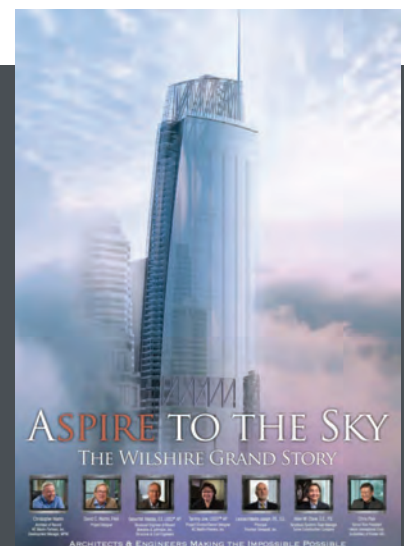
ASPIRE TO THE SKY: The Wilshire Grand Story

ECST and alumnus Dilip Khatri invite you to join us for the world premiere of the documentary, *Aspire to the Sky: The Wilshire Grand Story*. For more information, go to <https://thewilshiregrandstory.com>.

Location:

Cal State LA, USU Theater
5151 State University Drive
Los Angeles, CA 90032

For tickets and questions, please contact
H. Simon at hsimon@calstatela.edu
or (323) 343-5604.



Grants from the Cal State LA Research Office

Chris Bachman (ME)

"Development of Safe and Inexpensive Grid-Scale Energy Storage," **\$5,000**

Lily Chen (Tech)

"Use CFD Tool to Model Fire Hazard Posed by Energy-Saving Ventilation System in Green Buildings," **\$5,000 and one course release**

Ni Li (ME)

"A Novel Approach for CubeSat Attitude Control Using Distributed Solar Sails," **\$5,000**

Arturo Pacheco-Vega (ME)

"Experiments and Numerical Simulations of Energy Usage in Buildings," **\$5,000 and one course release**

Mohammad Pourhomayoun (CS)

"Using Artificial Intelligence and Deep Learning for Early Diagnosis of Cancer in Women," **\$5,000**

He Shen (ME)

"Robot Teaches Itself to Walk: A New Approach of Motion Control through Adaptive Interaction Between Rhythmic Motions of Joints," **\$5,000**

Mehran Mazari (CE)

"Predicting the Performance of California Highway Pavement Structures Using Historical Data," **one course release**

Travis Hu (ME)

"Bio-Inspired Integrative Self-Cleaning Surfaces for Solar Panels," **one course release**

John Petrie (CE)

"Acoustic Measurements of Suspended Sediment Concentration in Rivers," **one course release**

Mohammad Pourhomayoun (CS)

"End-to-End Traffic Vision and Monitoring Using Artificial Intelligence: The Challenges in Real-Time Processing," **one course release**

He Shen (ME)

"Advance Sensing, Actuation, and Control for Biomimetic Soaring of Next Generation Small Unmanned Air Vehicles," **one course release**

IN MEMORIAM

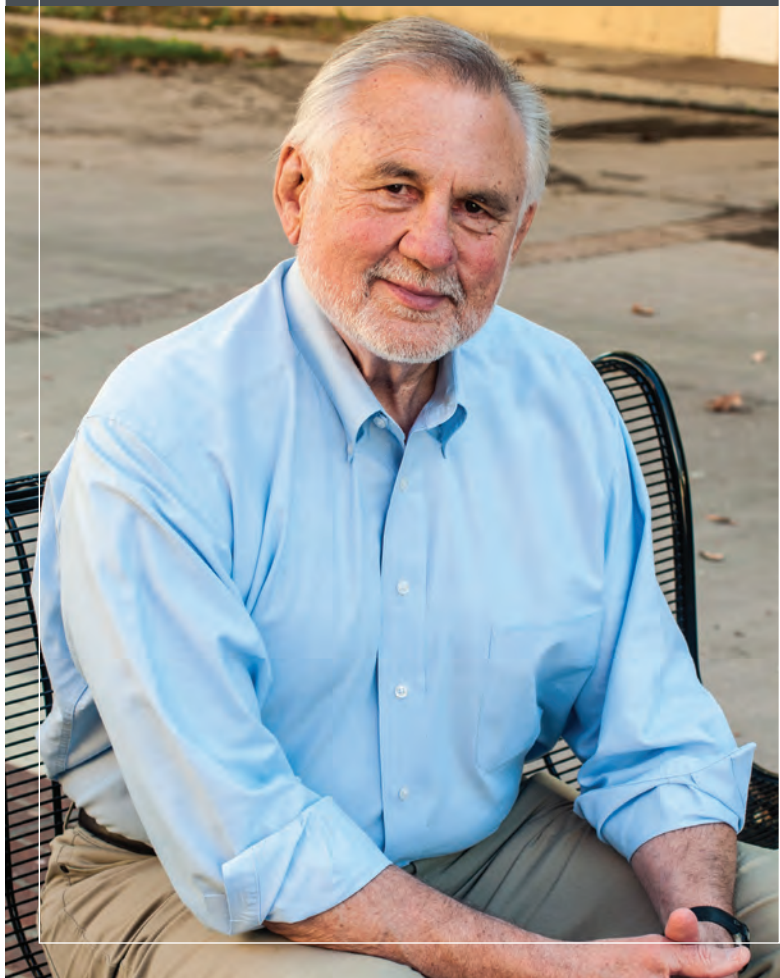
DEAN EMERITUS RAYMOND B. LANDIS

January 1, 1940 to July 16, 2018

Ray Landis served as Dean of ECST from 1985 to 2001. In 1973, he founded the first minority engineering program in California at CSU Northridge (CSUN). At Cal State LA, Ray championed the Solar Eagle projects, which brought national recognition to the college and the University. Solar Eagle III, which was engineered by a team of students under the guidance of faculty and staff, captured the national championship title at Sunracye 97 in June 1997.

His textbook for engineering freshmen, *Studying Engineering: A Road Map to a Rewarding Career*, has been used by tens of thousands of students at more than 300 institutions. Dr. Landis received many honors and awards for his work, including the Presidential Award for Excellence in Science, Math and Engineering Mentoring, and the first Wang Family Excellence Award.

Dr. Landis earned his B.S. and M.S. degrees in mechanical engineering from the Massachusetts Institute of Technology and his PhD in Engineering from the University of California at Los Angeles.



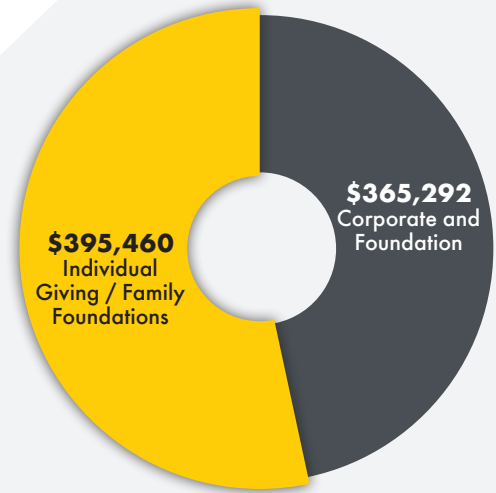
THANK YOU FOR SUPPORTING ECST

In 2017, generous donors like you gave \$760,754 in support of ECST.

2017 GIVING TO ECST

YOUR CONTRIBUTIONS MADE IT POSSIBLE FOR US TO:

- Support more than **60 senior design capstone projects**
- Award more than **\$135,000 in student scholarships**
- Enable **30 young women** to learn about engineering and computing during our summer LAUNCHPAD program
- Send **15 student teams** to competitions and conferences around the country



Individual and Family Foundations (2017)

Nida Alex
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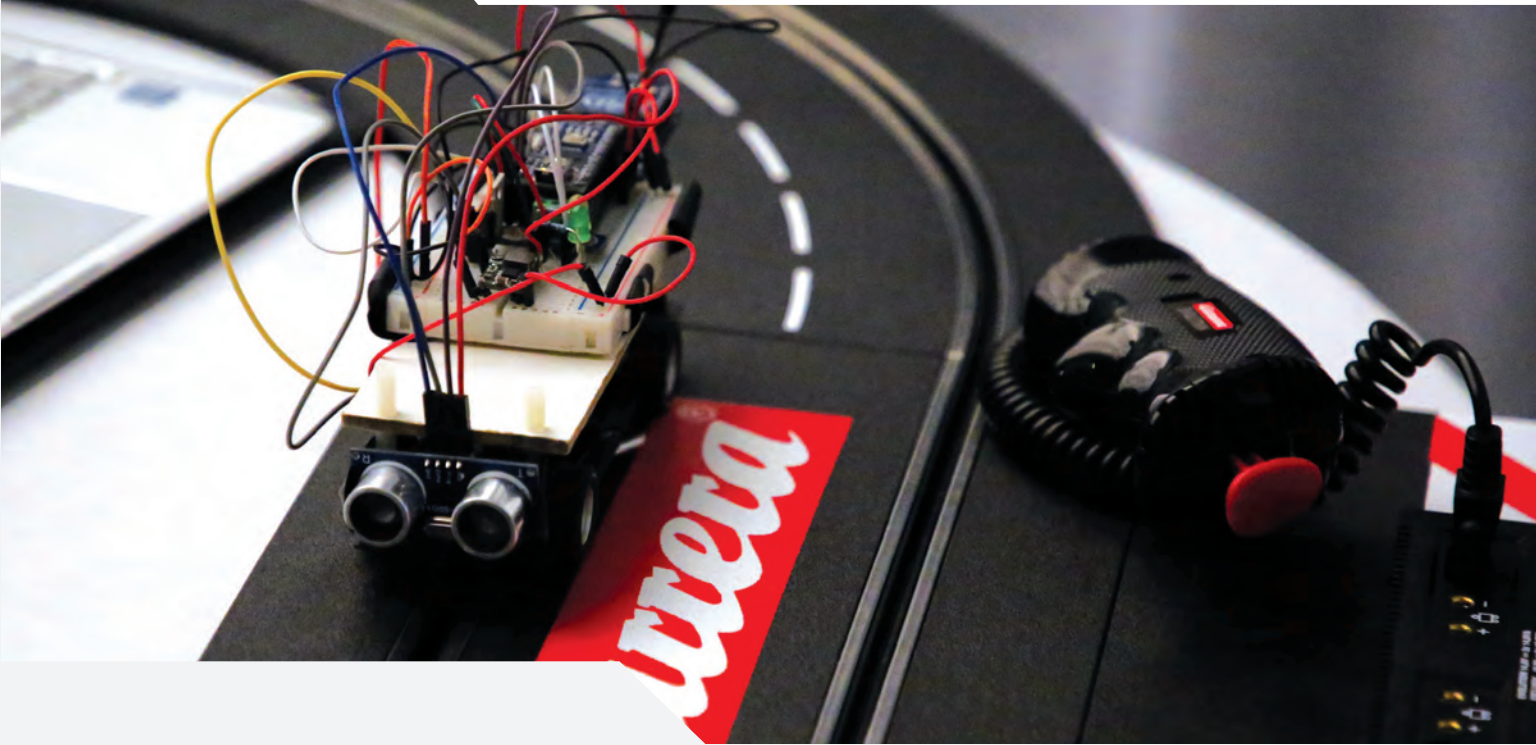
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SIKAND FACULTY RESEARCH SYMPOSIUM AND LUNCHEON



The annual Sikand Faculty Research Fellowship Symposium was held February 27, 2018, in the Golden Eagle Ballroom. The three Sikand faculty awardees - Assistant Professors Sonya Lopez (CE), Shaurya Agarwal (EE), and Tona Rodriguez-Niki (CE) - each gave presentations on their work, along with several of their students. The students also displayed posters and models of their work.

Mark Sikand (pictured to the right), President of Sikand Engineering, had the opportunity to see how his family's gift has broadly impacted college faculty working in a variety of aspects of urban sustainability, including hydrology, earthquake resilience, and transportation. Other guests included engineers from the LA County Department of Public Works, some of them alumni of the college, as well as Cal State LA President, Bill Covino.



SoCalGas DONATES \$100,000 TO SUPPORT ECST'S COMBUSTION ENGINEERING



The Southern California Gas Company (SoCalGas) gifted \$100,000 to ECST to support research and undergraduate education in combustion engineering.

The funds will be used to purchase laboratory equipment for research designed to advance energy efficiency in new gas products and reduce greenhouse gas emissions. They will also support undergraduate education on natural gas combustion, senior design projects, and student research. The projects will be directed by Assistant Professor Jeff Santner, Mechanical Engineering, and Professor Ted Nye.

Pictured to the left: Gina Orozco-Mejia, Vice President, Gas Distribution for SoCalGas



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