

information arts

intersections of art, science, and technology

Telepresence represents a major goal of telecommunications in both research and art. In some ways, every kind of telecommunications is telepresence—a technology for a person to be present *in some form* in a distant place. [...]

Researchers and artists have ventured a variety of definitions, with many different nuances. Lars Rosenberg offers this definition in the journal *Telepresence*:

The fundamental purpose of a telepresence system is to extend an operator's sensory-motor facilities and problem-solving abilities to a remote environment. Telepresence has been defined by Sheridan (1992) as a human/machine system in which the human operator receives "sufficient information about the tele-operator and the task environment, displayed in a sufficiently natural way, that the operator feels physically present at the remote site." Very similar to virtual reality, in which we strive to achieve the illusion of presence within a computer simulation, telepresence strives to achieve the illusion of presence at a remote location. The end results of both telepresence and virtual reality are essentially the same, a human-computer interface which allows a user to take advantage of natural human abilities when interacting with an environment other than the direct surroundings. The ultimate goal of these efforts is to produce a transparent link from human to machine, a user interface through which information is passed so naturally between operator and environment that the user achieves a complete sense of presence within the remote site.⁹ [...]

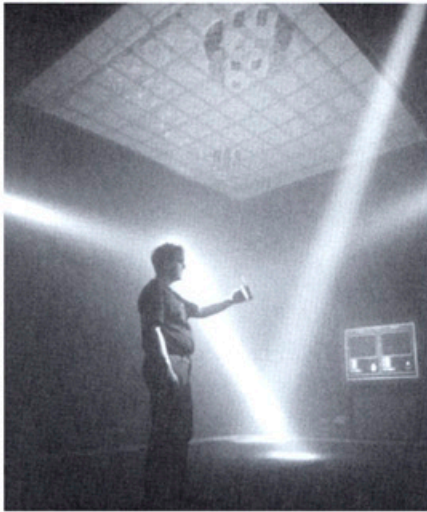
Artists are increasingly interested in the issue of telepresence. What kinds of environments can they create to allow audiences to confront the questions and meanings of communication over a distance? These questions become more critical as the richness of information being sent increases and the ability to act at a distance is augmented. In an introduction to the *Ylem Newsletter* on telepresence art that he edited, Eduardo Kac noted that telepresence art grew out of the telecommunications art described earlier:

Telepresence art branches out of this context, to merge the virtual quality of telematic space with the hardscape of physical environments—that is the basic premise of telepresence art. Whereas telepresence art was originally developed as an investigation of the unique aesthetic possibilities of telerobotics, today artists from different backgrounds contribute their own ideas and perceptions about the problem of remote presence in art.¹¹

Artists Exploring Telepresence

Rafael Lozano-Hemmer is an artist who creates events that integrate performance art, telepresence, and virtual reality. He heads a company called Transition State Theory, which has created events for many international art festivals. One well-known event called *The Trace* enabled people in remote installations to telepresently occupy each

other's space. Each location includes a large projection screen, robotic lamps that can move their focus, and ultrasonic trackers that monitor people's movements. The telepresence is created via four methods:



(a) computer graphics—geometric figures projected on the ceiling “float” exactly above the location of the local and the remote participants; (b) robotic lights—two white narrow light beams follow automatically and intersect at the exact 3-D location of the remote tracker, while two blue beams follow and intersect at the position of the local participant; (c) positional sound—audio samples indicating the relative distance between participants are panned around to match the movements of the remote participant; the sounds seem to originate from his or her relative position, giving a very clear “feeling” of where he or she is; (d) statistics screen—each station has a giant monitor that shows statistics, messages, and graphics designed to give the participants quantitative information about movement in both stations.²⁶

Fig. 6.3.9.

Rafael Lozano-Hemmer and Will Bauer, *The Trace*. Participants can trace the movement of persons in a distant space via light beams, graphics, and 3-D sound that re-create their relative placement in the local space. Work in collection of Telefonica Foundation, Madrid.

The Trace moves beyond traditional conceptualizations of telepresence. Lozano-Hemmer is not interested in maximizing the reality of remote presence but rather in investigating interesting ways of abstracting awareness of remote individuals. He is also interested in the new possibilities of multiple people occupying the same telepresence space:

Participants know nothing about each other except for their relative 3-D movements and positions. *The Trace* is a telepresence piece in the sense that it constructs a deterritorial transmission of presence, but unlike most other telepresence technologies it does not seek to “amplify” the senses of the participants but to construct three-dimensional shadows that may occupy and encompass the real space of their bodies.

“Telembodyment” happens when the two participants share the same telematic coordinates by entering the other’s 3-D representation. Telembodyment can be seen as a metaphor for those moments in which humans are inside other humans: physically, as in pregnancy, sex, or surgery; or virtually, as in Mikhail Bakhtin’s “intersubjectivity” or the holy communion’s “the body of Christ.”

Idle Hands investigates nonconventional collaboration made possible by computer networking and tracking technology. A giant projected hand follows the movement of a person in an installation space (via an ultrasonic tracking wand). Wherever the person goes, the ominous hand follows. The installation produces sounds that are a composite based on the person’s movements (interpreted without direct causal linkage) and the movements of another participant on a percussion controller. *Vectorial Elevation, Relational Architecture #4* invited Web viewers to control the position of several real search lights over Mexico City. In *Repositioning Fear*, Internet participants could help control the words projected on the facade of a building.²⁷

9. L. Rosenberg, “Definitions of Telepresence,” (<http://cdr.stanford.edu:80/html/telepresence/definition.html>).
11. E. Kac, “Introduction,” *YLEM Newsletter* on “Telepresence,” available at (www.ekac.org).
26. R. Lozano-Hemmer, “*The Trace*,” (http://www.ylem.org/newsletters/sep_oct1997/article7.html).
27. R. Lozano-Hemmer, “*Idle Hands* Description,” (<http://www.media.hks.se/media/teach/gibson/idletext.html>).

Reworking the Interface

The computer is not a neutral object. These devices come with conceptual baggage derived from their historical origins in military and commercial enterprise. [...]

Their constraints have limited the imagination in thinking of ways that digital information systems can be integrated into human life. The fact that the mouse and keyboard require a person to be tethered to an appliance (often sitting on a desk) fit well with Western patterns of organizational discipline and regimentation. The physical actions used represent a minuscule proportion of the potential physical repertoire of human-body actions. Some analysts suggest that this physical limitation can be understood as part of larger cultural patterns of body fear and hatred. The inherent isolation of one person to each interface also reinforces ideas of alienation.

Researchers and artists have started to wonder how the interface between digital systems and persons could be extended more widely into human life. Reaching beyond keyboards and mice, how could they read human actions such as motion, gesture, touch, gaze, speech, and interactions with physical objects? Wearable computing may one day convert body action into information function. [...]

Other systems, however, try to read motion without relying on all the custom body instrumentation, for example, using video image processing to track motion or gesture in free space. Working on the frontiers of this research, artists have created installations that respond to a great variety of visitor actions and probe the implications of this capability. Some assert that these body-oriented interfaces escape some of the cultural baggage of conventional arrangements and offer possibilities of moving digital art in much wider and deeper realms of life. Others, however, assert that even these body-sensing technologies are not benign and that they carry their own histories—for example, in military research—and that they can easily be perverted and assimilated into narratives of control and surveillance.

This chapter surveys artists who build installations that integrate body sensing and people's interactions with digitally activated objects. The artists investigate the implications of sensing motion, gesture, gaze, touch, and complex actions such as walking.

Motion

Rafael Lozano-Hemmer elevates motion to an act of inquiry. His relational architecture installation called *Re:Positioning Fear* used visitor movements near the three-hundred-fifty-year-old Graz, Austria, Zeughaus arsenal to reveal layers of contemporary and historical information. The installation sought to explore "several historical transformations and displacements of Fear." Text solicited from Internet chat sessions focused on contemporary fears such as AIDS, terrorism, global warming, and genetic tampering, and was projected on the facade and broadcast via Web cameras.

Rather than just projecting the entire text, however, Lozano-Hemmer created a layered projection system jointly determined by the movements of local observers and distant Internet contributors. The only text that could be read was that marked by the shadow of the local visitors. Wireless position sensors tracked the users movements and turned on robotic lights such that the user's shadow created a "dynamic stencil" in which projected revealed text could be read. The arsenal was chosen because it was a symbol of the threat from historical Turkish expansionism:

Tele-absence is defined as the technological acknowledgement of the impossibility of self-transmission. Tele-absence is a celebration of where and when the body is not. The shadow is not an

avatar, an agent, nor an alias of the participant's body; it is projected darkness, a play of geometries, a disembodied body part. . . . A shadow interface can be interpreted to be a metaphor of the obliqueness of ancient (and contemporary?) threat.⁸



Fig. 7.4.5. Rafael Lozano-Hemmer, *Re:Positioning Fear*. Motion-tracking lights and data projection cause images to appear in the shadows.

Other installations have similarly invited visitors to explore integrated physical and virtual spaces by motion and gesture. His *Trace* installation is discussed in chapter 6.3, on telepresence. In the *Able Skin* installation (in collaboration with Will Bauer and Emilio Lopez-Galiacho), visitors, armed with 3-D motion trackers, could wave their arms to control robotic lighting and projected points of view while exploring a virtual Renaissance building, the Palladio's Villa Rotonda. In *Displaced Emperors*, two geographical locations were conflated. Visitors used their bodies to explore a castle in Linz, Austria; however, the imagery revealed was displaced imagery from a Mexican palace.

8. R. Lozano-Hemmer, "Re:positioning Fear," (<http://xarch.tu-graz.ac.at/home/rafael/fear/>).