Artistic Environments of Telepresence on the World Wide Web

Luisa Paraguai Donati & Gilbertto Prado

ABSTRACT

The recent use of streaming video on the World Wide Web for the distribution of live images has enabled an interface that supports a new phenomenon of virtual, defered, remote presence, extending perception and expanding the possibilities of remote interaction. The purpose of this essay is to provide a brief survey of the use of these live images in artistic spaces specifically conceived for this medium. These environments will be presented in three different categories, which propose transformations in possibilities of participation, interference, and the participants' self-expression.

The World Wide Web, with its intrinsic capacities for inter-connectivity and synchronicity has generated new possibilities for the relationship between participants, information, and technological support and provides an interactive communication space where infinite paths allow for participation in events, real-time experiences, and remote actions exploring the sensation of ubiquity and simultaneity.

We already live in a society that has continuously been exposed to and incorporated the ubiquity of telecommunications. The Internet has recently increased this tele-connectivity by allowing text, images, sound, and video exchanges with any person one wishes to connect with professionally or socially, in a practically instantaneous manner. The creation of the WWW—as a net of human relations that transcends geographic limits and incorporates real-time participation and the occurrence of events in a continuous (synchronal) or partial (non-synchronal) flow—provides the circulation of social imagination, as well as scientific information. This utilization of the Web as a social space of information exchange—managing the processes, procedures, and actions involved in the formal composition of communication—involves the users in a concept of widespread and abstract space.

For a long time, images have been "transported" by different means and have produced different forms of aesthetics, with the intent to "contain" physical space and transfer it to other supporting media such as a screen, paper, and film. With modern communication technologies, the image gains another characteristic: real time. The live image enables and links people in remote locations in a temporal phenomenon and proposes transformations in the relationships between and knowledge of people, through a "distance" and "dimension" that suggests forms of "movement" throughout the world. The use of Web cameras to generate live images introduces its own specificity and transforms the "vision"of the viewer, as it incorporates telepresence into the metaphors of these images, generating a situation where a viewer/participant is capable of proposing a modification to a remote environment and receiving an immediate answer from it. As a result, new possibilities for users' performances are opened up through an aesthetics resulting from the synergy of non-formal elements—such as the coexistence in virtual and real spaces, the synchronicity of actions, remote control in real time, telerobotic action and remote observation in a collaborative form.

Using webcams, one encounters a real-time, constantly updated

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digital image, which transports information from a remote physical space where a user—despite the lack of a physical space of contact—starts to direct the potential development of events through alternative possibilities of "presence" and "encounters." The feeling of ubiquity that makes "being/acting" possible has its origins in the live images that implement a "tele-existence" in different physical spaces of contact, a feeling and sensation that can be converted into real and remote action. The images captured in real time unfold like "temporal windows," rendering virtual the interventions of users who can observe, interact, move and share other distinct "realities," regardless of the physical distances or geographic location but subjected to the speed of the connections for data transmission. According to Paul Virilio, reality became ubiquitous by simultaneously decomposing the time of the presence here and now and the telepresence beyond the "horizon of sensible appearances" [1].

The live image becomes "the horizon of sensible appearances" when it comes to enabling not only the synchronal, interactive communication over a distance (a situation already made possible by the telephone) but also the emergence of a tenuous dividing line between the several forms of "virtual/real communication" that allows users to coexist/operate in several "worlds," to be "at home" and at the same time itinerant and "distributed." The virtual realm allows the image to represent a space or an object, while the image's transmission enables both observation and the possibility to trigger actions, to manipulate and/or remotely displace material objects, thereby provoking and generating movement.

For Eduardo Kac, "The Art of Telepresence creates a unique context as a way to produce an open and engaging experience that manifests the cultural changes brought about by remote control, remote vision, 'telekinesis' and real time exchange of audio-visual information" [2]. Ken Goldberg observes that "while the virtual reality admits to its illusory nature, telepresence can be defined as the presentation of perceptual information that claims to correspond to a remote physical reality." What is being experimented with is less

the simulacra than the perception of the boundaries between fiction and reality, making the limits between what is built and observed extremely imprecise, uncertain, and ambiguous [3]. Telepresence thus produces a phenomenon where the logic of the transmission/reception is substituted by the corporeal division of an individual who appears simultaneously in several places. This feeling of potentially being physically present in a remote environment can be experienced as an individual point of view or as control over the image and/or the manipulation of a device in the remote space itself. The user's control over "what" and "how" to see over the Web becomes more important than the image that mediates a glimpse and/or an action. This low resolution image becomes secondary compared to the definition of or access to other realities. As Paul Virilio puts it, it is "a virtual reality that dominates the reality while disturbing its own idea of 'reality'" [4].

Several artists have developed streaming media projects on the Web and appropriated the technology to propose new forms of aesthetics, utilizing materials that are less physical than symbolic, created by software and code. In a constant process of reverting formal interventions, the artist transforms the conditions of production and circulation and enables various forms of performance and action on the user's end. The artistic environments supported by new technologies can be considered, as Marshall McLuhan puts it, "anti-environments or counter-environments, since they supply us with the means of perceiving the environment itself, as a form of training our perception and judgement" [5].

In terms of the use of webcams, there are quite a few sites that are transmitting information from remote spaces through live connections, providing a shared experience through constantly updated images. Several of these spaces are artistic proposals that use this technological interface in order to validate new behaviors by offering alternative possibilities for remote action experiences. This "new behavior" includes changes in concepts such as closeness, manifestation of distance, personal involvement and interaction among groups without any direct physical con-

tact. Based on the various possibilities for users' actions and interventions, one could propose a classification of experiences in three different categories [6]: direct observation of remote physical spaces, synchronous exchange of information, and remote action in distinct physical spaces [7].

DIRECT OBSERVATION OF REMOTE PHYSICAL SPACES

Sites that use webcams are monitoring the world with different objectives, for example, by transmitting images of traffic and the weather or panoramic views and "scenes" from people's private lives. This attitude of explicit voyeurism suggests exhibitionism, a reversibility of the gaze, as well as "self-expression games" of personal imagination, and is reinforced by anonymity, a specific characteristic of communication over the Web.

This form of direct observation can also be considered surveillance of people's whereabouts and personal lives. Our technological society is already permeated by surveillance systems, and we frequently come across surveillance cameras at airports, in subway stations, supermarkets, shopping malls and banks where we are submitted to the technological and impersonal gaze of monitors. With the miniaturization of technology, surveillance has become imperceptible, on the one hand, and abusive in the blurring of "seeing" and "being seen" on the other.

Depois do Turismo vem o Colunismo (After Tourism comes Colunismo) [8]

Gilbertto Prado's Web installation took place between September 3 and October 31, 1998, as part of the exhibition "City Canibal" at the Paço das Artes in São Paulo and was also included in the Web art selection of the 24th Biennial in São Paulo (1998). Documentation of the event [9] can be accessed through the wAwRwT Project [10]. The installation consisted of a "portal," two webcams that were triggered by sensors detecting visitors' movements in the physical space of the installation. The local images grabbed in real time were mixed with ones from an image database and made available over the Web (Fig. 1). The visuals stored in the database included images of anthropopha-

Fig. 1. Gilbertto Prado's *After Tourism comes Colunismo*: the Web installation.

gi and pictures from the 16th and 17th century portraying the first visitors and "tourists" of the Terra Brasilis, as well as references to art both contemporary and from other periods. Web visitors could observe the space through the webcam. The work humorously addressed issues surrounding presence and the "foreign" perspective, as well as cultural cannibalism and contamination.

The presence of visitors in the "other land" results in integration as well as the shock of a clash of values and cultural precepts embedded in "reality" and the culture itself. The imagery from the post-discovery period evokes the confrontation with the "difference" of the visitors, which manifests itself in their fantasies, longings, and projections onto the unknown place. On the Web, the live images present a navigable "space" on the screen, which visitors can observe and spy on, transiting and composing the remote space in real time. As the stored and real-time images are juxtaposed on the screen, they become composites of different historical situations and perspectives. The composition of the web page—an image being juxtaposed to and complemented by an other, as well as constantly updated in real time—formalizes the dynamic movement of "strangeness" that is created through local and cultural references and

always transforms itself through a new reading. Various cultural references can be mixed with a remote, observable physical space, qualified by the remote presence of the person who is locally discovering and visiting the installation. The possibility of juxtaposing two worlds (imaginary and real), each one involving the other, raises questions concerning intimacy and the sharing of the viewers'/visitors' inner and outer realities.

The Ghost Watcher

This installation, created by artist June Houston, was accessible on the Web from 1995 on and the site has now evolved into version 2.0 [11]. The original work was a formal invitation to the site's visitors to discover the cause of strange sounds that emanated from hidden nooks under the artist's "bed."

The physical installation consisted of wooden structures that supported June's bed and created corners and nooks, folds and textures and an atmosphere of reclusion that suggested that there was a lot to be unmasked. Five video cameras were surveying the space, with a spot light attached to them, and no attempt was made to deny the constant observation. The light moved around the camera, creating a play of shadows that insinuated forms and contours. Each corner of this space became an

invitation to personal imagination and navigating the space turned into a confrontation with one's own fears and "ghosts." In a very poetic manner, the artist exposes and shares her world and stories with the Web visitors.

In many of the images it was possible to spot the other cameras, which created the feeling that one might be observed. In other images, gaps, openings, and details of the compositional elements created an emphasis on aesthetics. The semantic information conveyed by these objects and spaces was less important than the aesthetics that may create its own meanings for each of the participants.

Wireless Wearable Webcam

The recent proliferation of video surveillance cameras prompted Steve Mann, based at the University of Toronto, Canada, to propose "reflectionism" as a new philosophical framework for questioning social values [12]. His WearCam was built out of two micro video cameras and computer screens embedded in glasses. The video cameras could wirelessly record and transmit images of what Mann saw as well as receive images and other information (Fig. 2).

The work was shown at MIT's Media Lab in 1994 and was accessible on-line until September, 1996. The Web visitor could accompany Steve Mann and observe

what he was seeing since the images grabbed by his device were sent to the Net in real time. His visual journey "grabbed" environments that were dominated by surveillance cameras. These cameras were often hidden and registering people without their previous consent. The procedure generated three works, *Maybe Camera, Probably Camera,* and *No Camera,* where
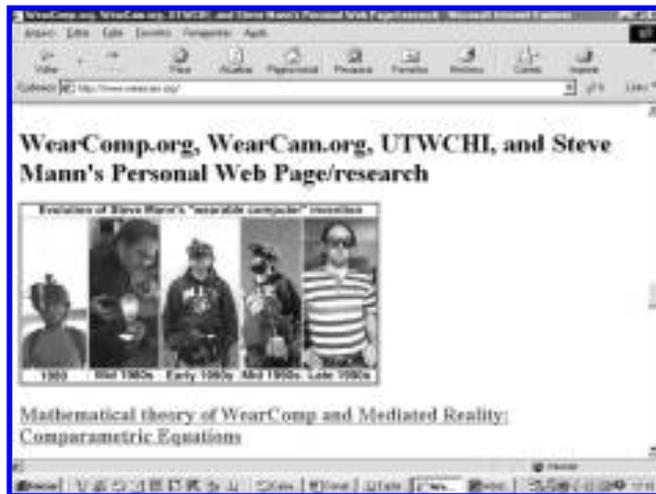

Fig. 2. The Steve Mann web page showing the evolution of the Wireless Wearable Webcam device.

users can follow the live images on the Web as observers of Steve Mann's journey, sharing his view on events, encounters, people, and objects. Another work by Mann, titled *My Manager* and inspired by Stelarc's works in "Performance Art," allowed the participants to become "managers" and contribute, via Radio TeleTYpe (RTTY), to the creation of a video documentary in an environment that was under surveillance.

Another work was the meta-documentary *Shooting Back.* In addition to recording with the Wireless Wearable device itself, Mann began to carry another camera and interviewed the people responsible for the surveilled environment, asking them to explain the reasons for the "presence" of surveillance as an instrument of power. The recorded images were transmitted to a base station and remotely assembled through a pencigraphic image compositing algorithm. The resulting images presented distortions of the space, constituting an aesthetic manipulation.

In all of his works, Steve Mann questions the use of surveillance cameras and suggests the construction of a mirror. In a process of turning its own power against it,

the mirror ends up being observed. As Steve Mann says, "an example of the authoritarianism of such watching cameras is found in those department stores where people are watched and treated not as members of a community but prisoners in a 'panoptic' society" [13]. His work intends to confront society with itself and its own mechanisms, forcing it to perceive its own absurdity [14]. According to Steve Mann, "the most fundamental matter of this device is, without any doubt, to empower the individual with a 'particular space of information,' customized, personalized, operated and controlled by himself" [15]. Another important aspect tackled in this relation and interface is the photographic memory that allows "everything" to be visually registered and stored in a database. This memory can then be shared, in a collective sense; in a collaborative way, individuals can participate in the construction of their consciousness and connect in a collective humanistic intelligence.

SYNCHRONOUS EXCHANGE OF INFORMATION

Video conference systems and CUSeeMe on the Web enable synchronous communication between users, which can be established with exchanges of images via camera, texts via chat, audio and/or simple file transfer. It is possible to connect to people, expand professional relationships and social circles, and establish communities of interest. Without being subjected to geographical limits or the need for physical displacement, people can more efficiently manage time with the possibility of sharing and transforming data, information and experiences in real time.

Rara Avis

Rara Avis, a networked interactive telepresence installation [16], was created by the

Brazilian artist Eduardo Kac in August, 1996, and presented at the Nexus Contemporary Art Center in Atlanta as part of an exhibition titled "Out of the Bounds: New Work by Eight Southeast Artists." It was also shown at Casa de Cultura Mário Quintana during the 1st Biennial of Visual Arts of Mercosul in Porto Alegre, from October to November, 1997.

The installation consisted of a large aviary occupying part of the gallery and a Web component, which allowed for remote experience and intervention. Inside the aviary were small gray zebra finches and a large colorful and immobile macaw—a robot with miniature video cameras in the place of the eyes (Fig. 3). Visitors to the gallery could put on a headset that would "transport" them into the aviary, viewing their surroundings (including themselves outside the cage) from the point of view of the macaw.

Web visitors could also "share" the body of the macaw, not only as observers but also through triggering the vocal apparatus of the bird, thus making themselves heard within the gallery. People from different locations could co-inhabit the same physical body and remotely intervene in a physical space, subtly influencing the behavior of the birds inside the aviary and the people in the gallery. Kac created a new, potentially omnipresent environment with telerobots, animals, remote and local human interaction, providing different options for perception in places throughout the world. The visitors' immediate perceptions of their surroundings were coupled with an awareness of what affected them remotely, while the use of CUSeeMe was extended/expanded both technically and aesthetically.

Alice Sat Here

In 1995, the artists Nina Sobell and Emily Hartzell—in collaboration with engineers and system analysts of the Center for Advanced Technology at New York University—developed a device that consisted of a wheelchair equipped with a telerobotic camera that captured images, which were transmitted live over the Web. Alice sat here constituted a passage between the physical space and cyberspace. According to the artists, the work "intended to elimi-

nate the limits of both spaces: the real and the metaphoric."

The installation was first shown at Ricco/Maresca gallery in New York City. Local participants could drive the wheelchair while the remote visitors on the Web could control the position of the camera that generated a real-time video, which could also be seen on a monitor in the gallery and on a small monitor mounted on the throne's handlebar. The monitor in the gallery was surrounded by several touchpads, which—when touched by the gallery visitors—would also direct the gaze of the telerobotic camera. A tiny camera mounted above this monitor captured the image of the participant in the act of controlling Alice. These images of the gallery visitors were blended with the images captured by the camera on the wheelchair and the resulting image was broadcast over the Web. People in the gallery could thus observe and manipulate the performance of the other local visitors, while the remote visitors navigated on the paths defined by the local ones. Participants in parallel spaces shared perspectives and re-designed spaces, their experiences that were formalized in the processing of the images sent to the Web. Each participant controlled some aspect of the respectively other environment, engaging in collaborative action in this inter-space [17].

REMOTE ACTION IN DIFFERENT PHYSICAL SPACES

The development of robotic technology in telecommunication environments has enabled transmission and reception of movement as audio-visual information. Telepresence can transport an individual from one physical space to another, allowing for experimentation with remote environments in terms of immersion (virtual reality) or intervention (tele-robotics, tele-operation).

Some Web sites offer users the possibility of manipulating a remote environment, which is made present through live images. The intervention is made possible by means of physical devices, such as robots

Fig. 3. Eduardo Kac's *Rara Avis:* the aviary from the visitor's perspective. Photo by Anna Yu.

Fig. 4. The interface of the *Telegarden* site through which the user can plant, water the flowers, and chat with the participants.

that are remotely manipulated by users. Robots' roles and functionalities are being explored in different ways, and they are frequently hybridized with other media, systems, contexts and/or life forms [18].

All the sites described in the following make use of a remote projection of human action through a telerobot, which in turn generates other dimensions of observation, operation, and control in a physical space. Some artists appropriate the technology in order to reflect on cognitive processes in their interactive installations, for example by exploring behaviors, relations over a distance, the domain of movement, systems of evaluations, and recurring opera-

tions in robot systems. Current information technology has introduced new approaches to comprehension and meaningful negotiation.

PRoPs (Personal Roving Presence)

This mechanical system, tele-operated by Web users, was developed by Eric Paulos (Department of Electrical Engineering) and John Canny (Computer Sciences) at the University of California, Berkeley, in 1996 [19]. It produces a sensation of "tele-embodiment" in a remote physical space, enabling human performance in a series of tele-activities by providing users with various opportunities for movement and expression, such as going for a walk, reading, listening, and talking. The system uses two forms of presentation, a "blimp" (space browser) and a surface cruiser, both tele-operated.

The project isn't aimed at portraying human interactions in a realistic way but at identifying and refining traces and inclinations of human behavior that are inherent in our communication, understanding, as well as comprehension of and interaction with a space and other people. Through a live video, one can usually see and hear what the remote partner places into the field of vision of the camera; PRoPs gives the user a greater flexibility of movements and autonomy when it comes to making decisions about what to see and hear.

The participant's image is transmitted via a CCD screen to the remote space and made available through a video or still image, thus creating the existence and identity of the remote user through the transmission of gestures and facial expressions. The capacity of the user to experience their own existence and actions through PRoP constitutes a form of reflexivity [20]; partcipants can listen to themselves or watch the actions that result from their commands, which becomes an important element in expanding the range of expressions in tele-embodiment.

Telegarden

In this tele-robotic installation, a natural garden survives through the interventions of a robot that is remotely operated by Web visitors (Fig. 4). The project enables participants' interaction over the Web and expands telepresence into the concept of on-line communities. The project was developed by a team including Ken Goldberg, Joseph Santarramana, George Bekey, Steve Gentner, Rosemary Morris, Carl Sutter, Jeff Wiegley and E. Berger.

The installation was developed at the University of Southern California and went on-line in June 1995. In 1996 it was installed at the Ars Electronica Center (Linz, Austria), where it resides until today [21].

While the navigation through the Web site mostly happens as a solitary, personal act, the project is aimed at reducing this feeling of solitude by simultaneously enabling virtual encounters. Meetings of communities usually require that the same physical environment is shared but on the Internet, the space-time barriers are transcended. *Telegarden* is an experience of digital community, where Web visitors can establish social relationships through the process of nurturing a physical environment, engaging in rituals and constructing hierarchies and social layers.

Conclusion

In the space mediated by the live, synchronous image—be it personal, artistic, or professional—people begin to exist on the threshold between the real and the virtual, "being dislocated" without leaving home and re-inventing themselves as they become an active member of a community that is technologically established through the exchange of images, audio, and text. These encounters make the "other place" viable through communities of interest rather than the sharing of the same physical space, thus making cyberspace a place for human relationships where it becomes possible to formalize experiences of simultaneously "being" several people in different places and of speed and interactivity as propelling elements of events.

The possibility of remote intervention in physical spaces accentuates the possibility of transforming the participants' percep-

tions of their relationship to the medium. The use of webcams and tele-robotic devices on communication networks allows for previously unexplored work processes and new forms of relationships with these devices and interfaces. This new synergy between humans, machines, and networks proposes new logical and poetic horizons, calling for a renewal of contents [22] and altering processes of perception, conception, and creation as well as learning and intervention.

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8. Play on the Portuguese words: colunista (columnist), coluna (spine) and colunável (celebrity).

9. *After Tourism comes Colunismo*, http://wawrwt.iar.unicamp.br/colunismo/colunismo.html

10. In the technological context of the Net, the need for discussion and critical reading of these artistic spaces manifests itself in a profusion of different manifestations. The objective of the *wAwRwT* project is the creation of artistic works on the Internet as well as reflection on the technological poetics privileging the telematic artistic dimension. In addition, it intends to chronicle how the new technologies influence the construction of these new artistic spaces. Web site: http://wawrwt.iar.unicamp.br.

11. *Ghost Watcher,* http://www.ghostwatcher.com/cgi-bin/gw/home.pl

12. *Wireless Wearable Webcam*, http://www.wearcam.org

13. The concept of the "panopticon" was developed by Jeremy Bentham. It originally was a concept for a prison where the individual cells would be arranged in a circle around a central surveillance tower, which allowed the guards to constantly watch their prisoners. The most important effect of this architectural project was that the prisoners felt observed even without the physical presence of a guard. See A. Machado, *Máquina e Imaginário: O desafio das Poéticas Tecnológicas* (São Paulo, Brazil: USP,1993).

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