Web wizardry: CS 50 Fair spotlights students' programming for the Web

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James Winter '11 (left) explains his keyboard application, which generates musical notes from melodies, to Chris Dornin of Power Advocates. Jon Chase/Harvard Staff Photographer

The observation became a question and finally an application.

The observation: High school students are addicted to their mobile phones. The question: What if teaching tools were added to mobile phones? The application: "iGetIt Physics: Mechanics," an iPhone tie-in for teaching high school physics, designed by Scott Crouch '13 and Sophie Chang '13 as a final project for the innovative course Computer

Crouch and Chang introduced "iGetIt Physics" during the second CS 50 Fair held on Dec. 8, a lively confab of techno wizardry that showcased more than 300 projects designed by the 380 students in Computer Science 50, otherwise known as "Introduction to Computer Science I." The course, taught by David J. Malan '99, Ph.D. '07, a lecturer on computer science at Harvard's School of Engineering and Applied Sciences, aims not just to teach computer skills but to put students to work at solving real-life problems.

The course's final projects were displayed at the fair, which this year attracted more than 1,000 visitors, plus recruiters from companies such as Facebook, [Google](#), and Microsoft. The displays were all the more intriguing because most of the presenters had little or no prior experience in computer programming.

"What's been really gratifying is to see these students who go from zero miles an hour to 80 over the course of just 12 weeks," said Malan, who has taught CS 50 for three years. "We've had to adapt and be sensitive to different learning styles."

The fledgling coders were able to create a variety of applications, ranging from games to research tools to Web sites that tracked worldwide news or health conditions. Some students were inspired by other class requirements. James Winter '11, an applied mathematics major with a keen interest in music, designed a beginning jazz arrangement Web site, an idea sparked by a homework assignment in a jazz harmony class. "I had to take a solo that was 64 bars long and write four-part harmony for every single note in it. Which took a long, long time. But now I can automate the process," he said.

Some students focused on applications for mobile devices, including the

team of Crouch and Chang.

With gusto, the pair showed off iGetIt Physics on their phones, scrolling with a flick of a finger through diagrams (all created especially for the application), equations, definitions, tutorials, and other material.

"If you're studying for a test and you want to review in the hallway, you open up our app," Crouch explained.

Crouch and Chang had little experience in programming or coding before taking CS 50. Yet they were able to create the application in the programming language Objective-C. "We knew nothing about Objective-C before we started," Crouch said.
They did, however, have a vision. "We love physics," said Crouch. "We love iPhones." Chang added, "Everyone is using iPhones or iTouches; it's definitely useful."

So the pair decided to create a physics review/teaching application for the iPhone, vetting the diagrams and other information with a physics professor.

"Physics is a big problem for high school students," Crouch said. "The concepts are frankly confusing to most. We thought we could help demystify them with this app. High school students are addicted to their cell phones. If they see physics is on it, they're going to use it, they're going to learn from it."

"Computer science, my own field, has become foundational. It can be found behind just about every aspect of research and discovery, from science to the humanities," said Dean Michael D. Smith of the Faculty of Arts and Sciences. "It is also increasingly a part of our everyday lives, although you rarely see the electronics and the programming behind our everyday devices. Thanks to David's hard work, the CS 50 Fair allows

students to experience the thrill of what is possible, and it gives them the opportunity to show off their ingenuity."

"David's dedication to teaching is apparent, as students quickly become comfortable enough to take a 'leap of faith' and dig into something brand new and challenging. This is a metaphor for the ultimate aim of a Harvard education," Smith added.

Other applications presented at the fair were aimed at the Harvard community, including Web sites and text-message services that would help students navigate campus, find a movie, review the day's dining hall menus, and even quit procrastinating.

CS 50 classmates Chioma Madubata '11, a molecular and cellular biology major, and Annie Ye '11, a history major, first considered creating a Web site that would allow Harvard students to exchange language lessons. (I teach you French, you teach me Mandarin, for example.) But then the pair started thinking of the other services that college students would like to exchange, such as help during move in/move out, or textbooks, or even lessons. (I teach you guitar, you teach me tennis.)

The result was their CS 50 Fair project "iTradeHarvard.com," open to those with a Harvard e-mail address.

"The key difference [from other fair projects] in iTradeHarvard is you don't bid for things. You don't exchange money. It's a mutual exchange, it's an online bartering system," said Ye. "You pick what you'd like to offer and what you'd like to request, and [the Web site] will automatically match people up."

The pair's ambitions had to be scaled back a bit. "It's fun to think of the different things to exchange, but we had a deadline, and after a point we

decided, 'OK, this was long enough,'" said Madubata.

Some fair projects were larks; others were intended for longtime implementation. For example, avid movie fans Luis Duarte '13 and Keoni Correa '13 created an improved design for the FDO Movie Club Web site; they have been talking with Harvard officials about adopting the design. Malan notes that Rover, an iPhone application that informs Harvard students of local events, news, and deals, was created two years ago by CS 50 students.

Crouch and Chang hope eventually to market their physics program through an iPhone apps store, with the download price of 99 cents — something any high school student could afford.

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