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Christmas connection

Opening presents with family and friends may look and feel different in the future

By Scott Duke Harris
Mercury News

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This is a tale of Christmas Future . . . say, about 2017, maybe sooner.

Picture this holiday on the next-generation of high-definition TVs that you may someday buy at Fry's, Best Buy or Costco. They will include sophisticated cameras and audio that enable live, interactive, two-way communication - perhaps three-, four- or five-way.

Imagine an extended family scattered around the country or the globe watching one another unwrap gifts. Grandparents back East or overseas can tune in on excited grandkids in Silicon Valley, and the kids can see the grandparents as well.

If researchers like Bruce Culbertson at Hewlett-Packard Labs or University of California-Berkeley grad student David Nguyen get it right, these personal narrowcasts might even approximate a sensation as intimate as eye contact - the elusive grail of advancing "telepresence" technology.

This holiday vision does not seem far-fetched to Silicon Valley engineers toiling in the field. After all, the Internet phone service Skype already has made long-distance calls with video on personal computers commonplace in many households. The emergence of Internet protocol TV (IPTV) represents another step in what might be called "telefamily" technologies.

Today, HP's Halo, Cisco Systems' TelePresence and other systems are dueling for share in the expanding corporate video conferencing marketplace. The systems are elaborate and expensive. But if technology progresses in its conventional trajectory, ever-lower prices will enable versions of such systems to migrate to the home.

HP's Halo, introduced in 2004, is credited with dramatically improving the aesthetic quality and verisimilitude of video conferencing. The first system was actually developed by film studio DreamWorks, an HP partner, for its own use in the making of the animated feature "Shrek II," because conventional video conferencing could not handle the intense detail of working in animation.

"They know how to make things look good," Culbertson said. "We know how to do things DreamWorks doesn't."

HP took control of the effort to develop teleconferencing products for the corporate market. The system requires an office outfitted as a studio with careful attention to geometry, lighting and audio. A long crescent-shaped desk faces a crescent of three 50-inch video screens and a separate screen to display work product, such as a Web page.

Cisco later introduced its similar TelePresence system with three 65-inch screens. Executives shopping for such video conferencing systems will

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find many trade-offs in terms of performance and cost among Halo, TelePresence and their alternatives.

Under Culbertson's direction, HP is researching new avenues, each aimed at improving the verisimilitude of the technology. The idea is to make it seem as if people are actually in the same conference room, working over the same table.

One project, dubbed Panoply, addresses the seams caused by the use of three video screens by employing a single curving projection wall - 19 feet wide, 16 feet tall - that captures the overlapping, multiple projections of images. Panoply's optics include a "fan camera" developed by HP engineers, which uses 22 lenses to capture more pixels and software to merge the perspectives into a single high-resolution image.

"The thought is to capture the whole room in high resolution," Culbertson explained.

The "video wall" is flexible. Working from a laptop, one of Culbertson's colleagues moved a variety of images around the screen, changing their size. When the image switched to the perspective of a rider on a roller coaster, the effect was dizzying.

Inside another room at HP Lab's Palo Alto campus, a smaller screen - about the size of today's popular widescreen TVs - featured the image of Nguyen, narrowcast from the lab at UC-Berkeley.

Nguyen, working toward his doctorate, studies at the intersection of technology and psychology.

Even the most advanced video conferencing technology falls short in approximating the intimacy of eye contact and more subtle forms of body language. Recently, however, Nguyen discovered a

chemical secret that moved him closer to making eye contact work: Aqua Net.

Yes, the same hair spray your mom might use. Nguyen, who has developed his "MultiView" video conferencing prototype with support from HP Labs, bought a can of Aqua Net and used it to achieve a better, glare-reducing texture on the retro-reflective material on its projection screen. "It's expensive to have custom optics built," Nguyen explained. "As a proof-of-concept, it worked pretty well."

Impressed with Nguyen's project, HP Labs provided a grant to UC-Berkeley to fund the work and do further collaboration.

At first glance, MultiView appears relatively crude, because the picture quality is grainy. But soon it's apparent that the system offers an improved sense of perspective and spatial relationships. Eye contact remains elusive, but participants have a better sense of when they are looking at particular individuals, and when others are looking at them - crucial elements to personal communication. Further improvements, researchers say, will enable subtler, non-verbal forms of interaction, such as a meaningful glance or private grin.

Nguyen and fellow researchers used the technology to conduct psychological studies known as "trust formation experiments." The published, peer-reviewed findings showed that participants exhibited more trust in one another via MultiView than other video conferencing systems.

Years may pass before the technology moves beyond the lab, if ever. If it does, Culbertson said, the Aqua Net-effect will instead be accomplished by materials specifically engineered for the screens. In time, Culbertson said, "We're pretty confident we can get the image quality as good as Halo."

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Nguyen said he "has no doubt" that such telepresence technologies will find their way to the home. Not only will they enhance personal communication, but also the way people watch sports or live performances. "When it reaches a level of maturity, you're going to see it in front of your couch," he said.

Meanwhile, valley research engineers will be working on the next marvel.

Telepresence, Culbertson said, "is a step between 2-D displays and a full 3-D holographic display. Someday we'd love to have holography."

Holography is an imaging technique that uses laser light to replicate an image on light-sensitive film or glass plates. When the film is developed and re-exposed to light, it can re-create a 3-D image in thin air. It can look so real that people touch it, only to discover its ghostly nature.

So perhaps by 2027, maybe sooner, families will be sending out their holiday holograms.

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