Computing Senior Design Project Ranks Top 12 Nationally

By: Desiré Bennett

Computer and electrical engineering technologies intersect to take home prize in the Texas Instruments Analog Design Contest.

Two students from the School of Electronic and Computing Systems (SECS) won the UC leg of the Texas Instruments Analog Design Contest. Caleb Bluesummers, a computer engineering technology major, and Mark Winterink, an electrical engineering technology major, submitted their Senior Design Project which won the local prize of $1500.

Each year, through their TI University program, Texas Instruments (TI) hosts an Analog Design contest. It is designed to encourage engineering students to submit senior design projects that utilize TI technology, and UC is a partner school in this contest. This year, Winterink’s and Bluesummers’ project was among the top 12 finalists in Dallas, Texas, so they were also invited to present their project to compete for the national TI Engibous Prize.

The students’ design, a Smartphone Footstrike Monitor, is an integrated hardware/software solution that measures pressure points in running shoes and transmits the data to an iPhone application.

“The footstrike monitor is a system that consists of running shoes with sensors built in and an iPhone application to process the data,” explains Winterink. He says that the idea to develop their project stemmed from playing an interactive video game. “There was this running game where you could sort of walk in place on a fit board – and we decided that was silly – and thought we should just put the same sensor stuff right into a pair of shoes.”

As part of the contest rules, the students were required to use at least three different TI analog parts, or two TI analog parts and a TI processor. “We used two power chips, an amplifier, and an ANT network processor, which is considered an analog device,” said Winterink. According to TI, ANT is a device that provides a simple, low cost and low power solution for short range wireless communication in point-to-point and more complex network topologies and is an established technology for collection, automatic transfer and tracking of sensor data within sports and wellness management monitoring applications.

Following these parameters, Winterink’s and Blusummers’ project measures pressure points at three different points on your feet and records this information at up to 180 times a second. It can also display and process this information in real time. “Originally, we were planning on two pressure points – one in the ball of the foot and one in the heel,” Winterink explains. “But I was
advised to add a third sensor in the front of the foot, and we used these two ‘forward’ sensors to measure pronation, which is the rotational movement of the foot.”

The students’ biggest design goal was functionality. “Our project really did always work when we were demoing it,” said Winterink. “Even though it's this little inexpensive student prototype project, we saw no reason why we couldn't make it simply work and work simply.”

Making it work simply involved making a few changes along the way. “At the start, we wanted to have a bunch of games to show off, like monkeyball or some other video game – like the Wii fit – so we had to cut out that stuff, keeping it simple so it would work in front of a crowd,” he explains. “It isn't too difficult to write a joystick driver, and plug in somebody else's game, but it's particularly hard to guarantee that it will always work,” he continues. “And we wanted to have everything going on the iPhone, which would have added another layer of complexity versus putting it on a Mac, just because we were more familiar with the Mac.”

In the end, their demonstration app proved to simply work and it also worked simply. “It showed what the hardware could do, and some places we could take this, whether for gamers, athletes, or medicine.”

Despite their success in winning the UC section of the TI contest, they remain modest. “We thought there were a lot of other cooler and/or better projects at UC,” said Winterink. “It just came down to having a polished, finished, ‘product’ that worked well, was easy to demo and understand and present, and was well-documented.”

Winterink thinks that one of the coolest things about winning this contest, along with design validation for the winners, is the possibilities it creates. “UC is a partner school in this contest, so it always provides fantastic exposure to the other contestants,” he said. “Last year there were over 600 students registered and in 2010, two SECS students, one of whom went on to work for TI after graduation, won the national competition.”

It is Competitions like the TI Analog Design Contest that continue to showcase UC’s connection to future technology.