Holograms Deliver 3-D, Without the Goofy Glasses

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WHEN the famous hologram of Princess Leia says, “Help me, Obi-Wan Kenobi,” in “Star Wars,” it’s science fiction. Now you can watch actual moving holograms that are filmed in one spot and then projected in another spot.

“The hologram is about the size and resolution of Princess Leia in the movie,” said Nasser Peyghambarian, an optical scientist at the University of Arizona and leader of a research team that recently demonstrated the technology, reported in the Nov. 4 issue of Nature.

The holograms aren’t as speedy as those in Hollywood. The images move a lot more haltingly, as the display changes only every two seconds, far slower than video sailing past at 30 frames a second.

But unlike science fiction, these holograms are actually happening and in close to real time; a fellow is filmed
In close to real time, a fellow is filmed in one room, the computer-processed data is sent via ethernet to another room, and then laser beams go to work. Voilà: His holographic telepresence appears and moves, albeit somewhat jerkily, in apparently solid detail (until you try to put a hand through him).

Innovative research in holography is going on at labs and companies worldwide, said Lisa Dhar, a senior technology manager at the University of Illinois, Urbana-Champaign, who is an expert in holographic materials.

“Groups are deploying new materials and methods to create compelling work” of both still and moving holograms, Dr. Dhar said.

The work has implications beyond the lab, she said. We may need to wait a decade before watching holographic movies at home. But even before the technology is practical for games and entertainment, it promises applications in advertising, the military, architecture and engineering.

Zebra Imaging in Austin, Tex., sells holographic prints that at first glance look much like ordinary 2-by-3-foot pieces of plastic — until an LED flashlight is shined at them. Then the patterns, burned into the plastic with high-power laser beams, come to life, said Al Wargo, chief executive. Out of the surface springs a model of a complicated building or an intricate network of pipes and mechanical equipment.

No special eyewear is required to view the holographic prints, which typically cost $1,000 to $3,000 each. The company has also demonstrated moving holographic displays in prototype at conferences, Mr. Wargo said. (It introduced color holograms in September.)

Zebra’s main customer has been the Defense Department, which sends data in computer files to the company. Zebra then renders holographic displays of, for example, battlefields in Iraq and Afghanistan.

Businesses are also Zebra customers, including FMC Technologies in Houston, which uses holograms of oil field equipment for sales and
training.

Adam Andrich, global marketing manager for fluid control at FMC, says holograms are handy substitutes when the company wants to demonstrate its 50,000-pound equipment at trade shows.

“The holograms are a lot lighter,” he said, and they create a striking effect as they rise in shimmering volume in the air. “They are so realistic that every time we show them, people try to grab them,” he said.

Holographic prints may also find use among architects and engineers. Tina Murphy, a project engineer at HNTB in Indianapolis, says she already uses extensive 3-D computer modeling to plan before construction, but holograms can also help to communicate, particularly with a group. “We can show them to plant operators, lawyers, regulators and engineers,” she said. “With this one visual image, we can all communicate.”

The holograms are an inexpensive alternative to bulky, often fragile physical models of wood or polystyrene, says Jared Smith, a senior vice president at Parsons Brinckerhoff in Seattle, an engineering, planning and architecture firm.

“Slip them into a portfolio case and carry them,” he said. “Then shine a light on them and up leap these buildings in three dimensions.”

At the University of Arizona in Tucson, Dr. Peyghambarian created his displays using 16 cameras. Software rendered the images in holographic pixels, and laser beams directed by the software recorded the information on a novel plastic that can be erased and rewritten in two seconds. Dr. Peyghambarian says that the group is working on speeding up the rate and expects versions to be in homes in 7 to 10 years. Slower versions may be useful far sooner, for example, for long-distance medical consultation.

To help make those long-distance connections happen, Keren Bergman, a professor of electrical engineering at Columbia University in New York, is working on ways to send holograms not just from room to room, but also from Arizona to New York on the Internet. Dr. Bergman and Dr. Peyghambarian are collaborating as part of joint research financed by the National Science Foundation.

One day, she may summon people to her lab by holographic telepresence, just as Alexander Graham Bell once summoned Thomas Watson (“Come here!”) with a historic telephone call. To introduce that memorable moment, maybe she will find a good quote from “Star Wars.”

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