3D Videoconferencing

Experience More Natural Videoconferencing

The old AT&T advertising slogan, "[It's] the next best thing to being there," may have been perfect for long-distance telephone calls in its day, but it's not exactly the perfect slogan to describe something such as videoconferencing today. Sure, when everything works, videoconferencing is a handy tool. It has many benefits vs. simply talking on the telephone, and it's less expensive and time-consuming than airplane travel. Still, airlines don't have too much to fear from current videoconferencing technologies. People will still travel for meetings because videoconferencing isn't quite the same as natural, face-to-face communication.

3D Videoconferencing

The next generation of videoconferencing, however, might make a dent in airline ticket sales. University of

MultiView Setup

MultiView only works with a specific setup and positioning of participants in two videoconference rooms. Within each setup is one video camera and one video projector per participant. Each setup also has one MultiView Display.

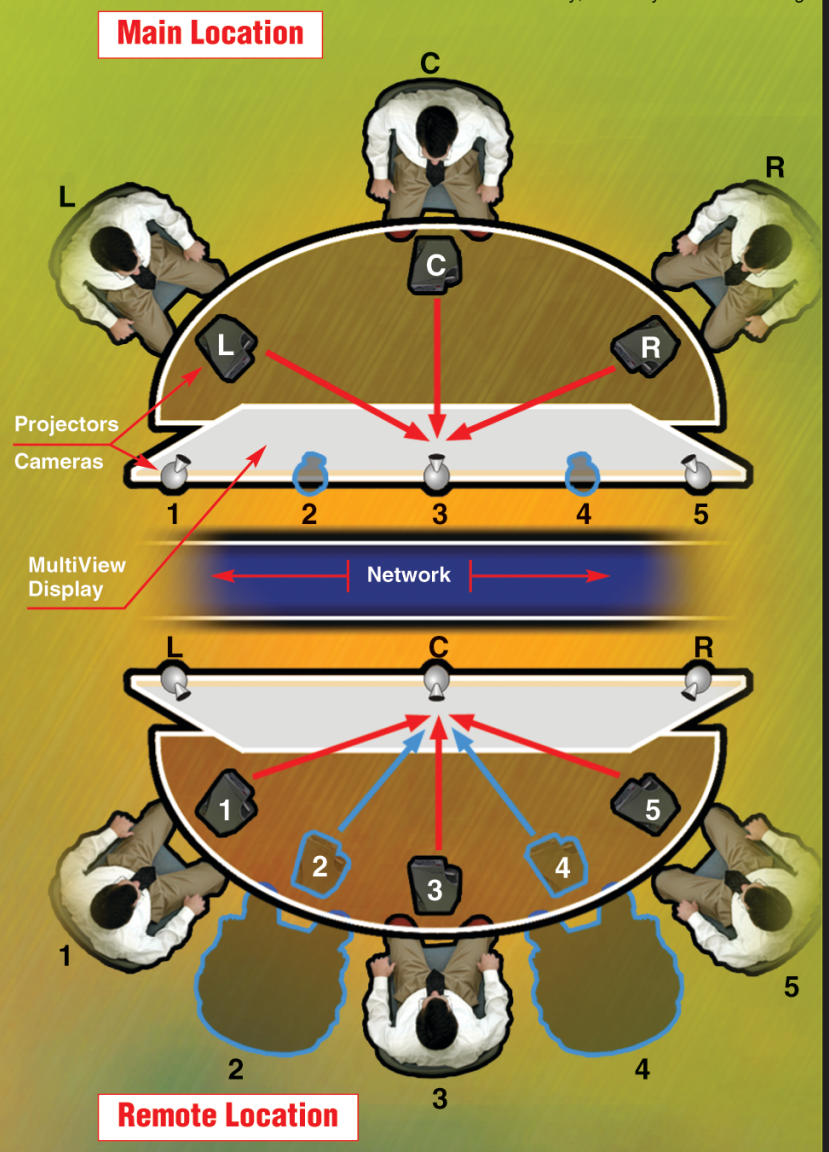
On the diagram participant L's viewing angle to the MultiView Display lets him see the only image projector L displays, which receives its video feed from camera L at the remote location. Each participant has his own video camera and projector; and the angle of the participant's view of the screen closely matches the angles of the corresponding camera in the main videoconferencing room and the angle of the corresponding projector to the center of the MultiView Display.

Each setup location can have any number of participants; they don't have to be equal numbers. In this example when two participants (numbers 2 and 4) are added to the remote location, you have to add properly angled cameras and projectors to give the new participants the proper viewing angles.

By preserving the proper viewing angles, MultiView creates the appearance of a 3D environment. Participants can follow the eye gaze of those in the main location, letting more natural interaction take place.

The top of the MultiView Display is placed at the same height as the participants' eyes. The video cameras then are mounted on top of the MultiView Display, giving a realistic image. If the camera is placed too high, such as well above the participants' heads, the images are too distorted from the overhead view. ▲

Source: UC Berkeley, Berkeley Institute of Design



California, Berkeley researchers John Canny and David Nguyen are developing useful technologies that are poised to bring an exciting new level of natural interactivity to videoconferencing.

2D vs. 3D. One of the most frustrating aspects of videoconferencing is its flat (2D) nature. In ordinary conversation the ability to make perceptions based on gestures or object placement (or even the direction someone is looking) relies heavily on depth (3D) perception, a phenomenon the Berkeley researchers call deixis. The idea of deixis is lost when looking at a videoconferencing screen; you can't establish eye contact through the 2D screens, for example. The researchers call this effect the "Mona Lisa Effect," where the eyes on the display seem to follow you at all times. There just aren't all of the normal, nonverbal connections that you'd have when communicating face to face.

MultiView. Canny and Nguyen are working on videoconferencing technologies designed to improve the way videoconferencing appears on-screen, giving participants more of a feeling of "being there" and making them better able to interact with each other. The latest technology, called MultiView, makes use of multiple video cameras and projectors and a special display to give users the feeling that they're sitting in the same room.

MultiView makes use of what the researchers call spatial faithfulness, which means (in basic terms) that each participant can determine where other participants are focusing their attention, just as they would in a natural 3D environment. When participants use spatial faithfulness, they're able to determine where others are focusing their gaze or when others are focusing their attention on another object. Making use of spatial information is important in a group communication setting. Participants often use nonverbal communications, such as eye gaze, to indicate when it's a certain person's turn to speak or to indicate when users should focus their attention on an object.

MultiView's components are fairly inexpensive, making use of "off-the-shelf" items. Researchers estimate that they can construct a three-person MultiView system for less than $4,000. What is more, the researchers expect costs to fall as the technology behind the projectors matures.

CENIC and videoconferencing. The idea of 3D videoconferencing grew out of work between the CENIC (Corporate Education Network Initiatives in California) and the BiD (Berkeley Institute of Design). CENIC is looking to aid in development of new technologies that will benefit from the next generation of high-speed Internet. 3D applications are at the forefront of many of these types of technologies, including 3D gaming and 3D TV.

3D videoconferencing is a natural fit for CENIC, as well, in part because of its current potential commercial appeal. In the future such technologies could become part of the common technology we use to make a telephone call. Having the ability to make a 3D video phone call truly would live up to the old AT&T slogan. ▲

by Kyle Schurman

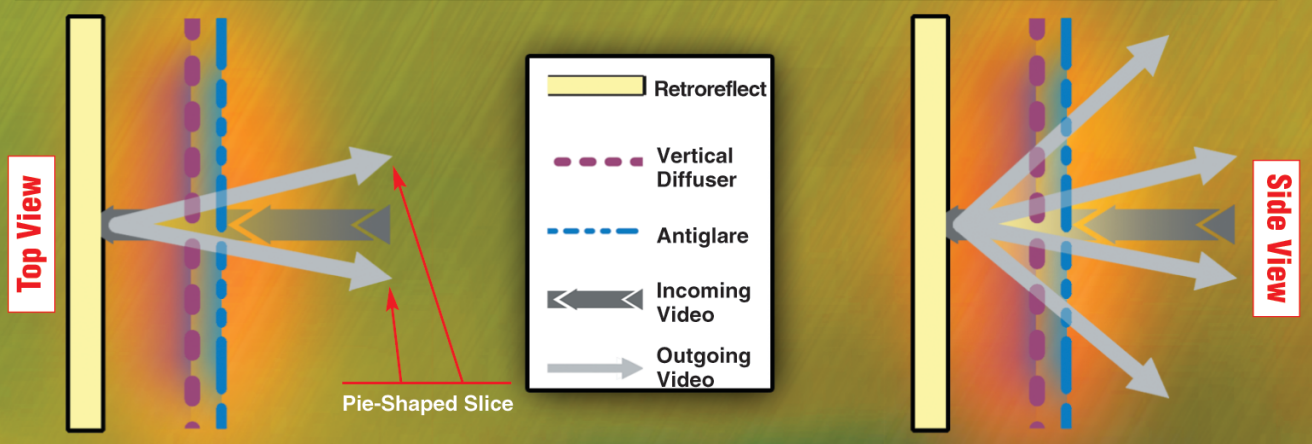
How The MultiView Display Works

The MultiView Display must show each participant the intended image. To perform this function, the MultiView Display must diffuse the image differently than a standard display, which provides a wide-angle view of a single image.

The MultiView Display shows each image from the projectors in a pie-shaped wedge, letting it display unique images from several projectors. As a participant in the videoconference sits behind and looks over a particular projector, he only can see the pie-shaped image produced by that projector.

The MultiView Display uses multiple layers to create the proper diffusion.

The back of the MultiView Display is a retroreflective cloth, which reflects light from the source back on the same path, regardless of the angle that it strikes the retroreflective layer. The vertical diffuser layer makes the light reflection in a pie-shaped slice (as show in the Top View), letting the viewer only see the image from his projector. The antiglare layer is required because the diffuser layer creates a sharp glare at the edges of the slice-shaped path. ▲



Source: UC Berkeley, Berkeley Institute of Design