



See Me in 3-D

Live 3-D Teleconferencing Rivals Star Wars Holograms



Los Angeles, CA (Institute for Creative Technologies - Army) -- Scientists are developing a 3-D teleconference system so that people can make a phone call and see someone as though they were really there. A live 3-D scanning system is connected to a 3-D projector system so that people's faces can be scanned, transmitted, and displayed very quickly. The display uses a rotating mirror that reflects a slightly different image to the recipient's left and right eyes, thus creating the illusion of 3-D.

"The 3-D teleconferencing system is a live 3-D scanner system hooked to a live 3-D display system."

Paul Debevec, project director

Framework

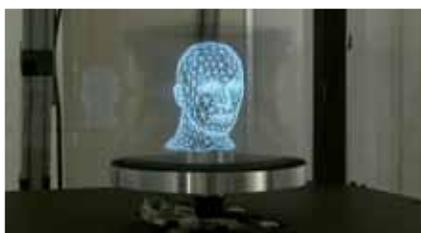
Middle School

Standards

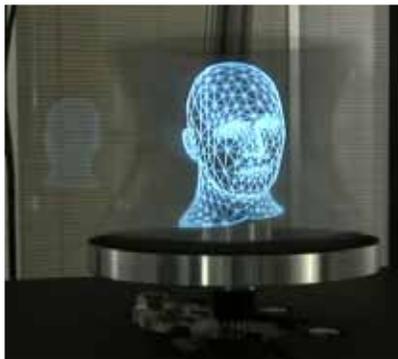
- NSES - B.ii.1 ➤ The motion of an object can be described.
- NSES - B.iii.3 ➤ Light interacts with matter.
- STL - 10.G ➤ Invention and innovation play a role.
- STL- 17.H ➤ Communication systems enable transfer of information from human to machine and machine to machine.
- STL - 17.I ➤ Messages are encoded and decoded.

Content Illustrated

- Light reflects off a mirror and other surfaces.



Content



Life Science

- Watching 15 consecutive still frames per second is enough to perceive an illusion of motion.

Physical Science

- To see an object, light from a source needs to hit the object and scatter in the direction of someone's eyes.

Technology

- To create the 3-D teleconference, a live 3-D scanner system is connected to a live 3-D projection and display system.
- Image scanning is done by projecting stripe patterns over the face while a camera captures those patterns. A high-speed video projector transmits the captured image at up to 5,000 frames per second.
- Projecting a set of different images onto a rotating mirror allows the reflected images to be perceived as if they are moving. A slight change of angle (about a degree) reflecting to one eye or the other creates the illusion of a 3-D image.
- The time it takes to capture and display the 3-D teleconferencing images is very quick—about 1/10th of a second. That means communicating with this technology is faster than a lot of cell-phone calls.

Engineering

- Using a mirror angled at about 45 degrees, images are reflected toward different eye positions.
- The speed of the rotating mirror and the timing of the images are calibrated so that a pattern of images is projected toward the right and left eyes and creates the illusion of motion and three-dimensionality.

Math

- From about one meter away, there is a difference of about a degree and a quarter, between left eye and right eye.
- To project or capture 288 images 15 times a second, the equipment needs to handle 4,320 image frames per second.

Guiding Questions

- What kinds of information is needed to make someone believe that they are seeing a 3-D object?
- How does your vision change if you close one eye?
- How do these 3-D images differ from the Star Wars hologram?

Suggested Activities

To think about as you watch:

- Find out how many “frames per second” are projected by various devices (such as a movie-theatre projector, computer monitor, or fluorescent light bulb).
- Create a “flip-book” animation.

Keywords

display, high-speed camera, high-speed projector, hologram, imaging, light, reflect, rotate, scanner, teleconference

- *See Me In 3D* can be found online at www.ndep.us/See-Me-In-3D. Visit www.ndep.us/LabTV for a list of process skills modeled in webisodes.