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'Tele-actor' tours — the next best thing to being there?

By Nancy Bronstein

Twenty-five Oakland seventh graders, dressed in street clothes, recently toured the campus's meticulously clean Microfabrication Lab, a high-tech facility where the standard garb, to guard against dust, dirt and stray hairs, is a head-to-toe bunny suit.

Their tour went off without a hitch, thanks to an Internet-based "tele-actor," an engineering student-turned-human robot who "lead" the tour, following instructions sent by the students from their classroom at Dolores Huerta Learning Academy.

Watching images of the lab over the web, the middle-school students "wandered" down hallways and voted on which door to open and where to zoom in for a closer look — for a rare glimpse of a lab where microchips are made.

"We can't bring a middle school class into the microlab, so let's bring the microlab to the middle school," says Industrial Engineering Professor Ken Goldberg, a pioneer of this technology to let us "be where we are not."

The microlab tour is part of an ongoing series of experiences created by Goldberg's team. The first was a visit to the 5th Annual Webby Awards; another took K-12 students to an event at San Francisco's Exploratorium. In the fall, a field trip to a Bay Area biotechnology lab is in store.

Tele-robots are nothing new. "Remember Jason the Titanic explorer, and the Mars Sojourner?" asks Goldberg, who heads a larger research effort in the College of Engineering on collaborative tele-robotics. Though robots have replaced humans in space, underwater and on the battlefield, Goldberg has turned the tables — putting



Peg Skorpinski photo

Wearing a helmet outfitted with a video camera, battery pack and antenna, 'tele-actor' Annamarie Ho takes Oakland seventh graders on a virtual tour of the campus's meticulously clean Microfabrication Lab. From computer terminals at their school, the students ask questions and give Ho directions on where to go and what to show in detail.

the human element back into the mechanical robot.

"People are capable of improvisation and are more agile than robots," he says, "and we're interested in the collaborative interaction we can elicit from a person." Goldberg's system employs a skilled "tele-actor" — who carries wireless audiovisual equipment, answers questions and takes directions from students in physically distant classrooms.

"Our goal is to preserve the educational advantages of a field trip without the drawbacks of group travel," says Goldberg,

whose research combines theories on geometric motion planning, economics and political science. His project wedding the latest technology with innovative science curriculum works with local school districts through Berkeley's Interactive University Project.

The Oakland seventh graders prepared for their real-world experience in the microlab with a short version of "Lithography 101" taught by electrical engineering doctoral student Matt Last — who demonstrated, in person, how to make your own circuit boards.

Later the students relied on a virtual guide, Annamarie Ho, one of the seven Berkeley students on Goldberg's tele-robotics team. In her transformation to human robot, the engineering and art student wears a helmet outfitted with a video camera and an antenna, projecting still images over the Internet to remotely located viewers.

A battery pack straps around Ho's waist; the earpiece connects to a cell phone; a laptop slips neatly into her backpack. All of which, she says, "is fine to wear, just a little awkward, especially with a clean suit over it."

In their role as "tele-directors," the students use a new graphical user interface — developed collaboratively by Goldberg's team and a group from MIT's Media Lab — to cast votes directing tele-actor Ho where to go, where to pause.

"What's unique here is that all the users see each other's votes, and can change their votes at any time within the election cycle," says Goldberg, who designed this interface with doctoral student Dezhen Song. Song is also developing mathematical models to analyze the students' voting behavior. "I'm looking at what we call 'bandwagon behavior,'" says Song. "I want to understand the difference between this system and conventional voting systems. Which is more reliable?"

Goldberg notes that the system "is democratic in two ways. It facilitates access to restricted places like labs, factories and government zones, and the process is based on the plebiscite: one person, one vote."

For information on the tele-actor, see www.tele-actor.net.