

MULTIMEDIA

China's Clever Classroom

AT TSINGHUA UNIVERSITY IN BEIJING, China, all eyes are on Professor Yuanchun Shi. But it's not the computer scientist's lecture that's so riveting—it's how she's giving it. One wall of her "smart classroom" displays photos of students at other universities across China who have logged in. Shi poses a question and calls on a remote student by shining a laser pointer on his photo. "Go ahead," the teacher says. The student's picture switches to live video and audio as he answers. Shi writes on a digital whiteboard that transmits her handwriting to the students' computers, complementing audio and visual feeds from cameras and microphones.

Shi's smart classroom is one of the most advanced in the world. Wide-scale

testing is under way, and commercialization is planned, initially within China.

Until now, most smart classrooms for distance learning have required teachers to use desktop computers to run their classes. But this version allows Shi to lecture and interact with remote students more naturally, using speech, gestures, and handwriting. "They are certainly doing some interesting things that other people have done before in isolation but not together in an all-in-one package," says Jason Brotherton, an expert in computer-enhanced education at University College London who is developing his own distance-learning classroom.



A teacher writes on a digital whiteboard and can call on remote students by pointing to their faces on a screen (left).

page in a textbook or writes on the whiteboard. The computers recognize the positions of her arms and zoom in on particular gestures. The system also tracks the trajectory of the laser pointer and responds to simple spoken commands. Remote students' desktop computers are equipped with video cameras, microphones, and communication software to allow them to send and receive multimedia data.

Last summer, 180 students took part in a computer science course at Tsinghua, one of the country's top technical schools, from their dorm rooms. And since last winter, hundreds of students in a half-dozen cities in China have joined the class. Now, working with Beijing MoVision Technologies, a multimedia telecom firm, Shi plans to commercialize the system's software within a year. Her first customer: Tsinghua's Continuing Education School, which could grant remote access to as many as 20,000 students. **Gregory T. Huang**

Shi's classroom relies on some technological wizardry. In the back of the room, behind a curtain, is a rack of seven computers. Computer-vision algorithms coordinate eight video cameras that track the teacher's movements, switching views as she points to a

LEADERS IN COMPUTER-ENHANCED EDUCATION

RESEARCHER	PROJECT
Gregory Abowd , Georgia Institute of Technology (Atlanta, GA)	Multimedia technologies for recording and enhancing classroom lectures
Ron Baecker , University of Toronto (Toronto, Ontario)	Web-based interactive audio and videoconferencing for universities
Jason Brotherton , University College London (London, England)	Experimental classroom for enhanced distance learning
Yuanchun Shi , Tsinghua University (Beijing, China)	Smart classroom for interactive distance learning

TELEMATICS

Getting Direction from Your Phone

Forget about asking for help at gas stations. Your cell phone is rapidly becoming a one-stop source of directions. Over the past year, several startups have launched services that send directions to your phone's screen and provide a speech interface that reads them as you drive.

In most cases, these services require location information from a separate Global Positioning System receiver plugged into the phone. A lost driver dials up the service, which interprets a spoken description of his or her destination, calculates a route based on the GPS coordinates, and transmits

directions back to the phone. New versions eliminate the external GPS receiver: gpware of Menlo Park, CA, plans to introduce a device this summer that includes a GPS receiver and cell-phone technology in a personal-digital-assistant-sized case that can be mounted on a car's dashboard.

These direction finders are a big step up from the navigation hardware sold with some cars, which uses maps stored on CDs or DVDs that typically need to be changed when a driver visits a new area. And only about 10 percent of new vehicles sold in 2003 had such "onboard navigation" built in,

says Phil Magney, principal analyst with the Telematics Research Group in Minnetonka, MN. That leaves plenty of room for "off-board navigation"—cell-phone systems.

The newer technology has advantages, says Magney. "It translates into lower cost compared to what you might buy in a car. It's go-anywhere, meaning you can take it from your car to a rental car," and you're likely getting the most current data, he says. He predicts offboard navigation services will help boost the North American market for wireless in-car systems from \$4.9 billion to \$18 billion by 2010. **Wade Roush**

COURTESY OF YUANCHUN SHI AND TSINGHUA UNIVERSITY

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