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HORIZONS IN ENGINEERING

School of Engineering

FALL 08

SANTA CLARA UNIVERSITY

DEAN'S MESSAGE

Recently returned from a weeklong immersion trip to El Salvador, I find myself in a reflective mood as we begin the fall quarter, and I am filled with thoughts of how we at SCU can contribute to a better world through the education of our students. The trip was organized by SCU's Ignatian Center in coordination with our international program, Casa de la Solidaridad. Undergraduates in this program spend a semester studying and working in a Salvadoran community. Through this experience, they learn the realities of those struggling to end social injustices while working to promote human dignity.

And the realities are harsh. Past human rights abuses, classism, guerilla warfare, earthquakes and now failed reforms, violent gangs and underfunded reconstruction efforts create a bleak picture. But there are rays of hope. The work being done by priests, nuns, private citizens and non-governmental organizations is truly inspiring. SCU's efforts make a difference, as well. Students from the Universidad Centroamericana (UCA) who have studied engineering at SCU as part of an exchange program say they returned home empowered and uplifted by their experience.

I returned with a renewed commitment to put faith into action, to put engineering into action. Just as liberation theology is a powerful tool for social change, so is engineering. It is our responsibility to educate the ethical leaders and innovators of the future, to encourage our students to engage with those less fortunate, and to promote the study of engineering through outreach efforts.

Godfrey Mungal
Dean
School of Engineering



Photo: Charles Barry

Two schools, one team: SCU and CCA Solar Decathletes take a break from their summer work on *Refract House*.

SOLAR DECATHLON TEAM BUILDS EXCITEMENT

The SCU-CCA 2009 Solar Decathlon team was busy all summer with a multitude of details relating to *Refract House*, our entry in the U.S. Department of Energy's competition in Washington, D.C., next fall. Students from SCU and our partner in this venture, California College of the Arts in San Francisco, met weekly to hash out details for building the 800-square-foot, totally solar-powered home, considering everything from photovoltaic optimization to logo selection, and from insulation options to pond evaporation rates.

"The students have gotten a lot of the preliminary research and decision-making accomplished, so we are in excellent shape as we move toward construction early next year," said Dr. Tim Hight, SCU faculty project manager for the team and chair of the mechanical engineering department.

"This was a key point in development for us," said Allison Kopf 'XX student project manager. "With the architectural design agreed upon, we were able to finalize the floor plan, decide which products to use, and build relationships with sponsors. We got our feet wet working

with a number of different kinds of technology, and it was a great time because we really came together as one team, rather than as individual groups from SCU and CCA."

Noah Greer, CCA student, agrees: "I think a huge part of what we accomplished this summer was opening up communication between our schools and gaining an understanding of how we can best work together—especially when things get challenging." As Jeffrey Abercrombie 'XX student technical lead for the project, notes, "Together, both the house and the team took on an identity that is of championship caliber. It was a big time for our Solar Decathlon Team as architects and engineers came together to bring a revolutionary look and ingenuity to green building."

The team is actively seeking donations from individual and industry partners and welcomes monetary and in-kind gifts to support our effort to build *Refract House* and advance sustainable design and engineering.

For more information: www.scu-cca-solar.org and www.scu.edu/engineering/solardecathlon.cfm



Photo: Heidi Williams

MECHANICAL ENGINEERING WELCOMES PROFESSOR OF AEROSPACE

This fall, the Department of Mechanical Engineering welcomes Mohammad Ayoubi as the newest member of the faculty. Dr. Ayoubi heralds from Virginia Tech, where he was a postdoctoral research associate in the Multidisciplinary Analysis and Design Center for Advanced Vehicles. He has interests in nonlinear dynamics control and optimization. He has published in the areas of analytic dynamics and spacecraft dynamics.

“There is a good opportunity here at Santa Clara working in aeronautics and astronautics,” said Ayoubi. “With neighboring employers such as Lockheed-Martin and NASA, there is a lot of interest in growing one’s career in this field.” Spending six years as an aerospace and automotive engineer

also serves him well. Ayoubi sees great prospects for helping students with a wide variety of mechanical applications through the study of dynamics and control.

Ayoubi plans to create new course offerings and modify existing labs by adding new experiments. “There is great potential for me here at SCU to grow academically, advance my research, and help the Department of Mechanical Engineering and our students,” he said. “I have very high standards for students and being at an institution that values academic excellence is very important for me.”

Dr. Ayoubi earned his Ph.D. in Aeronautics and Astronautics from Purdue University, and has a B.S. degree in Mechanical Engineering and an M.S. degree in Aerospace Engineering from Amir Kabir University of Technology and Sharif University of Technology, respectively, in Iran.

Mohammad Ayoubi joins the mechanical engineering department.

BIOENGINEERING HIRES FIRST FACULTY MEMBER

Yuling Yan has joined the School of Engineering as our first bioengineer. She will head the bioengineering program and provide focus as the program transitions from a general engineering degree with a focus on bioengineering to a full bioengineering degree program. Yuling has a long track record of research in the field, most recently in speech biomechanics and high speed imaging of the vocal cords to aid in clinical diagnoses. This research was conducted at Stanford University, where Dr. Yan had an appointment with the Department of Otolaryngology.

Yan is excited about the many opportunities for developing the bioengineering program at SCU. “This is such a wonderful opportunity for the University and Silicon Valley,” she said. “The great thing about SCU is that there are so many professors on campus and other industry leaders who are keen on seeing this program succeed.” Bioengineering is a highly interdisciplinary field of study, and to reflect this, the curriculum includes courses in biology, chemistry, and physics as well as many others from electrical and mechanical engineering. This fall, Yan is teaching an introductory class that presents many aspects of this emerging field as well as research and career opportunities, helping students to determine which track they wish to follow, for example biomedical, bioinstrumentation, bionanotechnology and others.

“Right now I am working on developing the undergraduate curriculum,” she said, “which will include independent research in the junior year as part of the credit requirements. This will give our students the opportunity to build skills in developing a research proposal, scientific writing, and presentation, in addition to actual research experience.”

Looking ahead, Yan sees exciting prospects for expanding this program to include Master of Science and Ph.D. degrees, and she is currently organizing a bioengineering research seminar series that will touch on current topics in bioengineering. She hopes to hire one or two new bioengineering faculty over the next two years. “Silicon Valley is rich with experts in this field,” she said, “and the opportunities for drawing guest lecturers from academia and industry, for participating in collaborative research, and for providing continuing education to industry professionals are tremendous. I am very enthusiastic about helping to build this program for SCU.”

Dr. Yan joins the electrical engineering department and also has a courtesy appointment in mechanical engineering.



Photo: Heidi Williams

Yuling Yan heads the bioengineering program.

CENTER FOR COMMUNITY-BASED ENGINEERING PROJECTS TAKES ANOTHER STEP FORWARD

As part of the University's mission to educate responsible citizens who work to create a more just and humane society, the School of Engineering is forming a center for community-based engineering projects. Here, students can select assignments to work on for a quarter or an entire year that will give them hands-on experience while serving the community.

This effort reflects the ardent efforts of Dr. Ruth Davis, associate dean for undergraduate studies and professor of computer engineering. For 10 years Davis has been building an infrastructure to support such a venture, with the goal of having all engineering students involved in some phase of community-based project work.

"It all started with a proposal to the National Science Foundation to increase the retention of women students in engineering," Davis said. Over the years, Davis has received more than \$1 million in grants to support the project and has enlisted the participation of other faculty members to revise the undergraduate curriculum based largely upon community-based learning.

Dr. Shoba Krishnan, associate professor of Electrical Engineering and fellow proponent of community outreach and service, was recruited into the effort last year and is teaching the School of Engineering's Community-Based Projects course this winter. She will also head a project in engineering education for middle and high school students now in development for the Bechtel Foundation. "There is a huge desire on our students' part to work on projects for the community," said Krishnan; "it is exciting for them to see what they have developed put to good use."

Patti Rimland, program coordinator for community projects and partnerships, is enthusiastic about the opportunities the Center will provide SCU engineering students. "The experience of working on real-world projects in the community develops students' skills in teamwork, communication, and an awareness of social issues," she said. "Through their community involvement, students begin to recognize and understand the benefits of life-long citizenship, civic engagement, and social reality in today's society."

Commenting on the long-term outlook for the Center, Davis notes, "This is another step in the development of what promises to be a tremendous asset to both SCU and our neighbors. It is a win-win-win situation. The students win with the experience of real-world projects for real clients, the clients win by getting assistance with projects they could not otherwise afford, and the profession wins by educating the community about who engineers are and what they do, resulting in more students considering engineering as a possible career path. We envision both local and global projects such as those we have supported in El Salvador, India, and Nicaragua, implemented by teams that are not only interdisciplinary but also international. The possibilities are endless!"

"Tell me, and I forget. Teach me, and I may remember. Involve me, and I learn."

Benjamin Franklin

MENTORING REIGNITES LOVE OF ENGINEERING

After teaching high school geometry for nearly 20 years, Kevin Jordan felt he was dangerously close to answering the age-old student-posed question, "Why do we have to learn this?" with the standard response, "Because we're having a test on Friday." So he applied for a summer fellowship with a San Francisco Bay Area program sponsored by IISME—Industrial Initiatives for Science and Math Education—that encourages bringing excitement and relevance to the classroom through industry-education partnerships.

"When I saw that SCU's Department of Mechanical Engineering had posted an opening for a fellow to come and work with the 2009 Solar Decathlon Team under the direction of faculty project

science fair with a model of a solar-powered home, so revisiting this area of research was exceptionally rewarding.

"At the beginning of my fellowship, Dr. Hight said engineers experience a joy solving practical engineering problems, and he was absolutely right," Jordan said. "This experience has been exhilarating; I couldn't have asked for a better summer!" The fellowship reawakened the excitement and joy of problem solving for the Los Gatos High School teacher, who returns to the classroom ready to pass that eagerness along to his students. "My enthusiasm has never been greater," Jordan said. "I had gotten to the point where I needed the physical and practical experience to make it real for myself. I needed, from a professional point of view, to see where the knowledge is going."

"It was great having Kevin here this summer," said Hight. "His experience

Photo: Charles Barry



Los Gatos High School teacher Kevin Jordan makes his point with the Solar Decathlon Team.

leader and mechanical engineering chair Dr. Tim Hight, the opportunity just leapt off the page at me," said Jordan. "This project brings all my interests together: engineering, sustainability, solar power, and intelligent design." Jordan is a long-time proponent of solar energy—as an 8th grader in the '70s, he took third place at his regional

with us epitomizes all that IISME seeks to accomplish through the program. He has seen how his teaching at the high school level can inspire future university students to contribute to solving the world's energy problems through engineering, and that is exactly what we were looking for in participating in this program."

GRADUATE OFFICE ANNOUNCES SHORT COURSES AND ALUMNI BENEFITS

The School of Engineering's Graduate Programs Office has great news to share: a new line up of exciting continuing education courses and perks for engineering graduate alumni.

Beginning this fall, the School of Engineering is offering short courses to students, alumni, and interested members of the community. "These courses, targeting emerging topics in engineering, will be offered in half-day or full-day sessions, providing added flexibility for working professionals seeking to stay current with the latest developments," said Alex Zecevic, associate dean for graduate studies and professor of electrical engineering.

Bringing together leading entrepreneurs, researchers, engineers, scientists, and managers, the program will allow participants to expand their ability to engage in the next generation of technology-based products and services while also providing excellent networking opportunities.

Kicking off the program, on Thursday, November 20, Dr. Peter G. Borden, leading technologist and Distinguished MTS with the Solar Business Group of Applied Materials, will present the first in a series of three courses on photovoltaic technology. As an introduction and overview to PV technology, the course will provide students with an understanding of PV applications and of how the components and systems work. The two subsequent courses (offered February 5 and April 30) focus on solar cells and advanced topics of current interest.

Two other courses (scheduled for March 26 and May 29, respectively) will address Orthogonal Frequency Division Multiplexing (OFDM), and MIMO Technology in IEEE 802.11n Standard. The instructors are Dr. Katie Wilson and Dr. Sundar Sankaran.

"Given our location in the heart of Silicon Valley, SCU has a tremendous pool of guest lecturers from which to draw for these courses in addition to our own stellar engineering faculty," said Zecevic. "We are thrilled at the possibilities for collaboration with top professionals in a wide variety of fields, and for reaching out to the community to provide continuing education."

Perhaps the most exciting developments in this context are the new benefits for engineering graduate alumni.

Beginning this fall, our graduate alumni are eligible for a 50 percent tuition discount on all SCU engineering

graduate courses, both regular and short. "This is a lifetime benefit, which allows our graduate alumni to take as many engineering courses as they like, provided there is space available," announced Godfrey Mungal, dean of the Engineering School. The sole restriction is that courses taken at the discounted rate cannot be taken for credit and must instead be audited.

"This is a tremendous benefit for our engineering graduate alumni, which furthers the School's mission of promoting lifelong learning" said Mungal. "Also," he added, "we see this as a way of encouraging scholarship, entrepreneurship, and innovation among our population of alums—something that is critically important in this increasingly competitive global marketplace."

For more details on the short courses: www.scu.edu/engineering/graduate/emergingtopics/index.cfm



Photo: Brent Hernandez

CIVIL ENGINEERING ALUMNA BUILDS A SUCCESSFUL CAREER

Since her graduation in 2004, civil engineering alumna Khanh Chau has been putting her knowledge to work as a Design Engineer with Gregory P. Luth and Associates (GPLA) of Santa Clara. Her latest assignment has taken her on location for the expansion of Anaheim's Grand Californian Hotel in Downtown Disney.

Working under the project manager, Chau's presence on site has kept the project moving forward as she and the architect and contractor are often called upon to work together to adjust the design on the spot. Along the way, there have been lots of surprises, but Chau says she was well prepared for the challenge. "We did a lot of real-life designs in class, and I have actually used some of my homework assignments in my design work, and I'm still using all my books," she said.

Being in the field has been an education, as well. "It's important for a structural engineer to see how things are actually built; how the concrete, wood, and steel interface; how the workers are struggling to build what you have designed," she said. "Though it may be less expensive to do things one way, I now ask myself if that is the easiest way for it to be done, and of course I can always call on my profs at SCU to ask their advice."

Khanh Chau '04 B.S. Civil Engineering, shows her Bronco pride on the job site at Disneyland's Grand Californian Hotel.

In fact, when Chau recently enrolled in the graduate program in structural engineering at the University of Texas in Austin, she went over her program of study with two of her former SCU professors first. "That's what I love about SCU," she said; "I can always call on them; they never turn me away."

Combining her bachelor's degree with field experience has been exactly the right design for Chau's career. "I wanted to work a bit first, to see what I wanted to learn before starting on my master's degree," she said. "Now I know my strengths and weaknesses and can expand on that." GPLA is helping with her tuition and her job will be waiting for her when she returns from Texas.



Santa Clara University

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