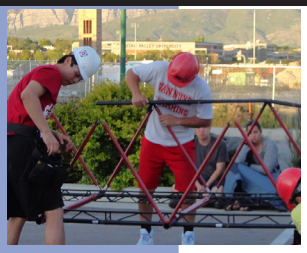
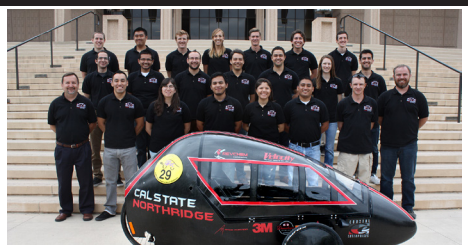
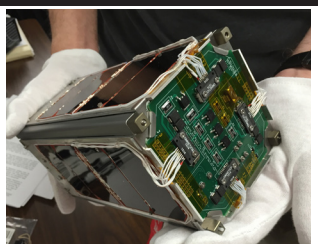
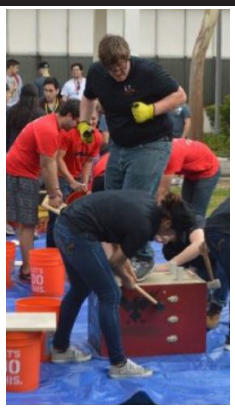
CSUN
CALIFORNIA STATE UNIVERSITY NORTHRIDGE

Spectra
COLLEGE OF ENGINEERING & COMPUTER SCIENCE

2016–17

Inside this issue...

CSUN and the college join new national smart manufacturing coalition

U.S. manufacturing has long been at a crossroads, but the way forward will likely be built on a foundation of technology and big data. It's an approach called smart manufacturing, and according to the National Institute of Standards and Technology (NIST), it consists of "fully integrated, collaborative manufacturing systems that respond in real time to meet changing demands and conditions in the factory, in the supply network, and in customer needs." Many predict that it will be the next Industrial Revolution.

Last June, smart manufacturing gained significant momentum when President Barack Obama announced a five-year, $70 million grant to the Smart Manufacturing Leadership Coalition (SMLC), a consortium of nearly 200 partners from more than 30 states, including academia, industry and nonprofits, to establish the Clean Energy Smart Manufacturing Innovation Institute (CESMII). Headquartered in Los Angeles and anchored by UCLA, CESMII will be a national network with regional centers in California, Washington, New York, North Carolina and Texas to leverage each area's unique industrial environments. Its aim will be to accelerate advances in smart sensors and digital process controls that can radically improve the efficiency of U.S. advanced manufacturing and fuel industry growth and innovation nationwide. The $70 million federal investment will be matched by more than $70 million from the private sector to develop the advanced technologies and a supporting workforce and education pipeline.

With CESMII looking to train 500 students annually in smart manufacturing, CSUN, along with CSU Long Beach and Cal Poly Pomona, have been enlisted among its academic members. These CSU campuses are part of the CSU-5 comprising the five LA Basin CSU campuses and will play key roles in educating students in the field. S. K. Ramesh, CECS dean, who represents the university at the institute, notes that CECS faculty will participate in research and have the responsibility of meeting education and workforce development needs. Certificate-level training programs may also become available through the Tseng College of Extended Learning.

"We offer one of the three ABET-accredited bachelor's degree programs in manufacturing systems engineering in the state of California..." Ramesh says.

"We offer one of the three ABET-accredited bachelor's degree programs in manufacturing systems engineering in the state of California, and we are a leading partner in the national Maker Faire Movement, Higher Education University Alliance," Ramesh says. "Our faculty and students work on a variety of areas of interest to the new institute, including software development, sensors, advanced modeling and control systems. It's a perfect fit because the institute—and the college—are committed to propelling manufacturing where it needs to go in the future."

A Message from the Dean

Welcome to the 2016-17 edition of *Spectra*!

Greetings!

Welcome to the 2016-17 issue of Spectra, our college's flagship magazine! It has been a very successful 12 months since our last issue, in February 2016, and I invite you to check out the wonderful work of our students, faculty and staff in this latest edition.

It is a matter of pride that our sequel proposal to continue the work we started in 2011 with our nationally recognized AIMS² program was selected for funding by the U.S. Department of Education in the 2016 competition. This timely $6 million grant expands and builds on the successes of the original grant and fits in perfectly with the college's efforts to improve student retention and graduation rates and close the achievement gaps. Some of the innovative pilots include summer workshops to assist incoming freshmen and transfer students with their preparation in key math courses and providing them with early exposure to their chosen majors. Speaking of innovative programs, we hosted ABET site visits for inaugural reviews of our bachelor's degree programs in engineering management and computer information technology in fall 2016. The visits went off very well, thanks to the diligence and preparation of our faculty, and we should be hearing the final outcomes following the ABET summer commission meetings later this year. Pending the accreditation of these new programs, we will have nine accredited bachelor's degree programs in the college in fall 2017. Our graduate programs continue to evolve to stay contemporary and relevant, and we will soon be launching our revised master's degree program in engineering management (online) in collaboration with the Tseng College of Extended Learning.

This issue of *Spectra* features the outstanding work of our faculty and students, from cutting-edge research projects to new partnerships and grants in emerging areas of interest such as digital manufacturing. We were thrilled when Robert Taylor (Class of '82) was recognized with one of the three 2016 CSUN Distinguished Alumni Achievement Awards—a testament to the transformative effect of our programs on our students and graduates. Tech Fest and the Senior Design Project Showcase continue to shine a bright light on the ingenuity and creativity of our students. Our award-winning CSUNSat1 CubeSat project was the grand prize winner in the 2016 showcase and is all set for launch by the time this issue hits the press. As the team traveled to Houston a few weeks ago to "deliver" the satellite, Professor Sharlene Katz emailed me to say that it felt like dropping off a child going to college! The project team will be recognized with a Distinguished Engineering Project award in the Engineers' Council annual banquet and awards ceremony during the 2017 National Engineers Week festivities. Our faculty and staff care deeply about student success, and it manifests itself in wonderful interdisciplinary projects such as CSUNSat1.

In closing, I would be remiss if I failed to mention the ongoing support from our incredible industry partners, donors and well-wishers. The annual donor-scholar reception is a great testament to the impact that our donors have on the lives and careers of our students. We are deeply grateful for your support and encouragement! Let me sign off by wishing all of you a great year ahead and requesting that you stay connected and guide and support us in all our endeavors.

S. K. Ramesh

Dean S. K. Ramesh

CECS receives new HSI-STEM grant

Success, as the old saying goes, breeds success. And nowhere is that more evident than in the U.S. Department of Education HSI-STEM grant that the college was awarded last October. The grant builds on the achievements of the AIMS² (Attract, Inspire, Mentor and Support Students) project, which was launched five years ago, also with HSI-STEM funding. That project, a partnership with Glendale Community College and College of the Canyons, was designed to increase the number of low-income, Hispanic and other underrepresented students graduating from CSUN with engineering and computer science majors. Through AIMS², students in the program, from CSUN and the two community colleges, have gained access to special faculty mentoring and proactive advisement, tutoring and peer mentoring, social activities, field trips, career advising and hands-on summer research opportunities (see AIMS² Research Symposium article, page 4) and are supported with stipends to motivate and inspire them to succeed. Since the inception of AIMS², over 200 students have taken part, and the program has been nationally recognized by Excelencia in Education (2014), and as a Bright Spot in Hispanic Education (2015) by the White House Initiative for Educational Excellence for Hispanics for its success in retention and improved graduation of Hispanic and underrepresented students in engineering and computer science.

Unlike AIMS², which has focused heavily on transfer students, the new grant will encompass services for freshmen and transfer students at multiple starting points, according to CECS dean S. K. Ramesh, the principal investigator on both grants. Called Bridging the Gap: Enhancing AIMS² for Student Success (AIMS² 2.0), the project, which awards the college nearly $6 million over five years, will serve students at CSUN and at five feeder community colleges that collectively account for 800 to 900 of the 1200 transfer students the college receives each year. These colleges include AIMS² partners Glendale Community College and College of the Canyons, plus Pierce College, Moorpark College and L.A. Mission College.

AIMS² 2.0 activities will include faculty and peer mentoring; peer tutoring; lectures; customized workshops in mathematics and English; career workshops; workshops in "soft" skills, such as study skills, time management, acclimating to the university, study groups, financial aid awareness and managing one's budget; summer and academic year research projects; and summer internships, among others. Every student who participates will also have a mentor from industry, and 50 students annually will receive $500 stipends for textbooks. A pilot introduction to calculus workshop will target students who have made it past developmental math, helping them understand where calculus is applied and improve their success rates.

> ***"...the new grant will encompass services for freshmen and transfer students at multiple starting points, according to CECS dean S. K. Ramesh, the principal investigator on both grants.***

"If we look at the freshmen population in the college's majors, maybe 10% qualify for calculus directly," Ramesh explains. "The rest are in developmental math. Our goal is to improve those figures and accelerate time to graduation."

Beyond the programmatic aspects of the project, Ramesh would like to create a space on campus for the program to call home. "We'd like a place where faculty can drop in and AIMS² students can go to have interactions that happen organically," he says.

Twelve CSUN faculty members—seven from CECS, three from the Michael D. Eisner College of Education and two from the College of Science and Mathematics, will be working as a team on the various interventions, helping to assure the continued success of students at the university and the community colleges. ❖

2ND AIMS² SYMPOSIUM SHOWCASES BREADTH OF STUDENT RESEARCH PROJECTS

Thirty-three community college students spent the summer working on research projects with CECS faculty, as part of the college's AIMS² program. But their work wasn't quite over when the ten weeks of research ended. The culmination of their efforts took place on September 14, when they presented their project findings at the second AIMS² Research Symposium.

The purpose of the symposium was twofold: (1) to encourage participating students to remain in engineering and computer science by providing them with hands-on research opportunities and (2) to inspire and motivate them by experiencing the entire research

process, from picking and working on a topic to analyzing data, organizing their conclusions and presenting their work to an audience. Students presented posters about their research and also made oral presentations, following standard guidelines for conference presentations.

"It's what you would see at any technical or professional conference," says CECS dean S. K. Ramesh.

For a few of the students, the AIMS² symposium was only the beginning. Two, Jessica Opinion and Veronica Rico, who worked with civil engineering professors David Boyajian and Tadeh Zirakian, have had a paper accepted by the American Society of Engineering Education and have been hired to help with the Caltrans-funded project that

"It's what you would see at any technical or professional conference," says CECS dean S. K. Ramesh.

the professors are carrying out with their colleague Sami Maalouf (see article, page 14). Elifalet Garcia, who worked with mechanical engineering professor Vibhav Durgesh, has had a paper accepted by the American Institute of Aeronautics and Astronautics, and Anna Chilingarian, who worked with Shereazad Jimmy Gandhi, a professor in the Department of Manufacturing Systems Engineering and Management, has had a paper accepted by the Society of Hispanic Professional Engineers (SHPE).

"The program has had really tangible effects," Ramesh observes. "How many undergraduate students have had peer-reviewed papers accepted at prestigious journals?"

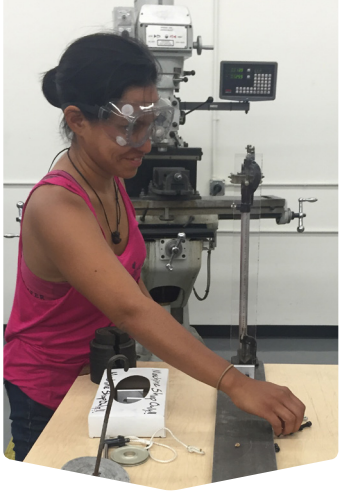
The breadth of the AIMS² projects is reflected in the following summaries.

Behzad Bavarian and
Lisa Reiner
Manufacturing Systems Engineering and Management

ALUMINUM ALLOYS FOR AIRCRAFT APPLICATIONS

Brian Arbiv, Aviv Brafman, C. J. Nesheiwat, Blanca Villafuerte and Julio Zamora, research assistants

When it comes to aviation, lighter, more efficient materials for aircraft are the holy grail. In the Airbus A350, for example a lithium aluminum alloy was used that enabled the company to reduce the weight of the aircraft by about 15-18 tons. Students working on this project investigated the properties of two high-strength aluminum alloys used in aircraft—the conventional aluminum alloy used in the aircraft industry and the newer, lighter lithium aluminum alloy used by Airbus. Dividing into two groups, one focused on heat treating and mechanical properties and the other at microstructure and corrosion resistance, they were trained to prepare samples, use universal test equipment, use microscopes and do metallographic analysis. They explored the effects of different heat treatment conditions on alloy performance and demonstrated that the lithium aluminum alloy was superior to the conventional alloy.

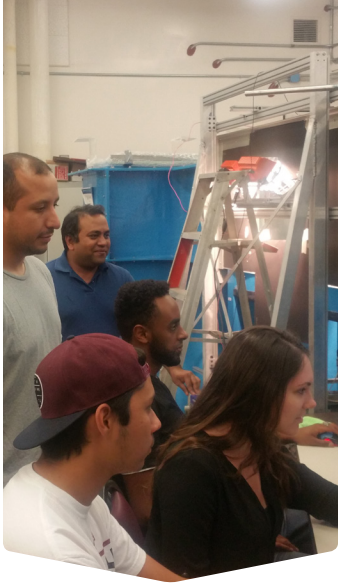


David Boyajian and
Tadeh Zirakian
Civil Engineering and Construction Management

DEVELOPING A STRUCTURAL ENGINEERING ENCOUNTER (SEE) ACTIVE-LEARNING LABORATORY ENVIRONMENT

Jessica Opinion and Veronica Rico, research assistants

David Boyajian and Tadeh Zirakian were determined to improve the AM 317 Mechanics Lab course for civil and mechanical engineering students, by introducing new experiments. To lay the groundwork, they set two AIMS² students to work designing and building a single-story, single-bay portal frame that was loaded vertically and laterally and equipped with measuring instruments to collect information about strain and deflection. The students began their project with a literature review and then started purchasing different elements needed to make the portal frame in order to construct various structural modules. Once the students had made the frame, they then loaded it and collected experimental data. They not only learned the basics of mechanics from analytical, numerical and experimental standpoints but gained valuable experience with instrumentation and helped Boyajian and Zirakian make considerable headway toward improving the quality of the mechanics lab instruction experience.

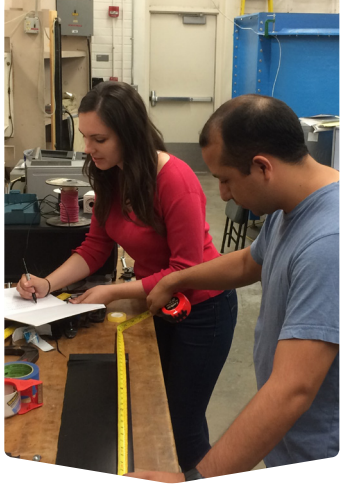


Vibhav Durgesh
Mechanical Engineering

EXPERIMENTAL STUDY OF AIRFOILS PERFORMANCE AT LOW REYNOLDS NUMBERS

Elifalet Garcia, Nebiyou Meshesha and Fernando Iniguez, research assistants

Advances in in technology have produced a push for better and more efficient drones. But in order to design improved aircraft, it's critical to know how they behave when they fly. While data exists for large, conventional aircraft like commercial and military planes, drones fly very slowly by comparison, and no one has examined comparable data for them. For this project, a team of students used the college's low-speed flow visualization water tunnel facility to make experimental measurements on thick and thin airfoils to determine which works best at low velocity. They studied the force and moment characteristics of the different airfoils at low Reynolds numbers, as well as correlated the steady and unsteady flow structures over airfoils with instantaneous load characteristics.



Vibhav Durgesh
Mechanical Engineering

APPLICATION OF MATLAB FOR SEPARATION DETECTION IN HYDROGEN BUBBLE FLOW VISUALIZATION

Elifalet Garcia and Charlotte B. Meola, research assistants

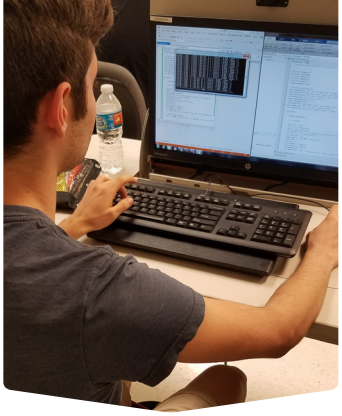
Flow visualization is an essential tool in experimental fluid mechanics research because it allows for the characterization of complex fluid dynamics phenomena and development of a deeper understanding of the physics of flow. In this project, flow visualization images were used to identify the point of flow separation on an airfoil. A separation point is defined as a location on the airfoil where the fluid flow becomes detached from the surface. It is important to gather this information because if the flow separates on the airfoil very early, an aircraft will lose its lift. To automate the separation point detection, the students wrote a program in MATLAB and tested it to ensure overall robustness and accuracy.

Shereazad Jimmy Gandhi
Manufacturing Systems Engineering and Management

CREATION OF AN ENTREPRENEURIAL MINDSET AMONG UNDERGRADUATE STUDENTS

Anna Chilingarian, research assistant

Even if an engineer has no intention of becoming an entrepreneur, there is enormous benefit to developing an entrepreneurial mindset—to considering how a technology or other innovation adds value to an organization, for example, whether it's a small startup or a Fortune 500 company. For this project, the student conducted a literature review on innovation and entrepreneurship, drawing on professional journals and industry magazines, and once she had identified the necessary skills, she correlated them to the engineering profession and produced a paper.



Ruting Jia
Electrical and Computer Engineering

SOLVING REAL-WORLD PROBLEMS BY USING INTELLIGENT CONTROL TECHNIQUES

Eric Boghozian, research assistant

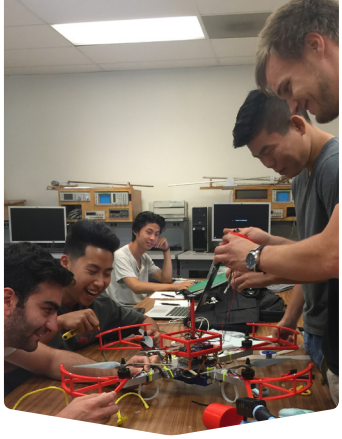
In the aftermath of a disaster such as an earthquake, hurricane or wildfire, where roads into the affected area are impassable and communication has been disrupted, airships, remotely controlled, can be a viable and cost-effective means of visualizing the area, gathering data and reconnecting communication networks. Unlike a helicopter or fixed-wing aircraft, airships require no crew members, are stable and robust and can remain in place indefinitely. For this project, a student used Particle Swarm Optimization Methodology (PSO), a population-based random search optimization, to identify controllers to control the airship's speed and altitude. The technique allows for a quicker and more detailed search, and based on a couple of simulation results, it achieved better performance with fewer iterations.

Vidya Nandikolla
Mechanical Engineering

ROBOTICS FOR ELEMENTARY SCHOOL

Michael Diaz, Tiffany Jovel, Christina Seeholzer, Michael White and Irfan Zaman, research assistants

When it comes to instilling an interest in STEM fields, the earlier students are engaged, the better. That's why the aim of this project was to introduce STEM fundamentals at the elementary level instead of middle school and high school. The team of five AIMS² students was charged with developing ten enjoyable and captivating projects to teach STEM concepts to 3rd and 4th graders. Among the projects was a keyboard created on paper that was then wired to play music, and making ice cream. Every concept from math, physics and chemistry, was introduced twice. The next step will be to demonstrate the activities in an elementary school and train the teachers to introduce them at a summer camp.



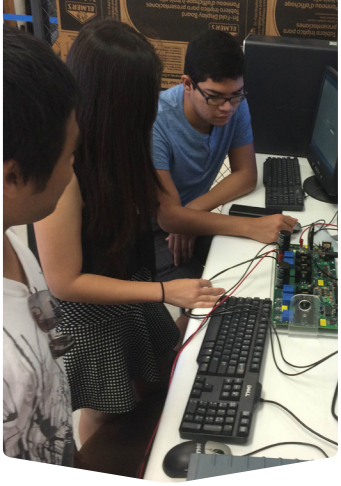
Vidya Nandikolla
Mechanical Engineering

STEM INTEGRATED ROBOTICS: DRONE

Diego Barreto, Jesse Bermudez, Robin Bochen, Andrew Fechtner, Changhyun Kim, Jesus Melendez, Seyediman Moosavicheheltanan, Kenneth Oyama and Brian Park, research assistants

Off-the-shelf drone kits are a dime a dozen, but a team of AIMS² students working with Vidya Nandikolla gained unique insight into the technology behind the unmanned aircraft when they designed and made their own drone from scratch, complete with camera and navigation technology. Divided into teams based on discipline and function (mechanical engineering, electrical engineering, programming, testing and mechanical design), they designed the drone in Solidworks, then built all the parts but the electronics in house. The team learned from the experience of the previous year's AIMS² drone team, taking apart their craft and fixing its faults. The drone that resulted flew, but was so heavy that it couldn't fly high.

"It was a good experience because these kids had never dealt with anything like it before," says Nandikolla. "It was the first time they had built anything from scratch, from design to making something fly. It was hard for them initially because they had no idea how to do machining. But they did it, and it was a good project."

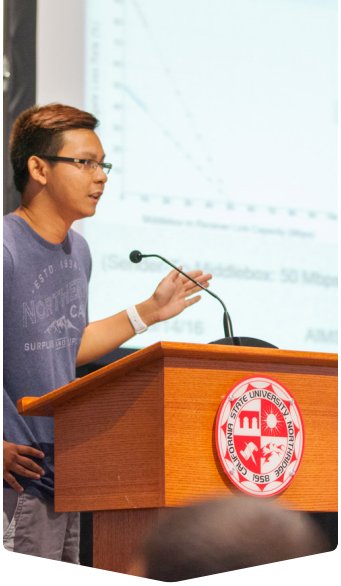


Bruno Osorno
Electrical and Computer Engineering

ELECTRIC SPEED DRIVES TECHNOLOGY IN TRANSPORTATION (ESDTT)

Francis Cuevas, Cristian Mendoza, Suthasinee Virnig and Ninsina Yadkar, research assistants

Electric cars have become big business, with car sales increasing by 50% in 2015 alone, accompanied by a boom in the demand for associated components. At the heart of electric and hybrid electric cars are electric speed drive technologies. The four students working on this project conducted research on existing technologies, focusing on three areas: electric motors, energy storage systems (batteries) and impact on the environment in the form of CO2 reduction. They spent the bulk of the summer trying to understand how the system works and how vehicle manufacturers implement it, starting with a literature review. In the lab, the students ran several simulation experiments to determine the control and capacities of different energy storage systems and came up with recommendations for the best approaches. First, they concluded that lithium ion batteries, while pricey, were the best solution for distance because they have large energy storage density. And second, they recommended considering other technologies, such as hydrogen and fuel cells.



Vahab Pournaghshband
Computer Science

DETECTING NETWORK COMPRESSION AND STRICT PRIORITY QUEUEING ON THE INTERNET

Richard Dojillo and Omri Gabay, research assistants

Currently, every packet sent over the Internet goes through numerous routers and intermediaries until it gets to the intended receiver. While routing the traffic, these intermediaries (referred to as middleboxes) have the potential of making significant changes to what happens to a traffic stream on the network. During the past decade, a wide variety of middleboxes have been proposed, implemented and deployed, and middleboxes are becoming a common element of various types of networks, making their detection by end hosts beneficial and in some cases crucial. For several years, Vahab Pournaghshband has been conducting a major research project designed to detect what happens to packets sent over the Internet, particularly to identify net neutrality violators. For this AIMS² project, two students wrote a script to automate the process of running multiple experiments to fine-tune the best parameters that can be used to detect middleboxes. They successfully completed the script and were able to validate it for a certain set of parameters in order to detect these two intermediaries. ❖

Felix Rabinovich

shares his diverse experience to aid CECS students

There's no telling where computer science will take you. Just ask Felix Rabinovich, a longtime member of the CECS Industry Advisory Board.

Rabinovich, who earned a degree in computer science in his native Latvia and came to the United States 25 years ago, began his career as a software developer, then expanded into IS management and business consulting. He has worked in fields ranging from biotech to financial services, from the insurance industry to retail, from aerospace to healthcare to public utilities, for companies like Deloitte & Touche, Andersen Consulting, Wellpoint, and Amgen.

Currently, as divisional vice president of ATIMS, he oversees a company that produces jail management software for sheriffs' departments around the country. And in that capacity, he has spent a lot of time at client facilities (i.e., jails).

"We're a small company, so when we went to production with a very large jail, pretty much everyone had to spend 12 hours onsite to relieve someone else," he says. "It was an interesting experience."

And Rabinovich, who had no public sector, correctional or jail management software background when he started at ATIMS, is putting that experience, along with the rest of his professional background, to good use. Their product, he explains, is like enterprise resource planning software, only for jail, and he is responsible for the company's entire operation, from business development and sales reports to professional development and finance and everything in between.

"Jail is a very complex enterprise," he says. "It's like a little town with high-level security. Sixty to seventy percent of inmates in county jail aren't sentenced and are taken to courts, and attorneys come to them. And the reason they're in jail is mostly because they were denied bail. So they're pretty nasty dudes and need to be kept separate from other nasty dudes. Plus jails have incidents. Jails have grievances against staff. And the whole enterprise is managed by our software."

For eight years, Rabinovich has also been sharing his expertise with CECS as a member of the Industry Advisory Board. His involvement was a direct outgrowth of the college's Honors Co-op program, which places highly qualified students in year-long internships at local companies. While Rabinovich was at Amgen, an especially talented Honors Co-op student joined his team of software developers, and in the process of mentoring him, Rabinovich became acquainted with faculty members Gloria Melara, Bruno Osorno and Steven Stepanek, as well as Dean S. K. Ramesh, who had joined CSUN less than a year earlier. Ramesh invited him to join the IAB, and he accepted.

"I was extremely flattered and very honored," he says.

In the intervening years, Rabinovich has played multiple roles on the board and is currently its co-chair. His strongest interest, however, is curriculum guidance.

Left, Felix Rabinovich (in blue striped shirt) and right with fellow judges at the 2016 Senior Design Project Showcase.

"The charge of the IAB is to make students ready for the marketplace as soon as they graduate, and that is something I feel very strongly about," he says. "I've seen the gaps in the knowledge of students who graduate from college and felt I could contribute to helping faculty bridge the gaps in the curriculum so students are much better prepared."

A perfect example is the new major in computer information technology, which the college is offering in partnership with the David Nazarian College of Business and Economics. Increasingly, he notes, organizations are opting for off-the-shelf software rather than custom software development. He feels that computer science graduates in the past have lacked experience implementing packaged software because their preparation has emphasized writing custom software. So the CIT major is ideal for producing students who are prepared to configure, implement and manage commercial software packages for their employers.

"It's an awesome way to prepare students to be business analysts or system implementers, and the need is huge," he says. "So there's a great opportunity to tweak the curriculum to meet the need."

Rabinovich particularly values the way IAB members share their perspectives from different organizations and industries and address different aspects of the college's needs. And he enjoys being in a position to help CECS students.

"CECS students really appreciate their education," he observes. "They have zero sense of entitlement and a huge sense of appreciation for the horizons that education opens up. It's a pleasure to help them and a privilege to be on the IAB." ❖

College's Industry Advisory Board Members

NEAL GABORNO
Program Chief Engineer
SAS Systems Verification Center
Raytheon Company

MILAD GIRGIS
Vice President, Neuromodulation, International Sales,
Deep Brain Stimulation & Program Management
Boston Scientific Neuromodulation

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Edwards Air Force Base (EAFB)

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Northrop Grumman Corporation

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FELIX RABINOVICH
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CHARLES VOLK
Vice President and Chief Technologist
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MARILEE WHEATON
General Manager, Systems Engineering Division
The Aerospace Corporation

DAN WILDT
Director
Woodland Hills Engineering
Northrop Grumman Corporation
Mission Systems

DISTINGUISHED ALUMNUS IMPACTS INDUSTRY, COMMUNITY, UNIVERSITY

Robert D. Taylor '82

The encyclopedia salesman knocked on the door, and Geneva Williams answered. He gave his pitch, and then Geneva looked to her eight-year-old son, Robert D. Taylor, for advice.

Not a good investment, the little boy told his mother. But she decided to go through with the purchase, despite being cash-strapped. At some point soon after, Taylor decided he would become a scientist when he grew up. So he looked the profession up in the new encyclopedia, which prompted him to keep digging until he read about engineering.

"At that age, I knew I wanted to be an engineer," he said.

Forty-five years later, Taylor insists that he made his life plan then: earn an engineering degree, go to law school, create jobs and opportunities for African Americans and make a difference in society, all of which he has achieved. And on April 16, 2016, something he didn't plan happened: CSUN recognized Taylor with a Distinguished Alumni Award, one of the university's highest honors.

"He was such an outstanding young man—bright, motivated, caring. He set an example and was a role model for others."

A MAN WITH A MISSION

Taylor's connection with CSUN began when he was drawn to the school's engineering program. In the early 1970s, Raymond Landis, a professor in the CSUN Department of Mechanical Engineering (and later dean of the College of Engineering, Computer Science and Technology at Cal State LA), had founded the pioneering Minority Engineering Program at CSUN, which became a model for similar programs around the country. Landis and the program's associate director, Rick Ainsworth, became mentors to Taylor and helped support his work.

"Right from the beginning, he was a standout," Landis said. "It was almost like he didn't need the program; the program needed him. He was such an outstanding young man—bright, motivated, caring. He set an example and was a role model for others."

After earning his engineering degree from CSUN in 1982, Taylor went to Stanford, where he earned an MBA and a law degree. That led him to McKinsey & Company, a worldwide management consulting firm, where he quickly climbed the ladder and eventually became the firm's only black partner.

Charles Schetter, a former senior partner at McKinsey, considered Taylor the glue of the company. "I entrusted to Robert the people processes for the several hundred people we had in the practice," he said. "Robert is a man of great empathy and an inspiring leader, and he is the person I wanted to be in charge of the care and feeding of our people."

Taylor (center) with CSUN Alumni Association president Carlos Fuentes '82 (Political Science) and CSUN president Dianne F. Harrison.

In 1992, in the aftermath of the Los Angeles riots, Taylor felt a calling to help the community. Mayor Tom Bradley started the Rebuild L.A. initiative and placed Peter Ueberroth, 1984 *Time* magazine Man of the Year and former Major League Baseball commissioner, in charge of the effort. Taylor reached out and offered his assistance.

"We needed thousands of people to help us, but we needed some really key

leaders—and Robert was one of the first to step forward," Ueberroth said. "He showed a calmness and a skill set that was very unusual, and it was key to our success."

It was through Taylor's work with Rebuild L.A. that he caught the eye of the National Urban League, becoming a longtime volunteer for the organization, whose mission is to enable African Americans to secure economic self-reliance, parity, power and civil rights. From 2005-12, he served as senior vice chair, the Urban League's most senior volunteer role.

Taylor also has been committed to serving his alma mater, as a member of the CSUN Foundation board and the CSUN Task Force on Engagement.

CREATING OPPORTUNITY

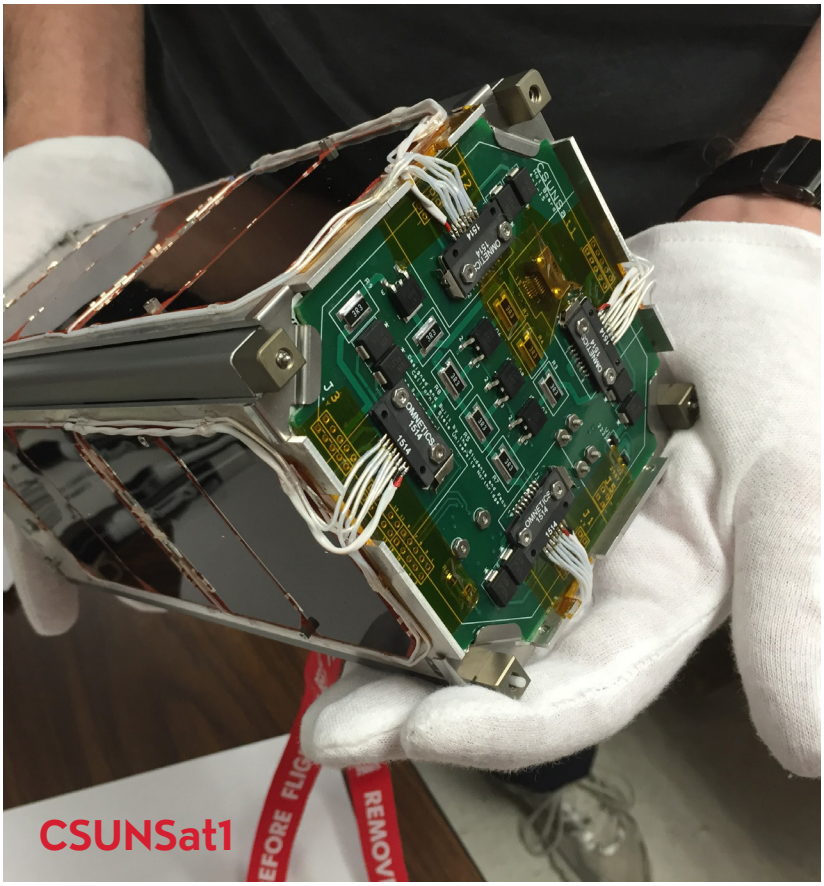
Taylor's numerous volunteer commitments have in no way diminished his passion for his professional work. One of the most influential African-American financial industry leaders in California, he cofounded two private equity firms, including Centinela Capital Partners, LLC, which has backed 46 new and emerging investment teams who have created an estimated $5 billion in value and unprecedented levels of diversity among their general partners. He is also a private equity investor and partner at holding company 3.5.7.11.

Above: Robert D. Taylor '82 (Engineering), CSUN Distinguished Alumni Award recipient. Left, family and friends congratulate Taylor as he comes forward to accept the award.

Upon receiving the Distinguished Alumni Award, Taylor thanked his wife and children, CSUN mentors Landis and Ainsworth, friends and colleagues and his alma mater. Most significantly, though, he reflected on what his mother did for him, and he shared the advice she gave him:

"Work hard. Be graceful. Believe in yourself. Stick together. Don't complain. Don't quit. And don't embarrass me by wasting the sacrifice I made for you." ❖

Adapted from an article by Cary Osborne for *CSUN Today*



James A. Flynn

Adam Kaplan

Sharlene Katz

David Schwartz

CSUN satellite at the final frontier

Sometime soon, an unmanned spacecraft will be launched from Earth, headed to the International Space Station. Once it arrives, the space station's astronauts will remotely open the doors on the craft and release into orbit space six small satellites called CubeSats, each about the size of a shoebox. One of those will be CSUNSat1, the culmination of 2½ years of work by electrical and computer engineering professors Sharlene Katz and James Flynn, emeritus professor David Schwartz, computer science professor Adam Kaplan and some 70 students, as well as colleagues at JPL. The CSUN team built and programmed the satellite and ground station, while the JPL group built the payload. Once CSUNSat1 is in orbit, the ground station, with its antenna installed atop Jacaranda Hall, will communicate with the satellite, run experiments for JPL and collect data.

"NASA won't trust a mission to anything that hasn't already been tested in space," says Katz, who along with Flynn served as co-PI on the project. "So the purpose of this is to validate an energy storage system that will help NASA venture farther into the solar system and carry out more scientific investigations."

Currently, the batteries that run spacecraft traveling past Mars need heaters in order to remain operational

Above left: CSUNSat1.

Above top (from left): Prof. Adam Kaplan, student Donald Eckels and Prof. James Flynn testing CubeSat prototype.

Above: Student Clifford Williams prepares for thermal vacuum testing of CSUNSat1. Prof. Sharlene Katz is seen in back.

because it's extremely cold that far from the sun. Heaters, however, use energy, depleting the batteries. The energy storage system on board CSUNSat1, by contrast, will function at very cold temperatures without needing a heater. JPL, which designed the system, has tested it in the lab, and the CSUNSat1 experiments will constitute its test in space.

The project had its origins in a 2013 design clinic with JPL to learn about CubeSats, and as part of that effort, CSUN and JPL collaborated on a successful proposal to NASA for $200,000 to fund the current program. Word about the project quickly spread, and student response was overwhelmingly enthusiastic, with electrical and computer engineering, mechanical engineering and computer science students all working on different aspects of the design. Most were seniors using the experience as their senior design projects, but others were graduate students, and the allure of space was so strong that a few volunteers signed on as well.

"We had more students than we knew what to do with," Katz says. "It was like an engineering department where every six months half the company leaves. Then we got brand-new people who had never done anything." Most who worked on CSUNSat1 quickly found jobs, at JPL and elsewhere.

Once CSUNSat1 was completed, however, it wasn't a given that the satellite would be given a free ride into space. That required another competitive application to NASA. Fortunately, CSUN was successful and the satellite won a slot on the craft heading to the space station.

While CSUNSat1 is in orbit, the CSUN-JPL partnership will continue, with CSUN responsible for monitoring the health of the spacecraft. If things are going wrong, Flynn explains, the CSUN team will fix it. Students will be involved in collecting data, but it will mainly be shipped to JPL for analysis and will perhaps generate new experiments.

The name of every student who worked on the project has been inscribed on a heat shield located between the payload and main part of satellite, along with the names of the four faculty members and a return address in case the craft is found. That isn't likely, however, since the bulk of the satellite's work will be done within a month, and it will run until it burns up, probably in a year or two.

Until then, however, it will be communicating with Earthlings in two ways—by transmitting data to the CSUN ground station and via a Morse code beacon that every three minutes identifies the satellite and reports its health. Anyone in the world with a $100 radio can listen in on the latter, and the advantage is that someone who enjoys listening to satellites (there's an entire international community of aficionados) can report to CSUN if something is wrong even when it's not passing overhead and communicating with the ground station in Northridge.

"Years ago, it would have taken decades and millions of dollars, and now for a few thousand dollars, your project can be in space," Flynn says.

It's no surprise, then, that given the success of CSUNSat1, he and Katz are now in search of their next mission to outer space. ❖

CECS Olympian racks up more wins

Computer science professor Richard Lorentz extended his winning streak at the 19th Computer Olympiad June 27 to July 3, when he took the gold in a game called Amazons and the silver in a game called Breakthrough, bringing the total number of medals he's won over the years to 14.

But it was at the concurrent ICGA Computer and Games Conference that Lorentz had another kind of breakthrough. The conference, which like the Computer Olympiad is sponsored by the International Computer Games Association and held at Leiden University in the Netherlands, named his paper, "Using Partial Tablebases in Breakthrough," co-written with graduate student Andrew Isaac, the best paper at the conference.

A tablebase is a special kind of database that keeps track of many different positions at the end of a game. The idea of using tablebases in chess emerged in the late 1970s, and today every strong computer chess program uses tablebases.

In Breakthrough, which is played on a chess board, each player has two rows of pieces, often called pawns. The aim is to push forward across the board to your opponent's last row, while following specific rules about how to move your pawns and capture opposing pieces. The game doesn't lend itself to tablebases because the game usually ends when there are still many pieces on the board, too many to fit into a tablebase. What Lorentz and Isaac did was make a case for breaking up the board and creating tablebases for part of the board instead of the whole thing. The paper was based heavily on the work Isaac did for his master's thesis.

"We had some success with some of the smaller versions of Breakthrough and less with the larger ones," Lorentz says. "But we showed that the idea has some merit."

A video of Lorentz's presentation is available on this site (Session1): https://cg2016leiden.wordpress.com/ (Isaac wasn't available to attend the conference, so Lorentz made the presentation.) ❖

A typical corrugated steel pipe (CSP) culvert during a dry season.

As part of the Caltrans grant, CSUN students have been making site visits around the state.

David Boyajian

Sami Maalouf

Tadeh Zirakian

CECS civil engineers receive Caltrans grant

It's no secret that the nation's aging infrastructure is facing numerous challenges. Every four years since 1998, the American Society of Civil Engineers (ASCE) has been issuing its Report Card for America's Infrastructure, and in that time, the nation has earned persistent D averages for the condition of its roads, bridges and many other essential structures, along with a host of other related civil engineering resources.

But over the next three years, a trio of CECS civil engineering faculty members will be chipping away at one of the issues—the state of California's culverts, which are basically pipe- and tunnel-like structures used to divert water underneath roadways.

Sami Maalouf, Tadeh Zirakian and David Boyajian were recently awarded a grant of nearly $400,000 from Caltrans to conduct a study of 500 culverts throughout the state, with the aim of developing a new method that civil engineers can use to determine the service life of these structures. The culverts they will be investigating are known as corrugated steel pipes (CSPs), which have been found to be vulnerable to corrosion. Although Caltrans engineers have been using an existing service life prediction equation to assess the longevity of CSPs, studies have shown that these models are not particularly accurate. Maalouf, Zirakian and Boyajian, together with a small team of graduate and undergraduate students, will gather and analyze data over the next three years in order to achieve more accurate service life prediction models of the structures. Their end result will be a detailed report of their findings to state engineers.

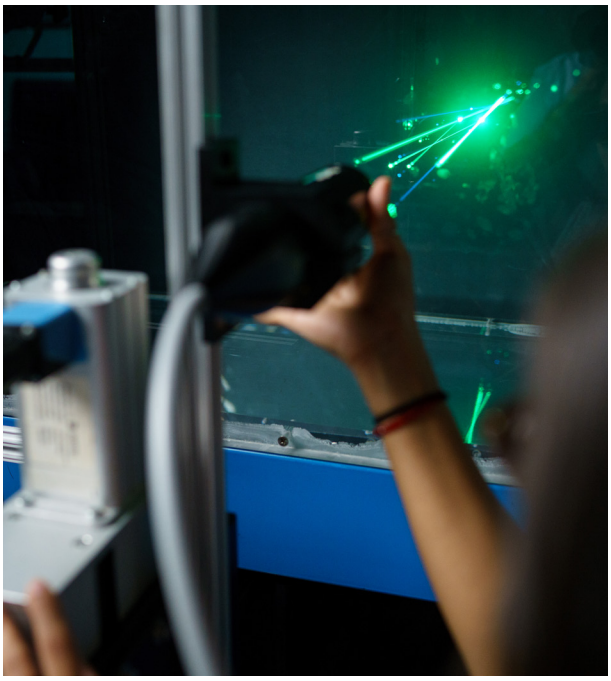
The project began at the end of July and will require the team to be out in the field making trips all over California, broken into thirds—northern, middle and southern regions—in order to spread the work out more evenly over the three-year effort.

"The lion's share of the work involves being out in the field and collecting data," Boyajian says, "and then we'll bring physical samples of the culverts, plus nondestructive data we've collected, in the way of ultrasonic measurements, back to campus for analysis." Some of the samples, he explains, will be analyzed using established techniques of chemistry to better understand the corrosion process.

Zirakian notes that at the end of the project, the team will try to come up with mathematical models to more accurately predict the service life of CSPs.

And, Maalouf adds, "From a utility standpoint, it would be desirable to ultimately furnish state engineers with a sort of flip chart or nomograph that they can easily refer to for enhanced CSP designs in the future."

In a fortuitous twist, the first two undergraduates hired for the project were Boyajian and Zirakian's AIMS² summer research students (see article, page 5). "We were so pleasantly surprised with the level of these students' desire to learn the theory and fabricate the physical model that we asked them to join us on our real-world Caltrans project," Boyajian explains. ❖



Student researcher setting up laser doppler velocimeter for inflow velocity measurement in low-Reynolds-number aerodynamics experiment.

Hydrogen bubble flow visualization setup by student researcher Elifalet Garcia.

Vibhav Durgesh

Unique drone research program gets off the ground

Drones, once synonymous with remote military recognizance and strikes, have gained mainstream ground over recent years. Hobbyist drones are now readily available online and at big box stores, and the drones of Google's Project Wing and Amazon's Prime Air are being field tested to deliver packages.

Advances in technology have brought a push for better and smaller and more capable drones, explains Vibhav Durgesh, assistant professor of mechanical engineering, but in order to design these improved aircraft, it's critical to know how they behave when they fly, in myriad conditions. Existing literature uses data for airfoils (wings) generated by government agencies and research labs for large airplanes, which fly much, much faster than drones. Limited comparable data currently exists for airfoils at low Reynolds numbers. (Reynolds number refers to an important dimensionless quantity in fluid mechanics that is used to help predict flow patterns in different fluid flow situations. It is widely used in many applications ranging from liquid flow in a pipe to the passage of air over an aircraft wing.)

"Making measurements at very low speeds is very tricky, and you have to design the experimental capability," says Durghesh. "Fortunately, here at CSUN, we already have it."

In fact, Durgesh has spent two years developing the capability in the college's Experimental Fluids and Aerodynamics Laboratory to test airfoils at slow speeds. This includes a state-of-the-art water tunnel and sophisticated instruments such as stereoscopic particle image velocimetry (PIV) and hydrogen bubble flow visualization systems to take the measurements.

Durgesh, who has two graduate students working with him on the research, has submitted his first conference paper with his flow visualization results, which can be used to explain certain lift characteristics of an airfoil.

"Unmanned aircraft systems have potential in both military and civilian applications and will continue to grow in coming years," he says. "It's one of the driving forces for this research." ❖

CECS again excels at student competitions

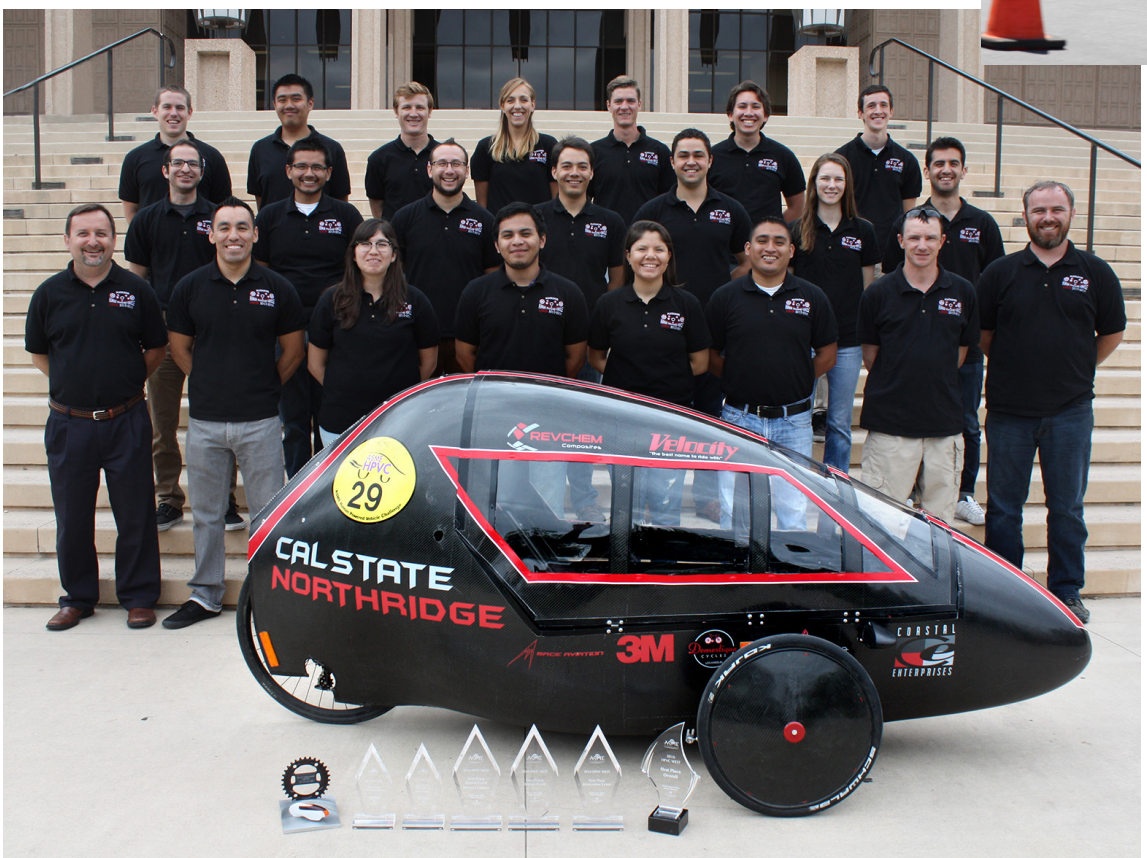
For many years, CECS teams have been distinguishing themselves in a host of national and international student competitions. And 2015-16 was no exception, with impressive wins for civil engineering and mechanical engineering students, and CSUN's cross-disciplinary VEX Robotics team, the Matabots.

Human factor propels team to success

CSUN's human-powered vehicle (HPV) "The Khach" probably won't qualify for the Tour de France anytime soon, but that's just fine with the 21 CECS mechanical engineering seniors responsible for designing, building and racing it. The Khach claimed first place in the 2016 American Society of Mechanical Engineers' (ASME) Human Powered Vehicle Challenge last spring, besting vehicles entered by more than 30 teams from the U.S., Egypt and Mexico.

Each team in the HPV Challenge brought an originally designed human-powered vehicle, which was judged for design, workmanship and innovation, among other categories. They then showed off their vehicles' performance in drag races and endurance races that tested speed and construction. The Khach, a recumbent tricycle with two wheels in the front and one in the back, won several challenges, enough to claim the overall first-place title at the event, which took place April 22-24, in San Jose.

Named for mechanical engineering professor and faculty advisor Aram Khachatourians, The Khach was designed to be as light as possible, weighing in at only 62 pounds, as opposed to the 100-plus-pound vehicles of other teams. The team's members designed the faring to be aerodynamic and chose the right combination of gears for the wheels to travel up to six feet



Top: The Khach in competition.

Left: The HPV team: Top row, from left: Robert Vallet, Jonathan Lo, Robert Timm, Rachel Foreman, Steven Molumby, Daniel Cabrera, John Kok. Middle row: Nami Taghavi, Eric Figueroa, Brian Albarracin, Kevin Matsuno, Benjamin Bell, Cassandra Mathison, Mihran Keshishian. Bottom row: Prof. Aram Khachatourians, Angel Sevilla-Diaz, Nancy Nodal, Alan Alcocer, Alexis Marquez, Armando Lagunas, Mark Shipman, William Steed

Chief engineer Robert Vallet at the endurance test event, a 2.5 hour riding test including five drivers.

in one revolution of the pedals, optimizing the vehicle and improving on the model from the previous year's team.

A special innovation was an autonomous brake assist system (ABAS), which the team incorporated after a vehicle from a competing school in the previous year's challenge lost control and collided with one of the ASME judges while traveling at more than 38 miles per hour. (The judge ended up needing surgery.) The ABAS continuously senses objects in front of the vehicle and analyzes the live data and distance from the object. If the object moves away or distance increases, no action is taken, but if the object is approaching, the brake system will automatically engage without any input from the rider, bringing the vehicle to a safe stop and preventing an accident. The CSUN team executed this innovation idea flawlessly even though the majority of tasks involved coding and electronics.

The HPV was a senior design project for the students fortunate enough to be selected for the class. Space in the class is competitive because Khachatourians carefully selects those who have the right attitude and want to work as a team that raises the bar each year, learning while having fun.

"Not anyone can just sign up," he says. "I have to go through a selection process. I ask, 'What do you bring to the table?' because this is about teamwork."

Members of the 2016-17 CSUN HPV team are continuing their predecessors' momentum and plan to maintain CSUN's first-place status by introducing a new optimized vehicle that goes faster, is environmentally friendly and incorporates yet another innovation. ❖

Recent News

CSUN's cybersecurity team placed first on January 28th at the Western Regional Collegiate Cyber Defense Competition (WRCCDC) Invitational,. Stanford University placed second and UC Riverside, third. The winning team will participate in the WRCCDC National Championship in San Antonio, TX April 13-15, 2017. The Layer 8 Cybersecurity team is led by team advisor Doris Chaney.

Matabots sweep the regionals in VEX robotics

VEX robotics may be an extracurricular activity for the Matabots, as the robotics club's members are known, but that doesn't mean it takes a back seat to more formal engineering projects.

"We have a passion for this, and we have the drive to do something amazing," says Adrian Castellon, president of this year's Matabots team and vice president of last year's team. "This may be in a 12x12 arena playing another team, but tomorrow it could be sending a robot to another galaxy."

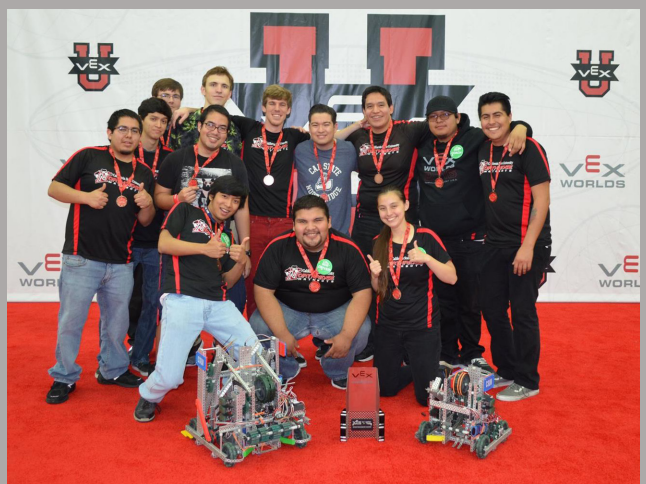
Based on the 2015-16 team's performance, the sky may well be the limit for the Matabots. The team, whose members represent all engineering disciplines, as well as the College of Science and Math and David Nazarian College of Business and Economics, started out by winning all four regional qualifiers for the world championship. In the tournaments, which took place at USC over one weekend each in November, December, January and February, the CSUN team, numbering close to 30 members, prevailed against a field of six other contenders. The different teams designed and built robots from kits to perform specific tasks established by the VEX organization, in particular to land as many balls as possible into a net while defending themselves and preventing other teams to get into theirs.

"The robot had shooting baskets down," says Dale Conner, the professor of manufacturing systems engineering and management who served as their advisor.

Upon advancing to the world championship in Louisville, KY on April 20-23, where the top 60 teams from around the world gathered to compete, the Matabots placed fifth in their division, which included 30 teams from Spain, China, Mexico, the United Kingdom and United States. The result was a personal best for the team and has created unprecedented momentum for the coming year. Castellon, a mechanical engineering major, explains that the team members will be escalating their efforts to a more challenging level by separating into two subteams to battle it out between themselves before the different tournaments and push themselves to build the best robots they can. In addition, CSUN hosted a one-day tournament qualifier in February.

"This is a great group of students who are really self-motivated and self-directed," says Conner. "I'm a fan." ❖

Below: The Matabots team. Front row from left, Steven Paqueo, Adrian Cecilio Castellon, Erin Kubo. Standing from left, Cesar Gonzales, Alejandro Bernardo, Christopher Moore, Nathan Boyd, Daniel Lopez, Kevin Joyce, Alex Resendiz, Edwyn Jocol-Perez, Edwin Delgado, Jose Zuno.



STUDENT COMPETITIONS

The steel bridge team was invited to the international championship at Brigham Young University in Utah on May 27-28, 2016, which attracted universities nationwide and from Puerto Rico, Mexico, Canada and China. Back row, from left: Cristian Duran, Prof. Rais Ahmad, Jose Sahagun, Luis Molina, Kevin Liu, Steve Morales, Jocelyn Payan, Simon Lao, Prof. Tzong-Ying Hao, and Kurt Van Volkinburg. Middle row, from left: Rigoberto Torres, Claris Rivera, Apekshya Bajracharya, Joanna Phung, Emanuel Moreno, Angel Martinez, Julie Yin, Soledad Conchas, Mareia Wisa Wasef, Rogelio Arias, and Cesar Crisostomo. Front row: Rudy Galdamez, John Copello, Paul Rivera, Ahmed Guerrero.

Building an outstanding track record

Cal State Long Beach was the scene of multiple triumphs for CECS students last spring , at the American Society of Civil Engineers Pacific Southwest Regional Student Conference. Members of CSUN's student ASCE chapter claimed second place in the steel bridge competition, against more than 20 challengers. The competition requires teams to design, fabricate and assemble a steel bridge measuring about 24 feet long and capable of resisting a load of 2500 pounds. ASCE specifies the guidelines ahead of time, including dimensions and the number of connections, and the bridge needs to be as light as possible and have minimal deflection. Teams are then timed as they assemble their bridges. The CSUN team assembled its bridge in just seven minutes and 58 seconds. As one of the top three finishers, the team was invited to the international championship at Brigham Young University in Utah, which attracted about 50 schools from around the world, where it finished 20th.

For the GeoWall competition, which was cosponsored by the Geo-Institute, teams had to design and build a model mechanically stabilized earth retaining wall measuring about 3'x6' and able to withstand different loading conditions, using the least amount of material. In an unusual twist, the national competition was held before the regional, and CSUN was invited to the national event, which took place in mid-February, for the first time. The team placed ninth nationally, out of about 50 teams, then turned around and came in third in the regional competition.

"Previously we couldn't find anyone to participate in GeoWall, but this year we did, and they did well," says Rais Ahmad, assistant professor of civil engineering and construction management, who advises the ASCE student chapter.

CSUN's team racing their concrete canoe "Daenerys."

CSUN students also took part in the regional concrete canoe competition, building a 22-foot-long canoe from pre-stressed concrete and racing the 230-pound craft against the other contestants' canoes. The CSUN men came in sixth in their race, and the women placed ninth. The CSUN team also came in second in the tug-of-war.

Nearly 70 students took part in the regional conference, and for the coming year, that number should increase. "We have huge a group working on projects for the 2017 competition, and our goal is to improve in all sectors," Ahmad says. ❖

Left: The GeoWall team (Joseph Hicks, Matthew Godinez, Jocelyn Payan, Adria Nicole Zulueta) during the regional competition, where they claimed third place.

MSEM team takes top prize at Manufacturing Challenge Contest

Aquaponics is the merger of aquaculture and hydroponics to grow fish and plants together in one integrated system. The fish waste provides an organic food source for the growing plants, and the plants provide a natural filter for the water the fish live in.

One of the challenges of aquaponics is maintaining a healthy balance between the fish tank (aquarium) and plant tank (growbed/greenhouse), much of which must be done manually. A team of four CECS seniors from the Department of Manufacturing Systems Engineering and Management, however, developed and built Cloudponics, a prototype of an automated aquaponics system that could be controlled via the cloud. The system is capable of monitoring all data for an aquaponics system and adjusting the settings as needed. It can be accessed through a computer, website or mobile app and can be integrated into any commercial aquaponics system.

Above: CSUN's grand prize-winning team at the Small Manufacturers' Institute Manufacturing Challenge Contest. From left, Navjeevan Sandhu, Rodrigo Soltero, Michael Mora, faculty advisor Bingbing Li, Hyunjin Kim.

Left: The Cloudponics project.

"For this Cloudponics system, you don't need to do anything because the system will monitor the fish tank and plant tank using sensors," explains Bingbing Li, assistant professor of manufacturing systems engineering and management, who advised the team. "It will control itself automatically."

Cloudponics was so novel and well executed that it won the grand prize at the Small Manufacturers' Institute Manufacturing Challenge Contest on April 18, 2016.

Held at the NTMA Training Center in Santa Fe Springs, the annual Manufacturing Challenge contest was originally established by the Society of Manufacturing Engineers (SME) over 30 years ago. Students choose their own projects and then design, manufacture and document the projects for display and evaluation. Judging categories include the project abstract, design, creativity, manufacturability, project management, presentation, documentation, health and safety, registration and judges' discretion. Teams compete in two divisions, two-year and four-year institutions; the best in show is awarded the grand prize. The 2016 competition pitted teams of students from 23 universities from California, Arizona, Nevada, New Mexico and Mexico.

In addition to the recognition accompanying the grand prize, the Cloudponics team—made up of Hyunjin Kim, Michael Mora, Navjeevan Sandhu and Rodrigo Soltero—received a $1,000 award. ❖

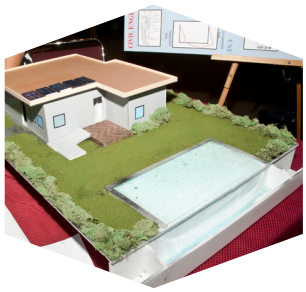
The Cloudponics project, evaluated by the judges below right, was also the MSEM department project display and oral presentation winner at the 2016 Senior Design Project Showcase.

AND THE **WINNER** IS...

CSUNSat1

- **GRAND PRIZE WINNERS**
- Electrical and Computer Engineering Department Project Display Winners

Faculty Advisors
Dr. Sharlene Katz
Prof. James Flynn
Dr. Adam Kaplan
Dr. David Schwartz



ADA-Compliant Accessory Dwelling Unit

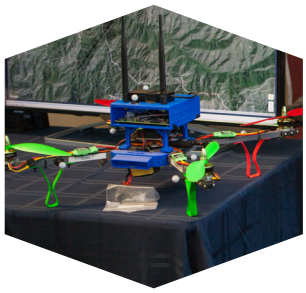
- Civil Engineering & Construction Management Department Oral Presentation Winners

Faculty Advisors
Dr. David Boyajian
Dr. Sami Maalouf
Dr. Tadeh Zirakian

Concrete Canoe

- Civil Engineering & Construction Management Department Project Display Winners

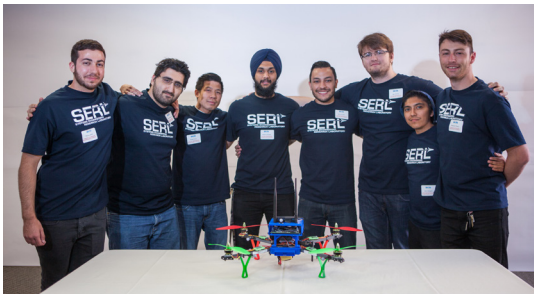
Faculty Advisors
Dr. Rais Ahmad
Dr. David Boyajian
Dr. Sami Maalouf
Dr. Tadeh Zirakian



CS Learning, Classifying and Recognizing Bot (LCAR Bot)

- Computer Science Department Oral Presentation Winners

Faculty Advisor
Dr. Nhut Ho

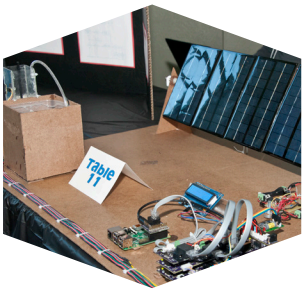


Join us at the 2017 Senior Design Project Showcase, 1 - 5 p.m. on Friday, April 14, 2017, USU Northridge Center

PartyQ

- Computer Science Department Project Display Winners

Faculty Advisor
Dr. Steve Fitzgerald



Modular Solar Powered Water Pump System

- Electrical and Computer Engineering Department Oral Presentation Winners

Faculty Advisor
Dr. George Law

CSUN Cloudponics

- Manufacturing Systems Engineering & Management Department Oral Presentation and Project Display Winners.

Faculty Advisor
Dr. Bingbing Li

2016 Human Powered Vehicle (HPV)

- Mechanical Engineering Department Oral Presentation and Project Display Winners.

Faculty Advisor
Prof. Aram G. Khachatourians

Fourth annual CREST Conference tracks renewable energy and storage issues, innovations

Internationally, domestically and especially statewide, clean, renewable energy continues to gather significant momentum, and the college's annual California Renewable Energy and Storage Technology (CREST) Conference aims to stay ahead of the curve. The 2016 CREST Conference, the fourth, took place November 12 and featured a full roster of speakers covering topics ranging from energy storage systems and energy harvesting from the ocean, to the State Lands Commission's renewable energy program, and strategies for transitioning LA County to 100% renewable energy, among others. A poster session featured the research of several CSUN students.

CREST conference speakers, from left: LA Cleantech Incubator director Tom White, UCLA Sustainable LA Grand Challenge director Casandra Rauser, Southern California Gas Company business strategy and advanced technology director Jeffrey Reed, UCI Water-Energy Nexus Center director and civil environmental engineering professor Diego Rosso, USC Nanostructure Materials and Devices Lab director Anupam Madhukar, and Seatrec engineer Michael Zedelmair.

The conference, which attracted some 90 attendees, opened with remarks by CECS dean S. K. Ramesh and Hamid Johari, chair of the Department of Mechanical Engineering. Plenary speaker Dr. Sudarsan Rachuri, from the Department of Energy's Federal Program Office, talked about smart and advanced manufacturing innovation in the department. Matt Petersen, the chief sustainability officer for the city of Los Angeles, was the keynote speaker and talked about solar and energy storage in context of the Aliso Canyon gas leak. Three panels of speakers, representing UCLA, USC, UC Irvine, Southern California Gas Company, SEATREC, and the California State Lands Commission, rounded out the event. Tom White, director of the Los Angeles Cleantech Incubator, ended the program with a discussion of the network for global innovation.

"This was probably the best group of speakers we've had so far," says Abhijit Mukherjee, associate professor of mechanical engineering and director of CSUN's Energy Research Center, who organized the conference. "I was very proud."

Sponsors for the daylong conference included Endelos Energy and Tom Brown, a board member of the Energy Research Center.

CSUN Recipient of Environmental Sustainability Award

Rosalba Gonzalez from former state senator Fran Pavley's office (pictured above with Dean Ramesh) attended the CREST 2016 conference and presented the university with an Environmental Sustainability Award in recognition of CSUN's outstanding efforts in this area.

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November 12, 2016

Fran Pavley

SENATOR FRAN PAVLEY
Twenty-Seventh Senate District

Art of Innovation Conference looks at the future

The many facets of innovation and entrepreneurship were in the spotlight October 14 at the fourth annual Art of Innovation Conference. The conference, a joint project of the College of Engineering and Computer Science, David Nazarian College of Business and Economics and Ernie Schaeffer Center for Innovation and Entrepreneurship, celebrated the broad range of trends and opportunities materializing in 21st century entrepreneurship. Sessions included Intrapreneurship versus Entrepreneurship (what it takes to succeed if someone is starting a new business or going to work for a large company); Social Entrepreneurship: Balancing Purpose with Profit (creating a for-profit, entrepreneurial venture that is designed to solve a social issue), and The Future of Technology (what kinds of unconventional technologies might exist in 50 to 100 years).

Speakers represented a wide variety of backgrounds, including education and social entrepreneurship, software, digital media, biotech, management consulting, systems engineering, creative consulting and more. The keynote speaker was Dr. Asad M. Madni, former president, chief operating officer and chief technology officer of BEI Technologies Inc., where he led the development and commercialization of intelligent sensors and systems for aerospace, military, commercial and transportation industries.

The purpose of the all-day event, according to conference co-chair Shereazad Jimmy Gandhi, assistant professor of manufacturing systems engineering & management and director of the Schaeffer Center, is to expose students to entrepreneurship and instill an entrepreneurial mindset in them. And, he notes, "We don't charge anything to the students so we can make it accessible to all." With close to 100 attendees, mostly students, the conference clearly achieved that goal. ❖

In addition to CECS and the Nazarian College, sponsors included the Department of Manufacturing Systems Engineering and Management, the CSUN Division of Academic Affairs, and the Rocky Peak Leadership Center. ❖

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Research Fellow

College research fellow turns her attention to improving breast cancer treatments

RUTING JIA

About one in eight—or 12%—of U.S. women will develop breast cancer during their lifetimes. But breast cancer isn't just one disease, and there are different treatment options, depending on the diagnosis and whether or not the cancer is prone to metastasize.

Currently, the process of determining which patients will likely benefit from which therapeutic protocol has a very low accuracy rate, leaving plenty of room for improvement. That means a substantial number of patients either receive unnecessary treatment or do not get the effective therapies they need. Efforts are already under way to begin applying bioinformatics to a massive online patient database in order to improve the accuracy rate, but it requires processing the database via supercomputers running for several days—a prohibitively expensive proposition that so far hasn't been deemed worth the expenditure of resources.

Ruting Jia, assistant professor of engineering and computer science and an expert in control systems, wants to help streamline that arduous task. And as the 2016-17 CECS college research fellow, she will be doing just that by carrying out a project titled "Improve Cancer Prediction Accuracy and Efficiency by Using Optimal Control Algorithm."

Optimal control algorithms can be used to control rockets, cars, and airplanes in dynamic situations and environments and are well suited to bioinformatics. They deal with the problem of finding a control law for a given system such that a certain optimality criterion is achieved.

"What we need to have is an optimal control algorithm before the computer science guys start to do a search algorithm," she says. "Applying an optimal control algorithm on top of their search algorithm will help narrow the search space by filtering out irrelevant data. Because of that, they won't need to reserve so many supercomputers, and it will reduce the calculation time exponentially. It will also be cost-effective and efficient and can increase the accuracy."

Jia, who will work with two senior students on the project, is collaborating with a faculty member in computer science and bioinformatics at another institution who has done some related work to help tap into the patient database. She will apply some optimal coefficients and conditions before the calculation starts in an attempt to reduce the calculation time, save computational resources and improve accuracy.

"There are different algorithms, and I have some candidates in mind, but I have to see which one or combination will work better," she says. "That's what the research is about."

Assuming she gets the good results she anticipates, she expects to produce some journal articles and conference papers with her collaborator. And in the long term, she plans to leverage the work to attract external funding from NSF and NIH in order to continue the project, which can not only benefit millions of women but serve as proof of concept for approaches to other confounding medical conditions.

ANNOUNCING THE **MORY EJABAT** ENDOWED CHAIR

The College of Engineering and Computer Science is pleased to announce the inaugural recipient of the Mory Ejabat Endowed Chair in the Department of Manufacturing Systems Engineering and Management

Behzad Bavarian, PhD.

Professor Bavarian has taught a wide range of graduate and undergraduate classes and laboratories in the area of materials engineering. His colleagues commend him for his teaching effectiveness, and as a researcher and scholar, he has been consistently impressive, acquiring prestigious grants such as funding from the W.M. Keck Foundation for a project on integrating nanotechnology in undergraduate education, and his service as co-PI on the nationally recognized AIMS^2 program. His scholarship has a tremendous positive impact on CECS students and their careers, as evidenced by the numerous students from his classes who have gone on to pursue further studies and advanced degrees in engineering. He truly exemplifies the "hands-on" nature of the college's curriculum through his work as a teacher and scholar, and students are very fortunate to learn from one of the very best in the field of materials engineering.

The Ejabat chair is awarded to a tenured full professor with an outstanding record in both scholarship and teaching, and a proven ability to acquire external funding to support research and/or teaching to further the mission of the university and the college. Recipients are appointed by the president with the recommendation of the provost, the college dean and the college personnel committee for a five-year renewable term.

Mory Ejabat

ABOUT **MORY EJABAT**

The Mory Ejabat Chair in Engineering and Computer Science was endowed with a $1 million gift from engineering double alumnus Morteza "Mory" Ejabat ('76 industrial engineering, '79 systems engineering). CEO and founder of Dictum Health, Ejabat is also cofounder of Zhone Technologies, where he has served as Chairman of the Board of Directors since 1999 and was president and CEO unil 2014. Prior to cofounding Zhone, Ejabat held various senior management positions with Ascend Communications, Inc, which in 1999, during his tenure as president and chief executive officer, was successfully sold to Lucent Technologies, Inc. "My degrees from Northridge in industrial and systems engineering have been the foundation of my success as an engineer, CEO and entrepreneur. I could not have done it without CSUN," said Ejabat.

RETIRING

The college bade farewell to **Jerry Siano**, who retired in June 2016 after 30 years of dedication and service. He worked in the engineering shop and in Technical Services. Everyone at CECS wishes him the very best in his future endeavors. He will be missed!

WELCOME

CECS welcomed staff member **Ms. Magda Azouz**, who became the manager of academic resources after serving CSUN in several leadership positions for over a decade, including senior financial analyst in the Tseng College of Extended Learning and account manager and schedule of classes coordinator in the College of Science and Mathematics. Prior to joining CSUN, Azouz had a distinguished career in the banking and insurance industries, serving as a financial analyst at Banca Nazionale del Lavoro S.p.A., in Los Angeles for over 17 years. Azouz earned her bachelor's degree in accounting and finance from Concordia University in Montreal, Canada.

Mr. Deazell Johnson rejoined CECS as the educational outreach coordinator and retention advisor, having left his six-year office manager positon in the Department of Electrical and Computer Engineering (ECE) to serve as a program manager in the Tseng College of Extended Learning. Prior to ECE, he started as a student assistant and administrative support assistant in CECS. Johnson earned his B.A. in screenwriting and M.A. in education administration in higher education at CSUN, and is actively pursuing his Ed.D in educational leadership.

Continued on page 29

From left, Erin Hong and Helen Mills at the WE conference.

SWE annual conference offers students new experiences, contacts, knowledge

Two CECS students got a taste of things to come when they traveled to Philadelphia last October to attend the annual conference of the Society of Women Engineers (SWE). Helen Mills, president of the CSUN SWE chapter, and Erin Hong, a chapter member, were among the more than 11,000 people from across the nation and beyond who gathered to connect with colleagues, enhance their technical training and share their expertise. Attendees ranged from students seeking internships or first jobs to established professionals in search of new opportunities.

The event, called the WE Conference, is the world's largest conference and career fair for women in engineering and technology, and it is SWE's flagship event. In addition to making the rounds at a huge career fair, Mills and Hong took part in a variety of sessions, including "Lean Manufacturing and the Philharmonic," "Get Your Worth: Salary Negotiations," "Virtual Reality beyond Gaming" and "How Is NASA Empowering Women in Engineering?" Mills, as chapter president, also attended a session that provided background on the national SWE organization and gave her insights into the benefits and opportunities available to members.

"This conference is a must for any member of SWE," Mills reported afterward. "There are so many things a member can do and learn. I had an opportunity to meet professionals and organizations that I would either never have been exposed to, or been able to meet in a more casual setting…. I cannot wait to attend the conference as a professional! "

Hong was equally enthusiastic, citing the opportunities to connect with women who offered advice about career-life balance. "It is integral for women to connect with other women and stick together," she said. "A lot of women experience very similar things, so it is nice to hear how to tackle those situations. It was amazing and so encouraging to be surrounded by like-minded individuals—more specifically, women—in STEM!" ❖

CECS team takes top honors at Accessibility Competition

A team of six computer science and computer information technology students won the 2017 CSUN Accessibility Competition, held February 3-5 on the CSUN campus. Entrants were challenged to develop a CAPTCHA alternative for elderly mobile users. CAPTCHA (Completely Automated Public Turing test to tell Computers and Humans Apart) is a verification technique that has become essential for defending against malicious bots in Internet operations. Most versions rely on keyboard input and language interpretation; for example, the most common CAPTCHA presents users with random, distorted characters and requires them to type them into a box.

On mobile devices, CAPTCHA can be challenging, especially for elderly users with physical impairments. Because of the small display area, lower screen resolution, display color combinations, limited processing power and virtual keyboards typical of smartphones and tablets, recognizing the images and inputting responses can be difficult. Consequently, CAPTCHAs are not accessible to all users, some of whom won't be able to carry out Internet or mobile tasks as a result. Visually impaired users, for example, will find it very difficult or even impossible to complete an image-based CAPTCHA.

Participants in the competition were required to develop their solution for older adults who fell into one of the following groups: deaf or hearing impaired; blind or visually impaired; or with other sensory impairments, such as fine motor impairments or memory, learning and cognitive impairments. A workshop on January 28 provided students with the basics of mobile development and machine learning, and four CECS teams competed in the weekend event.

The solution from the winning team (made up of Ayrin Golestanian, Beulah Preethi Vallur, Mohammad Laknahour, Carlos Sandoval, Kyle Astadillo and Yul Puma) made the mobile human verification process accessible by enabling users with visual impairments and limited fine motor skills to navigate the process via prompts from the phone. The team plans to continue refining their solution and to compete against other institutions in the 19th International ACM SIGACCESS Conference on Computers and later this year in Baltimore.

In addition to a talented team's savvy programming, support from industry helped make the victory possible, including sponsorship from Northrop Grumman and mentoring by Casey Smith, an accessibility specialist from CapitalOne. The competition was organized by Li Liu, an assistant professor in the computer science department. ❖

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In Memoriam

DOLORES RATCLIFFE

Dolores Ratcliffe, pictured here with her husband, dean emeritus Rick Ratcliffe.

The College of Engineering and Computer Science lost a longtime friend in April 2016, when Dolores Ratcliffe, wife of dean emeritus Rick Ratcliffe (who led the college from 1981-92), passed away.
A native of Los Angeles, Dolores began her career as a teacher, then quickly moved into administration, holding positions in school districts around the L.A. basin, where she specialized in training teachers and helping them plan their curricula. After 25 years, she left education to start her own business, Corita Communications, which offered entrepreneurial training and market research services. She also assumed leadership positions in business organizations, women's groups and the local chamber of commerce, and in 1984, she started the Association of Black Women Entrepreneurs, which became a national organization.

Dolores was a close friend of CECS for many years and a strong supporter of its students and programs. As recently as September 2015, she attended an AIMS² External Advisory Committee meeting, where she made a passionate plea to increase the number of women and minorities in engineering and computer science. She also served as a part-time faculty member in the CSUN Michael D. Eisner College of Education and David Nazarian College of Business and Economics.

"Dolores was always by Rick's side and will be deeply missed by all of us," said Dean S.K. Ramesh.

RUTH HORGAN

Ruth Horgan passed away in her sleep on September 2, 2016, at the age of 93. Horgan initially taught mathematics at CSUN, but in 1975 joined the computer science department, where she was one of the first faculty members. As a colleague, she was both a community builder and teacher. She retired in 1991. Prior to joining CSUN, Horgan worked at UCLA, coding an early digital computer (SWAC) for the National Bureau of Standards. She also served in the Marine Corps. After retiring, she was an active member of the League of Women Voters and the CSUN Association of Retired Faculty.

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Staff News continued from page 25

Mr. Malik Sooch joined CECS as the new director of development. Sooch is a seasoned fundraising professional, with over two decades of experience in nonprofit development, management and information technology. Most recently, he was at Caltech, where he was responsible for regional major gift fundraising. His background and experience are a great fit for the college, and he is already an asset to the CECS team as it seeks to build philanthropic support for college and CSUN programs. Sooch has an MBA in finance from the University of Redlands and a bachelor's degree from Indiana University.

Dean Ramesh with scholarship donors Pradip and Rekha Choksi and their scholarship recipients.

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Dean Ramesh with the Natel scholarship recipients.

The Shawn Solomon scholar with donor Brenda Anderson.

Dean Ramesh with scholarship donors Joseph and Nancy Owens and their scholarship recipients.

Dean Ramesh with the Southern California Edison scholarship recipients.

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Left, Associate Dean Robert Ryan, Edison scholar Erin Hong, a guest and Mechanical Engineering chair Hamid Johari.

Donors Joe and Nancy Owens with their scholarship recipient.

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