

# **SANECTION**

NEWS FROM THE COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

Issue Seven // Fall // 2014

# **Tales of Two Classes**

When Pat McGuire (M.S. '69) stops by the Cal State Fullerton campus, he marvels at the differences between the presentday engineering program and his experience four decades ago.

"The change is extraordinary," says McGuire. "There wasn't nearly as much infrastructure in the '60s, and there are far more program choices now." McGuire was among the first 27 students awarded engineering degrees from Cal State Fullerton in 1969. Since then, the CSUF College of Engineering and Computer Science has grown into seven departments and programs of study; expanded its curriculum, electives, and student support offerings; and become the fastest-growing college on campus. And while that first graduating class in 1969 was all male, many of today's successful students and graduates are female. Some things haven't changed, however. In 1969 as now, real-world application of knowledge was a huge benefit to students. "I was already well into my career as a design engineer when I learned CSUF was offering a systems engineering degree," says fellow alumnus Ronald Frazzini (M.S. '69). "I was inspired to take what I learned in the classroom and apply it immediately to a real problem at my job. That's sometimes lacking in many degree programs. Applying knowledge to real problems outside the university sphere is valuable."

#### From the Dean



Recently, our faculty directed a tremendous amount of energy and effort toward preparing for the ABET re-accreditation visit in September. Continually improving our programs,

courses, and instructional infrastructure, along with hiring new faculty, helped us secure reaccreditation for all of our undergraduate programs. Accreditation verifies the quality of our program and ensures our students are prepared according to the standards of their chosen profession.

One of the gratifying elements of the ABET visit was the commendations we received for the quality of our instructional facilities. The team members were genuinely impressed by our computer classrooms, laboratories, machine shop, and the technology-savvy general-purpose classrooms. Preparing for ABET re-accreditation also gave us an opportunity to review our achievements over the last five years. During that time, we leveraged a combination of state and private resources and invested \$3.2 million toward the overall improvement of our instructional infrastructure. Another noteworthy change is growing enrollment. Our fall 2014 enrollment reached a headcount I could not have imagined 13 years ago, with enrollment soaring to 4,222, and 71 percent of those are undergraduates.

Outside the classroom, our faculty members have been busy writing grant applications, and many have received funding. Student engagement, both independent and collaborative, is high. Two examples include our mechanical engineering students who have restarted the SAE Baja project and intend to compete in an off-road vehicle competition, and a mechanical engineering student, Scott Archbold, who used a bout with a sinus infection to inspire the invention of a device that would ease sinus congestion and aid sinus therapy.

Our alumni and industry partners are essential to the accomplishments and continued growth of the College. Here is where you come in. I invite you to become our partner in maintaining our excellence for years to come.

Raman Unnikrishnan, Ph.D. Dean

# **Tales of Two Classes**

#### CONTINUED FROM PAGE 1

Recent alumni agree. The CSUF College of Engineering and Computer Science continues to provide hands-on education that prepares graduates to solve problems in today's world. Internships, a wide variety of electives, student chapters of professional organizations, and the senior design project—none of which were even on the radar when Frazzini and McGuire were on campus—are now important aspects of the engineering curriculum.

"Through my internship at Carlton Forge Works, I was able to apply what I learned, on the job," explains Alexandra Dominguez (ME '14). Today, Dominguez works at that same company as a quality engineer, helping metallurgical engineers determine the best way to design a forging process within quality standards.

Another recent graduate, Rachel Caballero (ME '14), considers the elective courses and the senior design course as instrumental in preparing her for a career in mechanical engineering.

"Elective courses allowed me to experience fields including computer programming using MATLAB, design of fluid and thermal systems, and fabrication methods," says Caballero, who originally wanted to pursue biomechanics but found computer modeling and design engineering more appealing. "The senior design class was instrumental in developing my individual and collaborative engineering skills." Caballero is now using those skills at Titan Semiconductor Tool to design and build models of sockets and other fixtures used in semiconductor chip testing.





**From the archives** – Students in the 1970s test a ramjet engine in a mechanical engineering lab.

While Caballero and Dominguez are just starting on their career path, both McGuire and Frazzini provide an encouraging example of how applying an engineering education can lead to a lifetime of job satisfaction and a career that helps shape the future. McGuire published a book, "Basic Statistical Quality Control," which later contributed to an improvement program for the U. S. Air Force missile guidance system. He started his own company, McGuire and Associates, and also co-founded Professional Business Applications, which encompasses web development, software support, and manufacturing and accounting software.

"My study of systems engineering provided a wider view than most disciplines," says McGuire. "In a complex system, you have to consider the effect of one sub-system on another, and that has so many applications. I would definitely choose CSUF's program if given the opportunity again."

Frazzini went on to work as a senior staff engineer at Honeywell, earned his Ph.D. postretirement and now serves as a part-time instructor at both the University of Minnesota and Metropolitan State University.

"Systems is a thought process, a way of approaching a problem, and that extends beyond engineering," says Frazzini. "I've seen lifelong benefit from that course of study." <sup>(2)</sup>



**Joseph Renton (CS '88)** received the 2013 Ernst & Young Entrepreneur of the Year award, recognizing his nearly two decades of business achievements.

"I would eagerly recommend Cal State Fullerton for future computer science students. The curriculum is designed to prepare future software engineers for success by inspiring them to creatively tackle real-world problems and develop effective solutions."

**Joseph Renton** 

# The Importance of Being Earnest and Educated

Joseph Renton (CS '88) caught the entrepreneurial bug early in his career. Knowing the risks and responsibilities of starting his own business motivated rather than deterred him, and he relentlessly sought a path to achieve his dream.

Enter Cal State Fullerton. While working in the microprocessor lab at Rockwell International in Anaheim, Renton realized that a degree in computer science would be his ticket to career advancement, opening the door to a variety of new opportunities.

"My arrival at CSUF was more opportunistic than well thought out and planned," admits Renton. "Living in Orange County and working in Anaheim made the Fullerton campus very convenient, and the class schedules fit the needs of working students. My fatherin-law was a technical manager at Rockwell, taught graduate classes at CSUF in the evening, and had acquired an advanced technical degree there so, needless to say, he was enthusiastic about my decision."

Renton enjoyed all his programming classes, especially software development. He found the instructors and assignments to be challenging and the curriculum designed for real-world application.

"My time at CSUF taught me many things regarding my future business pursuits, but one lesson stands out. You have to weed out fads: technologies of the day, flash-in-the-pan programming languages, or very small niche markets that are not worthy of pursuit, no matter how passionate others may be about them. It is a keen skill to know what not to pursue."

#### **Rising Through Risk and Reward**

Upon graduation from Cal State Fullerton, Renton was promoted to the technical staff at Rockwell. He was quickly identified as a high-potential engineer and appointed to the Engineering Rotational Program. After less than eight months, he knew the job wasn't for him. "I knew that I would never be a very 'good' employee and decided to go out on my own and find a way to create some sort of value-added business," he says.

Renton saw an opportunity to provide technical software consulting to a variety of clients. He founded Systems and Software Enterprises (SSE) in late 1995, incorporating the business in March 1996. Renton's vision for SSE was to provide world-class systems and software consulting to Orange and Los Angeles county businesses.

Renton recognized in-flight entertainment as an emerging market and led his five-guys-inthe-garage startup to become the third-largest provider of in-flight entertainment solutions in the world. He has also built businesses in avionics and technology consulting. Through multiple economic cycles, an ever-evolving technology landscape, and significant roadblocks, Renton invested thoughtfully, defined a clear direction, and led his companies boldly. In December 2012, this culminated in the sale of SSE to a large French aerospace company, Zodiac Inflight Innovations.

In 2013, Renton received the Ernst & Young Entrepreneur of the Year award, recognizing his nearly two decades of business achievements.

"I was humbled by this award and the nomination by my colleagues," he says. "Frankly, each of the nominees had a pretty amazing story and was worthy of the award."

In February, Renton will serve as the 2015 Professor for a Day keynote speaker. His message will focus on entrepreneurial intent and how to combine Cal State Fullerton's world-class education with a perpetual desire to overcome real and self-imposed obstacles to pursue and achieve individual goals. ©



**Salvador Mayoral**, assistant professor of Mechanical Engineering, plans to develop an aerospace specialization within the Department of Mechanical Engineering.



If you have ideas or can help with the restoration of these aerospace facilities, contact Salvador Mayoral at smayoral@fullerton.edu

# **Rebuilding Aerospace:** Why Wind Tunnels Matter

#### When he arrived at Cal State Fullerton last year, Salvador Mayoral, Ph.D., said the wind tunnel lab looked like it had been used as a storage room.

"Half the space was filled with senior design projects from previous years, some from more than a decade ago," says Mayoral, assistant professor of mechanical engineering. "The low-speed wind tunnel had not been used in five years – the sting balance was bent and rusted, the data acquisition was outdated, and the inlet needed to be replaced. The inlet turbulence screens were loose and stained, as if someone had spilled a drink on them; paint was chipping off the pipes; and everything had a thick layer of dust on it."

Through the chaos, Mayoral saw potential. Given the scientific community's growing interest in unmanned aerial vehicles (UAVs), the low-speed wind tunnel could serve as a teaching, research, and design tool, allowing for demonstrations of basic aerodynamic principles. Students conducting research and design projects would be able to acquire both test data and valuable, hands-on experience.

Mayoral said he considered reviving the tunnel as the first step in developing an aerospace specialization within the Department of Mechanical Engineering.

"A functional wind tunnel allows for an aerospace laboratory course to complement the existing fluid mechanics course and a new aerodynamics course," says Mayoral. "Even before the specialization is established, students working on senior design projects, such as the Titan UAV and the Formula SAE car, can use the wind tunnel to test their designs."

#### An Aerodynamic Approach

Mayoral began restoring the wind tunnel last spring. He spent the summer in the machine shop, designing and manufacturing a new sting balance and an automated, two-dimensional traverse system. He worked with graduate student Shashank Reddy to replace turbulence screens, add a honeycomb cross-section to create uniform flow, and integrate a six-axis load cell, a differential pressure sensor, and eight static pressure sensors.

"Currently, the LabVIEW virtual instruments are being programmed to integrate with the sensors and digitally acquire data," says Mayoral. "Once the low-speed wind tunnel is complete, we'll focus on reviving the high-speed wind tunnel and developing an aeroacoustics facility."

The high-speed wind tunnel will allow students to work on research projects related to compressible fluid mechanics, exposing them to the aerodynamics associated with supersonic flight. With an aeroacoustics facility, students could research methods of reducing aircraft noise sources.

Mayoral said that although computational fluid dynamics have become more popular than experimentation, many of the codes depend on models, and most models still rely on wind tunnels to verify results.

New courses related to aerospace engineering, including aerodynamics, will be offered next semester – the first phase in introducing the aerospace curriculum.

"As the department grows, I'll look to recruit new faculty with backgrounds in areas like lightweight structures or aircraft controls," he says. "Ultimately, there will be enough available courses to create an aerospace specialization. Any form of help would be appreciated, whether it be equipment or materials. The lab does not have a proper set of tools, and the status of the compressor and air storage tank are uncertain, but I plan to try to restore these facilities so the department can expand its capabilities to better serve our students." <sup>(G)</sup>

#### **Human Robotics Lab**



#### Mechanical Engineering Department Launches Human Interactive Robotics Lab

The Human Interactive Robotics Laboratory (HIR Lab) launched this summer under the direction of **Nina Robson**, assistant professor of Mechanical Engineering. Initiated with 2012 funds from the National Science Foundation—and with the assistance of Robson's summer student interns—the lab will enhance student education and research with cutting-edge technologies in mechanisms, robotics, and biomechanical engineering.

In the lab, Robson and her students explore human-robot interactions, designing robotic devices that perform human tasks and allowing humans to perform tasks in augmented reality. Current research includes rover platform suspensions in a simulated environment that mimics the rough terrain on Mars, an anthropomorphic mechanical hand that will be attached to the universal robot arm and used for grasping and manipulation tasks, senior design team explorations into gait biomimcry and arm exoskeletons for power augmentation, and Robson's experimental work in robotic rehabilitation.

# **Faculty Achievements**

#### CSUF Awarded \$1 Million for Middle School STEM Program

To motivate young teens to pursue careers in engineering and computer science, the National Science Foundation awarded Cal State Fullerton a \$1 million grant for an after-school program in Anaheim junior high schools.

Directed by **Jidong Huang**, associate professor of Electrical Engineering, the "Strategies: Science, Technology and Engineering Mini-Business Incubator" project integrates STEM study and entrepreneurship training to engage seventh- and eighth-grade students. It also trains science and mathematics teachers to integrate engineering and computer science concepts and practices in their classrooms.

Faculty co-leaders for the project include John B. Jackson, director of the Center for Entrepreneurship, Mihaylo College of Business and Economics; Pradeep S. Nair, assistant professor of Computer Engineering; and Amy Cox-Petersen, professor of Elementary and Bilingual Education, School of Education.

#### Alcoa Grant Supports Engineering Student Success

Cal State Fullerton has received a two-year, \$150,000 grant from the Alcoa Foundation to establish an engineering professional practice program within the College of Engineering and Computer Science (ECS). According to ECS Dean **Raman M. Unnikrishnan**, the program—launched this year—is designed to increase student participation in industrysponsored research and design projects, upgrade labs, enhance interdisciplinary instruction, support innovative curriculum development, and improve student learning outcomes through industry influence.

In 2006, a \$90,000 award from the Alcoa Foundation helped Cal State Fullerton establish its environmental engineering lab.

#### Dean Receives National Service Excellence Award

Raman M. Unnikrishnan, dean of ECS, received the 2014 Service Excellence Award from the American Society of Engineers of Indian Origin September 27 at the professional organization's national convention in Irvine.

A past commissioner of the Engineering Accreditation Commission of ABET, Unnikrishnan serves as a mentor to the National Board of Accreditation of India. Representing ABET, he assisted India in obtaining membership in the Washington Accord, an international coalition that recognizes accreditation agencies and legitimizes engineering degrees from member countries.

#### CSUF Hosts 12th International Symposium on Geo-Disaster Reduction

Cal State Fullerton's College of Engineering and Computer Science hosted the 12th International Symposium on Geo-Disaster Reduction September 5 and 6. The American Society of Civil Engineers, Geo-Institute Los Angeles Chapter, and International Consortium on Geo-disaster Reduction joined CSUF as lead organizers of the conference, which welcomed more than 150 geoscientists and engineers who have been instrumental in the advancement of geo-disaster reduction across the globe, along with CSUF faculty and students.

David D. Bowman, interim dean of the College of Natural Sciences and Mathematics, presented "The Real Earthquakes of the OC: Preparing for Earthquakes in Southern California," and Binod Tiwari, associate professor of Civil and Environmental Engineering, served as chair of the symposium. © Students and Faculty of the College of Engineering & Computer Science acknowledge our 2013/2014 donors and supporters:

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### **Student Achievements**



#### **CSUF Students' Mobile Game Earns Top Honors**

The mobile game, "Paper Craft," created by Mathew Kelly (CS '15), Jeff Einspahr (CS '14), Jay Chan (CS '15), Zachary Aller (BFA '13), Zachary Spurlock (BFA '13), and Emily Chiang (CS '15), won first place at the Institute of Electrical and Electronics Engineers GameSIG Intercollegiate Computer Game Showcase competition in June.

The game depicts a world of paper, where players become pilots of paper airplanes or paper tanks and shoot down enemies like "the worm" and "the wasp."

#### **Engineering Students Receive Transportation Fellowships**

Five Cal State Fullerton civil engineering majors have each received a \$5,500 fellowship award to support their transportation-related student research. The awards from the U.S. Department of Transportation, Federal Highway Administration, total \$27,500.

The Dwight David Eisenhower Hispanic-Serving Institutions and Universities Fellowship Program seeks to attract qualified students to the field of transportation and research and to advance transportation workforce development. Fellowship award recipients are Sneha Upadhyaya (M.S. '14), Quang Tran (M.S. '15), Matthew Farrington (CE '14), John Thurlo (CE '14), and Adrian Guzman (CE '16).

#### CSUF Student Team Wins Grand Prize at International Women's Hackathon

Maira Ahmad (CS '16) and Noemi Quezada (CS '14) won the grand prize in the Natural Disaster Response Challenge at the International Women's Hackathon October 11. Their iOS app, called "Missing You," helps reunite individuals with their loved ones after a natural disaster strikes. The app allows rescue teams, organizations, or individuals to post to the app if they've located a missing person.

The team, called "Cache Me if You Can," was this year's only Cal State Fullerton's representative at the all-female student event sponsored by Microsoft Research.

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#### Students Present Robotic Arm Research at Conference

Adrian Iniguez (ME '16), Yeu Cheng (M.S. '15), and Grant Quental (EE '15) presented their brain-computer-interface-controlled robotic arm at the IEEE 2014 International Conference on Systems, Man, and Cybernetics in October. Their research seeks to improve the quality of life for patients with Lou Gehrig's disease (ALS).

Under the direction of Kiran George, associate professor of Computer Engineering, the students are developing a low-cost robotic system that allows such patients, with minimal effort and training, to perform simple but significant tasks that they would otherwise be unable to perform.



#### Summer Engineering Innovation Program Introduces High School Students to STEM Studies

Cal State Fullerton hosted 48 high school students from around the world this summer during a four-week program that helped them understand how to learn to think and problem-solve like engineers. The Engineering Innovation program, in collaboration with Johns Hopkins University, is part of a national effort to introduce students to careers in science, technology, engineering, and mathematics (STEM) disciplines. Using their knowledge of math and science, students applied engineering concepts to hands-on projects, including a spaghetti bridge construction assignment.







**Pumpkin Launch** – The seventh annual Pumpkin Launch attracted thousands of children and their families November 1 to watch pumpkins take flight from giant trebuchets, slingshots, and other homemade devices and enjoy hands-on engineering activities and challenges, food, and live music. Cal State Fullerton's American Society of Mechanical Engineers student chapter took second place in the event.

#### Support the College of Engineering and Computer Science.

Your gifts, your service, and your talent are fundamental to our goal of preparing graduates to solve 21st century problems. *Here's how you can get involved with the college:* 



Planned giving or deferred gifts can provide significant benefits to you and your family, now and in the future, while offering support for generations of Titans to come. Examples include a bequest provision in your will or naming the College of Engineering & Computer Science at Cal State Fullerton as a beneficiary of your life insurance policy or retirement plan. Regardless of its size, your gift will definitely make a difference in the lives of our students.

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Share your career development experiences in the classroom, mentor an aspiring professional, or serve in an advisory capacity to a department or program.

#### PARTNER

Link the college with your company – we're continually seeking partnerships that provide internship and employment positions for our graduates, research and development opportunities for faculty, and industry links that help facilitate curricular currency.

For more information about getting involved with the college and gift planning, please contact Hart Roussel | Director of Development | 657.278.5429 | hroussel@fullerton.edu





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