

# ENGINEERING AT SAN JOSÉ STATE

CHARLES W. DAVIDSON COLLEGE OF ENGINEERING

*powering* Silicon Valley



## Engineering For Good

# Dean's Message: Engineering for Good



## Greetings!

Welcome to the Spring 2017 issue of Engineering at San José State, which we have been fondly referring to as the “Engineering to Save the World” issue around our newsroom.

Our Associate Dean of undergraduate studies, Jinny Rhee, recently reminded me that over the past few years, students’ reasons for entering engineering schools have changed significantly. In the 1990s and the early 2000s many students pursued engineering degrees to get a good job. Today, increasingly more students say they are pursuing engineering degrees to help people and to make a difference.

At San José State University, we recognize, acknowledge, and support this noble shift from helping ourselves to helping others. Our pilot Engineering Projects in Community Service (EPICS) program was such a success last year that we’re expanding the program this year with more resources and more projects. You’ll read about some of the EPICS program’s initial projects and the inspirational students who worked on them in this issue.

You’ll also meet a classroom of Industrial Systems Engineering students who made trail mix and measured the effectiveness of their movements during the process. The sweet byproduct of these classes? Hundreds of pounds of trail mix donated to San Jose State University “Food Shelves”, which benefit students in need of immediate food assistance, and are deeply appreciated by students facing food insecurities.

I also want to call attention to our engineering Alumni Engagement Committee, formed just last year, which has already hosted a number of exceptional events that have connected alumni with each other, with our students, faculty, and staff, and with the University. The ways in which they have been facilitating relationships is just another form of Engineering for Good.

I hope you enjoy reading this issue, and if you have any comments, I’m listening.

Sincerely,

Ping Hsu,  
Interim Dean  
Charles W. Davidson College of Engineering

## ENGINEERING AT SAN JOSÉ STATE

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Cover photo: Eric Huynh ('17), Aerospace Engineering major and President of Sigma Gamma Tau, the Aerospace Honor Society.  
Cover photo by Lorrie Chan. Photos this page by Andy Ghosh (top) and Lisa Francesca (bottom).

# Research Forum News

The Davidson College of Engineering issued 20 mini-grants for faculty to work on research projects with student scholars between fall 2015 and summer 2016. Many talented students presented papers at the Research Forum this past May, including the following students whose papers will be published as conference or journal articles.

From the Biomedical, Chemical and Materials Engineering department, undergraduates Bella (Linh) Do, Weizhen Li, and Michael Balderrama. Their project is an SDS-PAGE analysis of snake antivenom peptide, with faculty advisor Claire Komives.

From the Computer Engineering department, students Rizen Yamauchi and Shaurya Chawla worked on a project named Exercise with a Friend: Using Collaborative Filtering for Activity and Fitness Buddy Recommendations, with faculty advisor Magdalini Eirinaki.

Also from Computer Engineering, undergraduate Jon Andrew Hernandez and graduate students Vidya Shankaramurthy and Sowmya Prakash did a project on Detection and Prevention of Cyberbullying, with faculty advisor Weider Yu.

From the Mechanical Engineering department, undergraduate Jeremy Nguyen's project is Robot Arm Control Using EEG Sensor Data; undergraduate Harpinder Dhillon worked on Stroke Rehabilitation through Advanced Sensors, Robotics, and Neuroscience; and graduate student Aditya Patil worked on Neural Signal Feature Extraction and Classification. The faculty advisor for all is Winncy Du (pictured here with waving robot).

Also from Mechanical Engineering, undergraduate Andrew Werdowatz worked on the Effect of Heat Sink Parameters on Thermal Spreading Resistance, while graduate students Joey Hoh, Sze Chung Wong, and Hung Nguyen worked on the Effect of Handheld Device Case Material on Skin Temperature. Their faculty advisor is Department Chair Nicole Okamoto.

*Photo of Winncy Du and robot by David Schmitz.*





# Going the Distance to Improve Customer Experience

## MULTIDISCIPLINARY TEAMS PROVIDE DYNAMIC CONDUIT BETWEEN ACADEMIA AND INDUSTRY

The burgeoning field of Service Systems Engineering and Innovation comprises designing, installing, operating, and enhancing the tools, environments, procedures, and relationships that result in targeted levels of service quality and customer loyalty.

San José State's **Center for Service Systems Engineering and Innovation (CSSEI)** aims to provide technological innovations and human-centered systems-engineering processes to improve a customer's access to services, and enhance that customer's service experience.

The CSSEI's research areas include:

- Creating or transforming innovative transportation systems
- Distribution of health care services, staffing of services, and applying technologies and cognitive assistants to improve access to those health services
- Assessments of government service quality and citizen satisfaction based on theoretical models of co-production

Director of CSSEI Dr. Louis E. Freund says "Our Center of Excellence forms collaborative teams of faculty, students, and industry partners to improve the performance of any service system or organization. The teams are multidisciplinary; they benefit from both domain expertise and cross-disciplinary expertise, and we provide a dynamic conduit between academia and industry."

The CSSEI is working on some key projects this year:

### **DYNAMIC PATIENT WORKLOAD ASSESSMENT VIA WEARABLE BIOSENSORS**

One of the Center teams is designing and validating a novel methodology to dynamically assess both maximum work capacity and actual workload. They will do this by combining multiple physiological data points monitored with research-grade wearable sensors. "Physiological data may include heart rate, respiratory rate, 3-axis motion and acceleration, galvanic skin response, and skin temperature," says Freund.

### **SPARTAN SUPERWAY TEST TRACK AND IMPACT STUDIES**

In the transportation field, the Center's long-term goal is to remove 100,000 South Bay commuter cars from US Highway



*Student scholar Kelli Sum manipulates a research-grade wearable sensor that will dynamically assess maximum work capacity. Photo by Lauren Hernandez.*

101 every day. This year's projects include building a test-bed demonstration track with a station near San José State's South Campus, and conducting a commuting study in Mountain View or Sunnyvale, two Silicon Valley cities that rely heavily on Highway 101.

"We are quite excited to get answers to the survey," says Freund. "Are there 100,000 commuter cars? Where are they coming from? Where are they going? We want to put this information together so that cities can decide and act."

### **MODELING COORDINATED CARE FOR MEDICAL USERS WITH COMPLEX NEEDS**

A third team is partnering with the California Department of Health Care Services to improve access to medical care for MediCal users, particularly high-risk or underserved children from birth to age five. They are doing this by developing a "healthcare trigger" system. Once the children are identified, the team will examine the status of care coordination between primary healthcare and early childhood community supports. They will then create a process that maps and identifies gaps in service, which they ultimately hope to address.

Companies that might benefit from the Center's research and cross-disciplinary domain expertise are invited to contact Dr. Barry Saeed, Associate Director for Industry Partnerships.

*In our next issue, explore SJSU's Center for Smart Technology, Computing, and Complex Systems.*

## An Adventure of EPICS Proportions

STUDENTS ACROSS THE COLLEGE EXPERIENCE HANDS-ON ENGINEERING, COMMUNITY SERVICE, PROFESSIONAL DEVELOPMENT, AND A SENSE OF GREAT PRIDE.



*Study Buddy team at work quality testing the new technology that grants access to Watson.  
Photo by Teresa Mercure.*

What does it take to create an underwater drone that counts Chinook and steelhead salmon in San José's creek system? How about converting an old shipping container into shower and laundering facilities to assist homeless clients?

In the Spring 2016 issue of this magazine, we introduced SJSU's pilot Engineering Projects in Community Service (EPICS) class, which provides service-learning and project-based opportunities for undergraduate students. Originally started at Purdue University more than 20 years ago, the EPICS program is now offered in more than 25 universities, including MIT and U.C. San Diego. Unlike other senior projects, EPICS student teams are interdisciplinary and work for real-world nonprofit clients.

As the class begins its second year, some students are working on projects created by their predecessors while others are venturing into new territory.

### WELCOME TO THE WORKING WORLD

Dr. Jinny Rhee, Associate Dean for Undergraduate Studies, initiated the pilot program, navigates it through red tape, and facilitates the EPICS class's connections with University-level personnel, and purchases.

"A study by CSU Northridge showed that involvement in community service increases both retention and graduation rates in engineering programs," she explained. "This was a profound motivation for us to start the program, and now we are realizing even more benefits. Students become involved with authentic

problems and build valuable connections with members of local industry and nonprofit communities. And it provides them with opportunities to mentor each other."

Nonprofits and government groups contact Jinny when they want to sponsor a project or a community partnership. "Our intention is to grow this course enrollment over the next few years," said Rhee. "As a point of comparison, the Purdue program enrolls around 400 students per year."

Professor Keith Perry brings deep industry experience from across the spectrum of job titles, a "get it done" attitude, and passionate dedication to his students in the EPICS class. "We started this as a senior project," he said, "but we've just approved two new EPICS courses in the upper and lower divisions so that our seniors can learn how to mentor others, while freshmen get a chance to do relevant community service."

"All three courses will meet at the same time. I also see us raising the bar, year after year. We are teaching these students how to be better employees, and I want them to be better every semester."

Professor Perry added, "By working with a real customer, it's already harder than a strictly academic class where you can invent anything. You have to learn how to pivot. People don't return your calls."

### STUDY BUDDY

Study Buddy is a software program that lets computer science students text questions to IBM's supercomputer, Watson, and

receive answers. It's like having Watson as a private tutor.

"I'm so excited about this project," said Joey Richardson (CmpE '16). "We are creating a completely new technology: we are training Watson to learn computer science so it can answer the questions. That means we have to supply all the information to Watson, as well as derive the questions that first and second year students are likely to ask. We are manipulating our knowledge so Watson can help anyone to study successfully."

"Here's the best thing," he added. "It's not an app. If you have a cell phone that can text, you can participate. So you don't need a smartphone." The implications are profound: this program could help students with basic, text-ready cell phones anywhere around the globe.

While Joey and his team intended to change the world, the EPICS class changed him. "I've found more purpose, more motivation to study and do my work. I'm driven to have this succeed and see it be used, and have it affect the educational system. I want education to be more accessible, more informal."

#### HYGIENE FOR THE HOMELESS

An old shipping container from the Port of Oakland was outfitted with axles, wheels and a hitch, and hauled to the Engineering courtyard where the original five-member Hygiene for the Homeless team turned it into a mobile shower and laundry facility. The Compassion Center and SJSU donated funds for the project, and local business Sunpower donated solar panels. The team interviewed other successful mobile shower projects, such as Santa Clara County's Dignity on Wheels and San Francisco's Lava Me, to gather best practices. They also worked with a start-up that manufactures shower heads using green principles of drought-endurance.

This team learned lessons about finding reasons, making business cases, and managing the physics of engineering. "It took us a long time to come up with the idea and solidify as a team," said Raymond Baldovino (ME '15), project manager and nonprofit liaison. "Then we all learned about creating a GoFundMe campaign." The 2016-2017 team is hard at work completing the project, including adding insulation, so that 14 clients a day can have comfortable showers.

#### ELECTRIC VEHICLE CHARGER: TEN TEAM MEMBERS FROM FOUR ENGINEERING DEPARTMENTS

"Imagine a Roomba that lives in your garage and has a tail," suggested David Chiu (CmpE '16), the team's industry liaison. "When your electric vehicle comes home, the charger connects and tells the "Roomba" the state of charge. If it needs more power, the device lines up the right magnetic attachments for that to happen. We're still coming up with its name, but it's sort of inductive, wireless, and autonomous."

Dr. Fred Barez, current Chair of Aviation and Technology, was the real-world customer. "We've been learning all about restrictions," said Daniel Khawaja (CmpE '16), project manager, facilitator, and fundraiser. "We don't get to design whatever we want -- it's what he wants. It would be much easier to design a solution for a "fun" problem. But it's exciting, too. We've been able to get critiques and ideas and help from industry professionals."

The Electric Vehicle Charger team managed the further complication of multidisciplinary membership: a large team trying to discuss the project with many perspectives and sometimes differing vocabularies. "I've historically been more of a work-alone guy," said Moises Negrete, (CmpE '16), "so the learning curve of working with a large group has sometimes been difficult. But now I feel more ready for whatever career is ahead."

“

By working with a real customer, it's already harder than a strictly academic class where you can invent anything. You have to learn how to pivot.

”

*Keith Perry,  
EPICS instructor*



*Keith Perry, community members, and the proud team of Hygiene for the Homeless stand in front of the shipping container that will soon become a shower facility. Photo by Teresa Mercure.*



# Five-Year Strategic Plan: An Update



In 2016–17 our key areas of focus and action include:

- ▶ **EVALUATING EFFECTS** OF NEW ADMISSIONS CRITERIA, ADVISING INITIATIVES, AND BLOCK SCHEDULING
- ▶ **UPDATING AND COMPLETING** SHOWCASE LABS AND BME OFFICE SUITE
- ▶ **EXPANDING SERVICE LEARNING PROGRAM** WITH NEW PROJECTS AND COMMUNITY/INDUSTRY PARTNERS
- ▶ CONTINUING **WEBSITE IMPROVEMENTS** FOR RELEVANCE AND APPEAL
- ▶ GROWING FLAGSHIP CONFERENCE: **WOMEN IN ENGINEERING**

- ▶ **ESTABLISHING TWO CENTERS OF EXCELLENCE**  
 CENTER FOR SERVICE SYSTEMS  
 ENGINEERING AND INNOVATION  
 CENTER FOR SMART TECHNOLOGY, COMPUTING, AND COMPLEX SYSTEMS
- ▶ 20 FACULTY **MINI-GRANTS** INVOLVED
- ▶ 53 STUDENT SCHOLARS IN RESEARCH
- ▶ 8 **RESEARCH PROFESSOR** APPOINTMENTS
- ▶ 24 **PROFESSIONAL DEVELOPMENT GRANTS** AWARDED
- ▶ **FELLOWSHIP AWARDS** FOR DISTINGUISHED STUDENTS

- ▶ **R&D PROJECTS** WITH INDUSTRY PARTNERS
- ▶ **EXTENDED STUDIES** PROGRAMS
- ▶ **CORPORATE CHAIR** POSITIONS
- ▶ **INDUSTRY/ STUDENT HACKATHONS**



# Hot New Engineering Programs Graduate First Classes

STUDENTS FROM CYBERSECURITY STUDIES AND BATTERY TECHNOLOGIES GIVE FAVORABLE REVIEWS

In December, 2016, San José State Engineering's Off-Campus Programs graduated its first classes from two of the hottest emerging technology disciplines: The Masters program in Software Engineering with specialization in Cybersecurity, and the Masters program in Engineering with specialization in Battery Technologies. Here, a few of the inaugural program graduates share their impressions of the program.

## CYBERSECURITY STUDIES

Michael Tjebben, product manager for Cisco's Trust Anchor Technologies, manages a portfolio of both hardware- and software-based technologies that build a secure foundation for Cisco products to protect customers from security threats. "I chose the SJSU-MSSE-Cybersecurity program so that I can better serve my customers and the community at large," said Tjebben. "I wanted to expand my knowledge into the software, network, mobile and web security areas to round out my security experience beyond hardware expertise. SJSU's MSSE-Cybersecurity program provided a terrific opportunity to earn my degree while working full time and from a remote Cisco campus. I have enjoyed the program very much and highly recommend it."

Justin Vayda, another member of the first cohort, is also based at Cisco, and enjoyed the opportunity provided by this partnership between San José State and Cisco to grow employee skills. "I learned a lot around security, both from a technical and business perspective, as well as the challenges facing cybersecurity today and in the future," said Vayda. "Having a class dedicated to business risk analysis was weird at first, but it really brought to light a different and very real aspect of security. Adding in the extra context of business decisions really helped me understand how and why cybersecurity is in the state it is in."

“Our backgrounds were professionally diverse, and collectively we had a deep bench of knowledge.”

*Kelly Davis,  
Battery Tech student*



## BATTERY TECHNOLOGIES

Gary Calderon chose the MS in Engineering with an emphasis in Battery Technology in order to update his technology degree in an area with strong market growth and to increase his clean- and renewable-energy experience. He already has two jobs (at Tesla and DNV-GL) that allow him to use his recently acquired battery technology skills.

"San José State was the only university that offered this graduate program for working professionals," he said. He added that he most benefited from instructors with industry experience, and gained a new network of colleagues who are experienced with battery technologies. He also appreciated the lab experience that involved building actual lithium-ion coin cells for testing.

Kelly Davis also chose Battery Tech. "I didn't want to spend more years broadly studying engineering theory, when, in my work experience, most of that theory goes unused," she said. "The laser focus on a specific topic with direct, real-world application to my present work led me to the Battery University program. I also didn't want to quit my job to go back to school, but this program was tailored to working professionals like myself."

She continued, "The most unusual and awesome part of the experience for me was the cohort nature of the program. My undergrad experience at a large school was competitive; fleeting classmates were rivals more often than partners. In this program you take every class with the same few people. Our backgrounds were professionally diverse, and collectively we had a deep bench of knowledge available. Chances were good that someone in the class knew about electrical engineering, photovoltaics, electric vehicles, analytical chemistry, failure analysis or grid integration. You get two years to work with and learn from your classmates, and that format enables a cooperative atmosphere. You're all in it together, and therefore supportive of one another."

# Faculty News

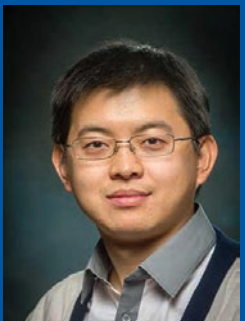
## WELCOME

We warmly welcome the faculty members who joined us in August 2016.

**David Anastasiu** | Assistant professor, Computer Engineering  
**Mohamed Badawy** | Assistant professor, Electrical Engineering  
**Francesca Favaro** | Assistant professor, Aviation and Technology  
**Xuan Guan** | Assistant professor, Computer Engineering  
**Farshid Marbouti** | Assistant professor, General Engineering  
**Anand Ramasubramanian** | Associate professor, Biomedical, Chemical, Materials Engineering  
**Gokay Saldamli** | Assistant professor, Computer Engineering  
**Vimal Viswanathan** | Assistant professor, Mechanical Engineering



Belle Wei



Kaikai Liu



David Anastasiu

## GRANTS

Promoting engineering education: Professor **Belle Wei**, Carolyn Guidry Chair in Engineering Education and Innovative Learning, and former Dean of the College of Engineering, is directing a project entitled “Collaborative Research: A Technology Pathway Program in Data Technology and Applications.” This project just won the support of the National Science Foundation (NSF) in the form of a grant of \$482,106 to San José State University Foundation.

Dr. Wei’s project is in response to rising U.S. demand for workers with the knowledge and skills required to fill an estimated 1.1 million computing jobs by the year 2024. “Women are drastically underrepresented in the nation’s technology talent pool even though they now make up more than half of all college graduates,” says Wei. “The Technology Pathways Initiative is a catalyst for systemic change, from campus to career, to educate more women innovators for the Digital Age.”

Computer Engineering assistant professor **Kaikai Liu**, who recently joined the college, was Principal Investigator on a grant proposal to develop a community infrastructure for interoperable emergency connectivity that can operate in austere conditions, provide its own power, and create linkages throughout the community and across jurisdictional boundaries. This project will deploy the edge devices in local communities with multi-modal communication modules as well as an external long range radio. Liu’s team (**Jerry Gao**, **Younghee Park**, and **Frances Edwards**) won an Early-Concept Grant for Exploratory Research for \$199,921.

Associate Dean **Ahmed Hambaba**, PI, won \$1,050,000 from Cisco for Lab Naming and a Cisco Chair Professorship.

Research & Development Faculty projects facilitated by Dr. Hambaba include:

1. **Shahab Ardalan**, **Robert Morelos-Zaragoza**, and **Melody Moh**, \$43,000 from Nokia to pursue applied research on 5G Radio and machine learning.
2. **Chandrasekar Vuppalapati**, research on IoT Edge Analytics, \$30,000.
3. **Kaikai Liu**, **Hyeran Jeon**, **Pedro Santa Cruz**, **Younghee Park**, Software Defined Networking (SDN), \$100,000.
4. **Younghee Park**, Software Defined Storage (SDS) course development, Nexenta, \$50,000.
5. **Kaikai Liu**, and **Gokay Saldamli**, applied research on data center and course development, Citrix, \$100,000.

Aerospace Engineering professor **Kamran Turkoglu** and several fellow SJSU professors, led by College of Science professor Sen Chiao, received a \$900,798 grant from the NSF for their project, “MRI: Acquisition of Hybrid CPU/GPU High Performance Computing and Storage for STEM Research and Education at SJSU.”



## ACCOMPLISHMENTS

Biomedical, Chemical & Materials Engineering Lecturer **Marc Privitera** was appointed to the technical advisory board of Canadian International Minerals. Principal engineer and co-founder of PreProcess in San Ramon, he holds numerous U.S. patents in the area of chemical process design.

Electrical Engineering professor **Robert Morelos-Zaragoza** has been selected as a Fulbright U.S. Scholar in Mongolia for the spring 2017 semester. Part of his work will be to launch new Signals and Systems and Digital Signal Processing courses.

SJSU honored **Akthem Al-Manaseer** (Civil and Environmental Engineering), **Ahmet Bindal** (Computer Engineering), and **Sotoudeh Hamedi-Hagh** (Electrical Engineering), for their 2016 publications at its Annual Author Awards in early November. Dr. Al-Manaseer co-authored a book titled *Guide to the Postal Stationery of Iraq*. Drs. Bindal and Hamedi-Hagh published a book titled *Silicon Nanowire Transistors*.

**Mohamed Fayad** of Computer Engineering has a book forthcoming from Auerbach Publications: *Stable Analysis Patterns for Systems*.

Computer Engineering's **David Anastasiu** received the Best Research Paper Award and the Next Generation Data Scientist Award at the 2016 IEEE International Conference on Data Science and Advanced Analytics. He is the first awardee in this prestigious NGDS award.

Aviation & Technology department's **Francesca Favaró** presented remotely at the PSAM13 Conference in Korea, showing her video of Temporal Logic for System Safety Properties and Hazard Monitoring.



Ahmed Banafa



Laura  
Sullivan-Green



Sigurd Meldal

## IN THE NEWS

Civil and Environmental Engineering chair and professor **Laura Sullivan-Green** was interviewed about her flipped-classroom research project, for which SJSU received a \$3 million First in the World grant. Electrical Engineering Professor **David Parent** is also working on this project.

ESSC advisor and ENGR 10 instructor **Ahmed Banafa** is listed at the top of Five Tech Voices You Should Be Following on LinkedIn.

Civil and Environmental Engineering associate professor **Jae-Ho Pyeon** and the Mineta Transportation Institute released a report discussing the state of the art for construction and operation of long tunnels used for high-speed rail. The report was featured in the Transportation Research Board's March 2016 newsletter.

Mechanical Engineering professor **Buff Furman** and SJSU's Spartan Superway Project was featured in the Podcar City and Advanced Transit July newsletter.

Aerospace Engineering professor **Periklis Papadopoulos** was interviewed by KTVU news on the Moon Express story.

**Virginia Lehmkuhl-Dakhwe**, director of the Jay Pinson STEM Education Program, was quoted in an opinion piece published at *InsideSources*, citing the need to train more students in cybersecurity education. "The number of jobs in information security is going to grow tenfold in the next 10 years," said Lehmkuhl-Dakhwe. "We have to do much more if we want to meet that demand at the university level as well as K-12."

Computer Engineering's **Sigurd Meldal** testified in a patent trial in the District of Delaware between MobileMedia Ideas (MMI) and Apple. The jury found infringement by Apple. Dr. Meldal, the sole technical expert called by MMI, had previously testified as a smartphone expert in other patent cases, including another trial between MMI and Apple in 2012.

# The Great Trail Mix Mix-off

INDUSTRIAL SYSTEMS ENGINEERING STUDENTS LEARN HOW TO CREATE THE MOST EFFECTIVE PROCESSES WHILE MAKING IMPORTANT CONTRIBUTIONS TO THE CAMPUS.



Photo by Teresa Mercure

Anticipation runs high as students cover long tables with parchment, set up their work stations, and pull on surgical gloves. Large stainless steel and plastic bowls, Tupperware, and even colanders are loaded with carefully chosen ingredients: Cheerios in multiple flavors; M&Ms; yogurt raisins, banana chips (very popular); slivered almonds; goldfish; Chex and Kix cereals; mini pretzels. As they situate their ingredients and tools, students chat and shift their weight from foot to foot like race ponies before the starting gun.

Industrial Systems Engineering 120 is a work methods design and management class taught by assistant professor Dan Nathan-Roberts. He conducts research at San José State University in cognitive ergonomics; his research interest lies at the intersection of human factors, design, sociotechnical work systems, and non-hospital health care. In his ISE 120 class, students are taught about ergonomics, taking human factors into account, and designing experiments that are safe, efficient, and user-friendly.

“First we had to select a semester-long project,” explains junior Tanita Jha. “We almost chose the process of making an ice-cream sundae.” But the class ultimately decided to examine the process of making trail mix, a mixture of nuts, seeds, dried fruits and sometimes chocolate that is eaten as a snack. Trail mix is favored by hikers because it’s a portable and tasty way to access instant caloric energy; students like it for the same reason.

In the class’s first phase, teams of three to four students made 20 baggies of trail mix according to a pre-set layout of ingredients and tools. They had to analyze the tools and motions that were used, calculate the time performing the motions, and make predictions. The fastest team completed their task in ten minutes and thirty seconds.

During the second phase, newly re-assigned teams broke the

procedure into elements and performed a time study, adding in factors such as waste variances. “There’s a trade-off between rush and waste,” Jha says. “We decided not to do it as fast as we can, but as fast as our abilities allow, which made our actions more precise and lowered the level of wasted motions and ingredients.” This time, the fastest group clocked in at eight minutes and thirty seconds. “There’s also a rework factor,” adds Jha. “You had to allow for mislabeled bags.”

For the third phase, students calculated ergonomics and cost in addition to all the other factors. The students, in a third new configuration of teams, were free to change the layout to align with best ergonomic principles in order to reduce time. Rather than a single scale to weigh the mix, some teams brought two. Ease-of-handling factors led one team to work with sunflower seeds rather than sticky raisins, and even stickier mini-marshmallows. Managing the expense factor, some teams substituted granola and Chex for more costly almonds.

There were only two unbreakable commands: Safety first, and absolutely no peanuts or peanut oils of any kind, after some students reported peanut allergies. While students were free to take home as much trail mix as they wanted, many chose to donate much of the mix to fellow students. “Over the course of the semester these students have manufactured more than 150 pounds of trail mix for food pantries on campus that are used by students with food insecurities,” says Dr. Nathan-Roberts (who has invested significant dollars of his own to ensure his students have parchment, baggies, and sanitary conditions in which to work). “I’ve been working with the Student Hunger Committee to get the bags of trail mix distributed all over campus, and trail mix is one of the most requested items by students.” Donations are always welcome; simply visit <https://commerce.cashnet.com/HFESJSU>.

Back in the classroom, all teams are finally ready to assemble their bags. Dr. Nathan-Roberts reminds them to enter predictive factors into their collective spreadsheet. “Remember to think about the waste, about the rework. Enter your data as fast as possible. What’s the most important thing in this class?” “SAFETY,” yell the students.

Together, they count down. Then there is no more talk, only the rattle of candies and hollow cereals being scooped and weighed. The students tackle real-world assembly problems. The large surgical gloves interfere with peeling labels from their backing. One group member drops something and his colleagues groan. At another table, a team member holds her baggie close to the scale to await the scoop of trail mix, the baggie mostly closed to save precious seconds. The smell of toasted corn rises and mingles with the aroma of chocolate.

Three minutes in, all that can be heard is a rattling, clattering, cascading symphony from all corners of the rooms, accompanied by soft underlying shakes of plastic bags. “Just past four minutes,” someone murmurs, photographing her team. Finally, the first team to finish enters their data onto the screen. Scooping, weighing, bagging, and boxing 20 bags: five minutes, eighteen seconds.



# Fancy Flying in Wichita

SAN JOSE STATE TAKES FIRST PLACE IN 2016'S AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS (AIAA) ANNUAL DESIGN/BUILD/FLY COMPETITION.

The competition began in 1977 in order to let students gain practical knowledge. Every year, professional engineers create new missions for a radio-controlled aircraft. Student teams must then design, build, and fly their planes via remote control.

The mission in 2016 was to mimic distributed manufacturing, in which aircraft ferry components of other aircraft to manufacturing locations. The San José State Aerospace team's design prevailed, conquering 40kph wind along with design entries from 68 other colleges throughout the nation and around the world.

For the competition, teams had to build two planes – a carrier aircraft and a smaller production aircraft. The carrier plane had to fly by itself, and also to carry the second aircraft in one piece or in components over multiple flights.

The production aircraft then had to complete a flight carrying a one-liter (32-ounce) bottle of Gatorade as the payload. A “bonus” mission also required teams to assemble the production aircraft, if disassembled, and perform a tip test and systems check within two minutes.

Historically, teams with previous experience in the competition tend to do well. SJSU's Aerospace team has been a perennial top contender, and was also the winner of the 2012 competition. With senior Aerospace Engineering major Tyler Sanders at the helm, SJSU's design won, due in part to Sanders' leadership, the team's familiarity with the competition, practice flights, design modifications, and also a key piece of veteran advice.

“From a logistics standpoint, this year's task was a little bit harder,” Sanders says. “Last year's was a little more dynamic. You got more points for speed. This year really came down to being able to get one airplane fully assembled into another one, then really nailing the weight and getting it as light as you could.”

The team's first move was to analyze the scoring system. They quickly gave up an approach that required disassembling the production aircraft, which would increase the rated aircraft cost and thus lower the overall score. Instead, the team opted for a



Photos by Anindya 'Andy' Ghosh

“Russian nesting doll” design, making the production aircraft fit into the inside of the carrier aircraft. The larger aircraft was about 1 meter long and weighed about 91 kilograms, making it one of the smaller aircrafts in the competition.

The team also drew on outside advice as well. Sanders' father suggested a box tail, like those on the World War I-era planes, in order to reduce the width of the smaller plane's tail. That in turn would enable shrinking the larger plane's rear section. But the students found that the box tail design didn't handle as well as they hoped.

Another piece of advice the team followed was to conduct at least two-dozen test flights, far more than most teams at the competition. “You go to races to race, you don't go to test,” Sanders says, quoting his father. “To finish first, you have to finish.”

During the competition, the aircraft “got a little beat up” by Wichita's notorious winds. However, the design performed as expected. In the end, San José State was one of 12 teams out of 69 to receive full scores on all three flight rounds--making SJSU the top finisher for this 2016 competition.





# Student News

It's been a busy year for our students. The student clubs at the College of Engineering are, according to those in the know, some of the most active clubs on the SJSU campus! The following is a taste of what they've been creating.



## MARS ROVER CHALLENGE

This year, the San José State Robotics Team competed alongside 29 other international teams in the University Rover Challenge. The team scored 7th in the 14-team Phobos finals. You can watch a video about their rover, Nessie, at [bit.ly/sjsurobotics](http://bit.ly/sjsurobotics).

*Photo by Keven Gallegos (CmpE '17).*



## ANNUAL BAY AREA BIOMEDICAL DEVICE CONFERENCE

The students of the award-winning SJSU Biomedical Engineering Society hosted the 7th annual Bay Area Biomedical Device conference, a jam-packed day of insights and challenges from CEOs and industry speakers.

*Photo by Lisa Francesca.*



## CONCRETE CANOE

San José State University's Concrete Canoe Team, under the leadership of Hester Yu, placed 2nd overall at the American Society of Civil Engineers Mid-Pacific Regional Conference hosted by the University of Nevada, Reno.

The team, consisting of more than 25 students from seven engineering disciplines, spent the school year designing, constructing, and finishing their canoe, Axiom. Shown here is the paddling team.



# Alumni Events at the College of Engineering

The College of Engineering set precedents in 2016 with completely new Alumni Engagement events. Thank you to all of the alumni who attended! The following is a snapshot of some of our very successful events.



Photos (clockwise): Alumni-Student Career Panel, Happy Hour, Homecoming Tailgate Party



(Photos this page by Teresa Mercure and Lisa Francesca)

## SPRING: ALUMNI-STUDENT CAREER PANEL

Eight alumni panelists shared their advice with students during our “Engineering Today: Qualities & Skills Needed to Succeed” discussion. “The engineering degree just gets you to the interview,” panelist Mary Hoang told students. “But teams, clients, management, leadership -- they all require interpersonal relationship skills, and if you talk about your experience with these skills, you are miles ahead of the other applicants.” Thank you to our panelists for their time, and gracious willingness to answer all the students’ many questions.

Panelists: Anne Narimatsu, Mechanical Engineering, Intuitive Surgical | Mary Hoang, Civil & Environmental Engineering, HydroScience Engineers | Karen Ann Brouwer, Industrial & Systems Engineering, Apple | Napoleon Tumonong, Biomedical Engineering, ApoMed Consultants | Alberto Vidal, Computer Engineering, Intel | Sagar Vikani, Software Engineering, eBay | Prasad Panchalan, Electrical Engineering, Jawbone | Jacob Latone, Chemical Engineering, DuPont.

## FALL: HOMECOMING TAILGATE PARTY

This year we also hosted our inaugural Engineering Tailgate party during the 2016 SJSU Homecoming Game. With a grilled lunch, door prizes, and more than 50 faculty, staff, and alumni in attendance, the event was an excellent occasion for Spartan spirit and fellowship. Patrick Landrum (ME ‘07), Priyank Kothavi (EE ‘13), and Edgardo Ochoa (CEE ‘10) were our prize winners. Plans for a 2017 Homecoming Tailgate party are already in the works!

## SUMMER: HAPPY HOUR

Our inaugural Alumni Happy Hour took place on July 21st at the Old Wagon Saloon & Grill in San Jose.

Alumni caught up with old classmates, and expanded their networks through new friends. “It was a nice way to get in touch with old classmates and revisit one of the venues I frequented when attending college,” said one attendee.

Overall, it was a great event, and one that we hope to continue. Thank you to the Alumni Engagement Committee for hosting, and to the more than 80 alumni who attended.

Keep an eye out for upcoming alumni events at SJSU Engineering Alumni on Facebook.

### GET INVOLVED!

We’re looking for a few new members to join the Alumni Engagement Committee and help brainstorm, facilitate, and enjoy events like these! If you want to learn more about the Alumni Engagement Committee and what we do, please contact us at [engineering-comm@sjsu.edu](mailto:engineering-comm@sjsu.edu)

# Alumni News



The College of Engineering wants to stay up to date with our Alumni. Send us YOUR story!  
<http://bit.ly/alumnotes>

## Tom Ashburn

*BS Electrical Engineering, '70, MS '72*

Retired from Raytheon in 2007, Tom spent his career in defense electronics for various companies. Tom has met a lot of interesting people and worked on many very challenging projects, and thanks the Charles W. Davidson School of Engineering.

## Yorkman Lowe

*MS Industrial and Systems Engineering, '82*

Retired from UPS after 25 years in 2008, Yorkman currently volunteers for historical and architectural organizations, and also for the National Park Service as a summer tour guide on Amtrak's Coast Starlight train between San José and San Luis Obispo.

## Mark W. Eddy

*BS Aviation and Technology, '93*

Has worked for the State of California for 22 years, with the past two as an air quality engineer. Mark manages the State Referee program, inspecting vehicles that cannot be smogged at a regular station. He says, "It keeps me busy, and the days go by quickly."

## Michelle Davis Vargas

*BS Industrial and Systems Engineering, '96*

Is an ASQ manager of quality/operational excellence certification. Michelle is currently training to become ASQ Lean Six Sigma Green Belt certified, and works at Illumina. Michelle thanks her degree for landing this dream job.

70s

## Felipe F. Calderon

*Industrial and Systems Engineering, '74*

Is currently quality and manufacturing manager at Mountz in San José. Felipe has spent 22 years in manufacturing engineering at companies such as Northern Electric, TRW, Data General, and Jabil.

## David Fitzgerald

*BS Aerospace Engineering, '83*

Is currently a United Airlines 777 captain at San Francisco International Airport.

80s

## Wayne Woodard

*BS Industrial and Systems Engineering, '87*

Is the CEO and founder of Argonaut Manufacturing Services headquartered in Carlsbad, CA. Argonaut is a contract manufacturer dedicated to the life science and molecular diagnostics reagent and consumables markets.

## Ivar Satero

*BS Mechanical Engineering, '93*

Appointed this year as director of San Francisco International Airport. Satero previously held the position of deputy director of design and construction and has worked at SFO for 22 years.

90s

## Yves Zsutty

*BS Civil and Environmental Engineering, '93*

Oversees San José City's Trail Program which seeks to develop a 100-mile interconnected trail network for recreation and active transportation. San José has one of the nation's largest urban trail networks with over 57 miles already developed.



**Ashit Joshi**

*MS Computer Engineering, '06*

Is currently the Vice President of Engineering at Chegg. Ashit wants fello alumni to know that Chegg is always interested in speaking with great talent!

**Hiren Shah**

*MS Electrical Engineering, '08*

Got married in 2014 and currently works at a health-care organization.

**Kevin Rivas**

*BS Technology, '10*

Currently works as a manufacturing engineer. Kevin has been prepared thoroughly by the Aviation and Technology degree.

**Priyanka Upendra**

*MS General Engineering, '14*

Received the Biomedical Instrumentation & Technology Best Article 2015 award at the 2016 Association for the Advancement of Medical Instrumentation conference. Priyanka then became the compliance manager at Intermountain Healthcare in Salt Lake City, Utah.

**Andrew Masterman**

*MS Aerospace Engineering, '15*

Was hired after graduation in 2015 by Space Exploration Technologies, and is currently celebrating a 1-year anniversary with the company. Andrew has since worked on both first and second stage engines that flew on ten individual Falcon 9 rockets.

00s

**David Luu**

*BS Computer Engineering, '06*

Currently works at Mist Systems as member of technical staff. Mist is a startup in the wireless and location services market.

**James Martin**

*BS Mechanical Engineering, '10*

Started as an intern, now a senior solutions engineer at a data and analytics company.

**Kyle Schmidt**

*BS Mechanical Engineering, '14*

Works for Altwork as a mechanical engineer and helped launch Altwork Station, Altwork's first product, a workstation for high intensity computer users such as engineers, software developers, and game designers.

10s

**Jessica Chavez**

*BS Civil and Environmental Engineering, '15*

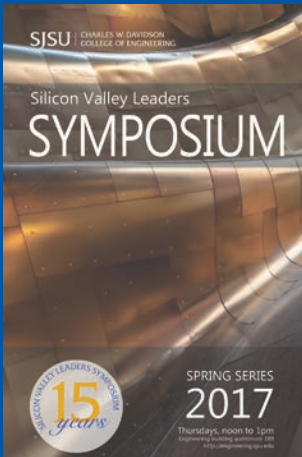
Recently cofounded a new Civil Engineering company, BC Engineering Group, in Sonoma County. Jessica is excited about the new opportunities and a promotion to wastewater division manager, while still performing project engineering tasks.

**Afshan Rehman**

*BS Industrial and Systems Engineering, '15*

Currently works at Kaiser Permanente IT campus located in Pleasanton, CA. Afshan started as an application engineer/programming analysis associate and just got promoted as a web application engineer.





## SVLS

One of the best traditions of the Charles W. Davidson College of Engineering, and now in its fifteenth year, the Silicon Valley Leaders Symposium hosts prominent leaders who discuss how to succeed in today's highly competitive global economy. Join us on Thursdays from noon to 1 p.m., Engineering building auditorium 189. For the most up-to-date schedule, visit: [bit.ly/SJSUSVLS](http://bit.ly/SJSUSVLS)

## WiE

The Third Annual Women in Engineering conference will take place March 25, 2017. This extremely popular conference strives to provide professional and leadership development while empowering women in engineering. To learn more please visit <http://sjsu.edu/wie>

## ANNUAL ENGINEERING AWARDS BANQUET

The theme of this year's banquet is "Making Connections and Celebrating Partnerships." This great event will take place on April 20th at 6pm. To sponsor or participate in our first-ever recruitment fair at the Banquet, please contact Sanela Latic at [sanela.latic@sjsu.edu](mailto:sanela.latic@sjsu.edu) or visit <http://engineering.sjsu.edu/banquet>

## Engineering Student Spotlight: Michael Lee



**Michael Lee** has been surrounded by engineering since he began learning how to build computers at the age of 4. He watched his father work at Cisco Systems and as a student at Valley Christian High, Mike was part of a team that created the first fully automated potential plant growth experiment in outer space for the International Space Station.

One reason Mike chose SJSU was the Silicon Valley Engineering Scholarship, which allowed him to attend college and graduate debt-free. Mike credits the Davidson College of Engineering's faculty and staff, as well as his peers for making his college experience so good. Mike is a committed member of student organizations such as the Mathematics Engineering Science Achievements (MBSA) program and the 100 Black Men Collegiate. A product management intern at Hitachi Data Systems, Mike is also growing his new business, Coldbrew Creative, a marketing and creative agency.

We recently sat down with Mike and asked him about his current projects as an emerging entrepreneur and leader.

**CoE:** What are some challenges you've faced as an entrepreneur?

**ML:** Balancing it all on top of school work. I spend so many late nights at the library. Even when I go home, I'm still working. In the beginning, I made the mistake of not asking for help—but I really needed a mentor who could show me the ropes of the industry, and how to work with people and have partners. You have to learn quickly who you want to get involved with and whether or not people are in it for the long haul.

**CoE:** Do you have any specific industry leaders or mentors you look up to?

**ML:** I admire my mentor, Bill Kendricks. Others include Sally Pera, Quincy Phillips, Damon John, Ken Coleman, and of course, my mom. All these people have so much determination. They have such drive and eagerness for learning more, and they encourage others.

**CoE:** It seems like you have a big passion for encouraging others.

**ML:** I want to go into entrepreneurship full-time after I graduate. I also want that path to lead into investing but I don't want to solely invest in companies, I want to invest in people. That's the most important part of any business, not what they're doing, but who's doing it.

**CoE:** Do you have any words of encouragement for current engineering students who are looking into entrepreneurship?

**ML:** Strive to be the best person that you can, be nice to everyone, and get to know as many people as possible. You never know, ten years down the line, someone could be a great connection. Remember that failure is part of success. Look at failure as an opportunity to grow, because you can learn a lot from your mistakes. And don't be afraid to ask for help. Chances are, someone has been there before.



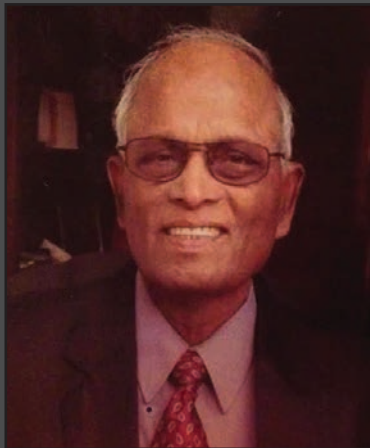
# In Memoriam

## Thomas Leonard

**August 18, 1922 - February 27, 2016**

From 1953 to 1985, Tom Leonard (MS Aeronautics/Education '56) served as an associate professor, then full professor and Aeronautics department chair. In 2004 Tom was recognized by the National Aeronautics Association with the McDonald Distinguished Statesman of Aviation Award. An endowment scholarship in his name will be given annually to an SJSU student majoring in Aviation to attend the University Aviation Association's Educational Conference in Washington, D.C.

Tom is survived by his wife of 66 years, Ann, son Robert, daughter-in-law Dividica, and granddaughters Claire and Kathryn.



## Rameshwar Singh

**July 2, 1937 - May 2, 2016**

Dr. Singh taught for more than 40 years in the Department of Civil and Environmental Engineering. With a PhD from Stanford, he taught water resources courses to both undergraduate and graduate students, and provided leadership in the community through the Santa Clara Valley Water District and the National Society of Professional Engineers. He also served as a member of the California State Water Board. He is survived by his wife, Shanti, son Vinod, daughter-in-law Neeti, and daughters Veena, Usha, and Shiela.

IN MEMORIAM

JAINISH PATEL AND BHAVESH PATEL

SJSU MECHANICAL ENGINEERING 2010



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“I chose San José State after my military training and active duty tour because it has a challenging engineering program and is surrounded by Silicon Valley industry.

I’ve taken advantage of nearly every program this school offers its students for personal and professional development. Between those and my engineering studies, I feel confident that I can compete in the job market with any student from big-name schools.

A lot of us students also work, which adds dimension to our personalities. That makes us distinctive and successful in the Valley.”

Michael Souza (Mechanical Engineering ‘17), is the recipient of one of the National Science Foundation’s Engineering Leadership Pathways Scholarship and a Silicon Valley Engineering Scholarship. He founded Bridge Engineering Student Transition, a mentoring program for new transfers and freshmen.

*Photo by Teresa Mercure.*



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