

# Holograms: You can find some real ones here

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I've seen some holograms recently. Hologram Tupac Shakur, you are no hologram.

To backtrack a bit: Back in April, a surprise guest performed at the Coachella Music Festival alongside Snoop Dogg. The ghostly visage of rapper Tupac Shakur, who died in 1996, was somehow on stage performing. Hologram Tupac went viral, suddenly opening up a whole world of possibilities for live performance and bringing the word "hologram" back into the realm of the cool and the possible.

The only problem? The visual wasn't really a hologram. Instead, it was a very old projector-and-mirror [optical illusion](#) called "Pepper's ghost." While the company Digital Domain employed some 3-D magic in creating the computer-generated video, the image shown to the crowd was strictly 2-D.

The [misperception](#) even prompted an amusing correction in the Los Angeles Times after Coachella: "The image was two-dimensional and thus not a hologram."

If you want real 3-D holograms, though, look no farther than Austin's Zebra Imaging, a company that's been developing holographic technology since it started in 1996.

Eric Doane, a spokesperson for the company who specializes in its work with defense and intelligence clients, says the renewed interest in holograms - even things that are incorrectly called holograms - has not

been unwelcome.

"Regardless if it's considered a hologram or not, we like the attention," Doane said.

The company, which has about 60 employees, was started by MIT grads and quickly picked up a Ford grant to work on concept car projects. But before long, Zebra's work shifted to projects with the military. It currently supplies holographic prints that go to Iraq and Afghanistan in efforts like the Army's Tactical Battlefield Visualization Program.

Zebra's looking to get more involved in industries like oil and gas, architecture, city planning and product presentation.

But why would they need holograms and, before we go any further, what are holograms? Can they rap?

Upstairs in the North Austin Zebra Imaging building, the company has a large display area it calls "the Holodeck."

There are no robot security guards or lasers to scan your eyes for entry. Instead, it looks more like an art gallery, where examples of the company's work hang against strategically lit walls.

And here are holograms: They look like large sheets of film negative. The company takes data from 3-D design files and prints with lasers into the film's surface. To the human eye (and without 3-D glasses), the monochrome or color imagery appears to exist in 3-D, its planes stretching from far below the film to a few feet above it.

The "full parallax" view means you see new elements as you (or the film) moves around. The hologram could be of the Vince Lombardi trophy, showing you what appears to be a realistic 3-D representation of an

object, or something far more detailed, like a city block, an oil rig or floor plans for a hospital.

Zebra can do neat tricks with these prints; the data embedded into the prints in pixel-like bits can be modified to present different views from different angles. Some hologram prints might present a view of a building with cutaways to the interior if you rotate the film or you move around it.

And the company is working to perfect another kind of hologram technology. "Zscape" motion displays apply the same principles, but present a 3-D image floating above a table holding a set of tiles. It can present video holographically or a series of images. In one demo, a 3-D model of a human brain could be viewed from any angle.

It could be zoomed in on, rotated and shown in cross-section views as it appeared in front of me, a slightly faint, but seemingly tangible physical object.

Again, all without 3-D glasses.

Al Wargo, CEO of Zebra Imaging, said that the increase of 3-D in movies and other entertainment has helped create content and interest in the kind of work Zebra does. Laser and optical technology advances have allowed Zebra to print higher-resolution hologram prints more quickly and cheaply. And while it's hard to communicate through photos or videos the visual effect, those who see the holograms in person are exposed to something truly unique.

"You move around a true hologram and see complete perspective anywhere. It's just as if you're seeing a physical object represented," Wargo said. "It's very intuitive to understand."

That's been a key reason the military has been so bullish on the technology. The prints are durable - they can be rolled up, shipped in tubes, written on and laid out on a simple table with a light pointed at it. Soldiers seeing a hologram of a battleground can more easily coordinate a path of attack or examine where their line of sight will be.

The future of the tech will include making the dynamic displays higher-resolution and adding tools like motion controls, allowing someone to interact with a 3-D object, sculpting it or moving it around.

(Hints of the Xbox 360 Kinect's motion controls?)

While the applications for, say, city planners, architects or medical students are obvious, holograms aren't a closed, institutional technology. Zebra produces 3-D holograms for anyone who has a 3-D data file he wants printed up. Software downloadable from its website allows anyone to pay Zebra to turn a 3-D rendering into a hologram.

Prices range from \$249 to \$2,499, according to Zebra's website.

It appears holograms - the real ones and the projected "[holograms](#)" - are here to stay. Billboard reported last week that future concertgoers can expect to see 3-D versions of Jimi Hendrix, Jim Morrison and other music and film stars who've passed.

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