GIVING TRAFFIC THE GREEN LIGHT

Nick Bergseng and Riccardo Franchi, senior computer science and engineering students, don’t just view waiting at stoplights as a frustrating inconvenience, the way most of us do. Instead, when they see cars inch from one red light to the next, they recognize the millions of hours of productively being lost and the tons of CO₂ needlessly emitted into the atmosphere. So they focused their attention on this problem for their senior design project. “Obviously, if you hit one green light while driving the speed limit, you’s hit the next and the next,” they said, “so we have to communicate clearly and stay on the same page while sticking with our design constraints. With so many different perspectives, it makes the project really interesting.” Early on, the SCU team sought the advice of experts at MBKAR (Montery Bay Aquarium Research Institute). “They pointed out that our sensors were placed too close to the motor, which would cause turbulence and electronic interference,” said Willmert. “It was great to be able to pick the experts’ brains to help save us some trouble.” Still, as Willmert noted, the students enjoy the challenge of trial and error: “When you have access to engineers who know a lot more than you,” finding the balance between doing things on your own as opposed to asking someone who knows how to do it is an experience of its own.” “We’ve learned new ways of thinking about engineering problems by working on this project all year, for sure,” added Pitchc. “There are so many factors you just kind of have to know from your previous experience how to proceed and figure things out.”

DEAN’S MESSAGE

Recently, Santa Clara University adopted a strategic plan to guide our curricula, programs, and decisions making over the next several years. The five areas of focus—excellence in Jesuit education, engagement with Silicon Valley, global understanding and engagement, justice and sustainability, and academic community—are places where the School of Engineering has already been focusing attentively for some time as evidenced in our students’ senior design projects. For the past year, engineering seniors have worked diligently on the capstone projects they recently presented before an audience of alumni, industry collaborators, faculty advisors, family, and friends. The selection of their projects says a lot about the excellence of our Jesuit education as they put their expertise to use tackling some of the most challenging problems of our age. Many took advantage of SCU’s location in the heart of Silicon Valley, calling on local industry leaders to serve as advisors. A number chose to focus on sustainability research for projects at home or around the world with teams that include not only engineering students and advisors but teammates from our business school and academic advisors from external departments across campus. Still others have partnered with various universities around the country and non-government organizations. The School of Engineering is dedicated not only to furthering the knowledge, compassion, and Integrity of our students, but also the goals of the University. In this edition of Engineering News, you will see how well we’re doing with both. Enjoy!

Getting to the Heart of Engineering

Nick Devich, a mechanical engineering senior, found his senior design project while working as an intern at Sadra Medical in Los Gatos, California. The innovative company needed a test fixture for their prosthetic heart valve, so Devich enlisted classmate Billy Hendricks’ help, but needed one more teammate to get the job done. After pitching the project to fellow seniors during their weekly design class, Edward (EJ) Hayes was on board. His experience interning at Venkome, a small start-up in Menlo Park, made him an asset for the team. With so much riding on the efficiency of the device, it is critical that the prosthetic valves function perfectly, so the team designed and built an online monitoring system which subjects the devices to a fluid flow that imitates the heart’s pulsable flow in order to verify that the valves are free of all known manufacturing defects. They included everything from ultrasonic flow rate monitors and transvalvular pressure and temperature sensors, to a high-speed camera for visual inspection and quality assurance. The result? A future that performs tests within an environment equal to that of the human body to effectively measure the safety of the device, in less than a quarter of the time of the previous test system. “We’ve also improved the ease of use for operators on the line,” said Hendricks. “Most companies don’t put this type of project in students’ hands,” said Devich, “but they came to us and said ‘we need a test fixture,’ and left it up to us to design, test, and construct the system.” “The entire month of meetings with Sadra personnel—everyone from junior and senior engineers to vice presidents and the CEO—to define the scope and seemingly ever-changing needs for the system.”

“Getting all the requirements satisfied was stressful,” said Hayes, “but the scariest moment was when we learned Sadra was being acquired by Boston Scientific, right when we were getting ready to purchase a $16,000 pump.” Fortunately, the new team assured them all of Sadra’s partners, so funding for the $50,000 project was not in jeopardy. “It was a massive relief,” said Hayes. The teammates agree the experience has given them an incomparable opportunity to work with industry on a project with real value. “Mechanical engineers have so much to offer the medical device industry,” noted Hayes. “You don’t have to be a biomaterials expert to contribute; MIs have very applicable knowledge for this field.”
**SoE RECEIVES $1.142M KEEN GRANT**

The grant is a mark of the organization’s high regard for Bronco engineering and its students, as well as sizable investments that SCU has made in providing work experience for engineering students.

The grant is awarded in recognition of the engineering school’s commitment to the KEEN philosophy and the delivery of educational opportunities that align with the foundation’s mission.

SCU will use the funds to support the development of new courses and initiatives that foster innovation and entrepreneurship in the engineering curriculum, as well as to support student projects and research.

SCU has a long history of partnerships with the foundation, and this latest grant is a testament to the success of those efforts.

**LEADING THE WAY TO OPTICAL WIRELESS COMMUNICATION**

You could say Will Cook and Dylan Rust, electrical engineering seniors, have turned the lights on in the lab.

Two years ago, they had an idea for a light-based indoor wireless data distribution system that doubles as an energy-efficient lighting system.

The team is currently working on the second phase of their project,

The system is called BRAC (Building Retractable Architectural Canopy), and it uses light-emitting diodes (LEDs) to transmit data and light simultaneously.

The team hopes to have a working prototype ready by the end of the year.

**HEADS, HEARTS AND HANDS AT WORK FOR HAITI**

Three civil engineering senior design teams are helping Haiti rebuild stronger and more affordable homes.

Students Jake Escamilla and Chris Sampson have researched and tested new materials and building techniques developed in conjunction with EBInn (Ecological Building Network), a group of architects and engineers in the Bay Area who are volunteering their skills to create modular homes using sustainable-building materials.

The teams are working with the Architecture School of the University of Haiti on a design for a modular home that can be constructed with locally sourced materials and fabricated offsite.

The project is funded through the Keen Foundation, which provides matching funds for projects that contribute to a culture of innovation and entrepreneurship.

**BIOENGINEERS BREAK NEW GROUND IN WATER SAFETY DETECTION**

It’s amazing what a tiny drop of water can tell you when it finds itself in the right hands. For their senior design project, bioengineering seniors Sarah Ghanbari and Nick Giustini are fabricating a portable, fast, accurate and user-friendly diagnostic device for use in remote areas that will detect the presence of pathogens in a tiny water sample without the need for expensive and bulky lab equipment.

“With more than one billion people in the world without access to potable water, and more than two million deaths each year due to water-borne diseases, this lab-top project is an important tool for health management,” said Giustini.

“We’re basically starting from scratch, trouble-shooting the steps to design and fabricate a microfluidic device that integrates several complex laboratory processes into a single chip,” said Ghanbari. Their new device incorporates a high-throughput concentrator, cell lysing chamber, and electrochemical DNA sensor. First, the concentrator sorts out target pathogens from the unfiltered water sample at a high-throughput, enabling a large volume of the sample to be processed even in a microfluidic device. Then, cells are thermally lysed to expose their DNA and, but the DNA is directed to the sequence-specific electrochemical sensor.

Though they had a basic idea of how their device would look when they started out, the pair acknowledges that the project has evolved greatly over the past year. “It’s a big responsibility to make a device that is both rugged and easy to use in the field, also figuring out how to make it more portable,” said Giustini. Their device will be put to good use in Haiti, where it’s looking good right now!

**SANCTUARY BY DESIGN**

The architecture and engineering students at SCU are working together to create a sustainable and affordable housing solution for Haiti.

This innovative project involves the design and construction of modular, earthquake-resistant homes that can be assembled quickly and easily on-site.

The students are collaborating with the architecture and engineering faculty at the University of Haiti to create a design that is both sustainable and cost-effective.

The modular homes are designed to be constructed off-site, reducing the need for on-site labor and materials transport.

The project is supported by a Keen Foundation grant, which provides matching funds for projects that contribute to a culture of innovation and entrepreneurship.

**WE’RE TURNING 100!**

It’s a once-in-a-century event—the School of Engineering at Santa Clara University is turning 100! We will celebrate our centennial all year long, beginning in October 2011, with our biggest Bash Ever event during Grand Reunion weekend, and continuing right through commencement in 2012, said Dean of Engineering Godfrey Mungal.

**FACULTY NEWSMAKERS**

Recently, Terry Shoup, professor of mechanical engineering and former dean of the School of Engineering was inducted into the Silicon Valley Engineering Hall of Fame.

Edwin Maurer, associate professor of civil engineering, received a Fulbright award. Read all about their stellar accomplishments here:


**WE NEED NEWSMAKERS!**

We’re looking for faculty and staff who are leading the way in research, teaching, service, and outreach. Submit your nominations for the next edition of the Engineering News.