

# “Reflectionism” and “Diffusionism”: New Tactics for Deconstructing the Video Surveillance Superhighway

Steve Mann

*Those who desire to give up Freedom in order to gain Security,  
will not have, nor do they deserve, either one.*

—Thomas Jefferson

*There is no place for the privacy factor when public safety is  
concerned.*

—John Fitzgerald, Supervisor, Transportation  
Operations, U.S. Postal Service, New York [1]

## SAFE AND SECURE, BUT AT WHAT PRICE?

The perceived “success” of video cameras in banks has led to their use in department stores, first at the cash register and then throughout the store, monitoring the general activities of shoppers. “Success” there has led to governments using ubiquitous surveillance throughout entire cities to monitor the general activities of citizens. (In Baltimore, throughout the downtown area, the government installed 200 cameras as part of an experiment [2] that, if “successful,” would mean other cities would also be so equipped.) Businesses such as the Sheraton hotel have used hidden video cameras in their employee locker rooms [3], and the use of hidden cameras by both businesses and governments is increasing dramatically.

Other forms of visual surveillance and environmental intelligence also include the following:

### 1. Automatic face recognition:

A computer system being installed at welfare offices will compare each applicant's face to a database of thousands of other recipients' faces . . . exposing fraud faster and more efficiently than other methods such as fingerprinting. . . . Viisage Technology, in Acton, bought the rights . . . and produced the fraud-detection system for the welfare department. Under its \$112,500 state contract, Viisage will provide facial-recognition and fingerprinting services to welfare offices in Springfield and Lawrence as part of a six-month pilot program [4].

Meanwhile, Privacy International is calling for a ban on Computerised Face Recognition [5] and ordinary citizens are arming themselves with ink pads and demanding that politicians and other officials submit to fingerprinting.

2. Television set top-boxes, designed for deployment in people's homes, with built-in cameras that allow the cable-TV company, or the like, to track the number of people watching, along with their identities (e.g. keep records of who is/has been watching what and when):

Arbitron, Nielsen's competitor in measuring television-viewing habits, asked him [Alexander Pentland, inventor of the automatic face recognition technology] to develop a “people meter” to recognize which family members were watching a show, so that the company would no longer have to depend on viewers' diaries for demographic information [6].

3. “Smart spaces,” general workspaces equipped with cameras and microphones to “constantly watch” those in the spaces and “try to be helpful at all times” [7]. The designers of these so-called “smart spaces,” “smart rooms” and “interactive video environments” based their work on earlier work by artist David Rokeby [8] but have taken his concept of an artistic performance tool [9] into the domain of ordinary day-to-day living spaces.

4. An experimental bedroom (“the room is also equipped with a microphone . . . and hidden video cameras” [10]), used as an interactive space: it can “see” when occupant(s) awaken in the morning in order to automatically start a coffee maker [11].

5. A proposed (not yet built) shower, or bathroom mirror, with built-in camera to examine skin condition and report any abnormalities (such as moles and the like), as well as to sense when the occupant is almost finished showering in order to send a message to the coffee maker, causing it to start brewing [12].

6. Pressure-based imaging sensors inside office chairs that provide a so-called “butt print” in real-time video [13]. (The terms “butt print” and “seat-of-the-pants impression” appear to originate from a study of car seats using butt measurement technology [14].) The stated goals of the smart-chair project are “to build a smart chair by making it aware of the user's activities (posture, movement, and sitting habits)” [15].

7. A synthetic aperture camera capable of seeing through clothing, with applications such as “securing buildings from employee theft” or “for police to covertly monitor crowds for weapons” [16]. Although proponents envision recorded im-

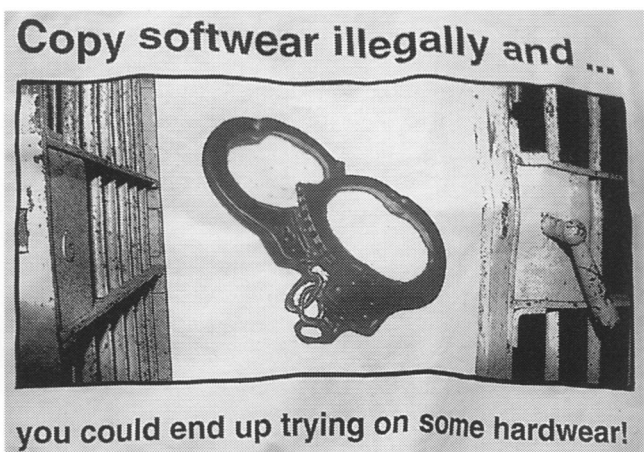
## ABSTRACT

The recent proliferation of video surveillance cameras interconnected with high-speed computers and central databases is moving us toward a high-speed “surveillance superhighway,” as cameras are used throughout entire cities to monitor citizens in public areas. As businesses work alongside governments to build this superhighway and expand it into private areas as well, there is a growing need to develop methodologies of questioning these practices. The goal of this paper is to stimulate inquiry into both surveillance and the rhetoric used to justify its use. “Reflectionism” is proposed as a new philosophical and tactical framework that takes the Situationist tradition of appropriating the methodology of the oppressor one step further by targeting that methodology directly against the oppressor. The oppressor then becomes the audience of a performance resulting from this new use of his or her own methodology.

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Fig. 1. Pieces constructed to assert the principle of self-ownership (1993–1994). Given society's utilitarian tendency to put our "blood and sweat" ahead of our "heart and soul," these pieces question the apparent notion that copyrighted material (intentional works) should have more protection than people and the data they give off (unintentional works). (a, above) Parody of the classic "shrink wrap" software license agreement, placing restrictions on those who might photograph the wearer (including restrictions when shirt is removed, e.g. restrictions on use of hidden cameras in fitting rooms). (b, top right) Parody of software piracy poster put on back of T-shirt, including material to which the author owns the copyright. (c, right) Parody of a "Say No! to software piracy. If you don't own it, DON'T use it!" poster.



ages "being viewed only by same-sex security officers" [17], the situation begs the question "would a security guard be willing to pose naked with a promise that images would only be viewed by same-sex citizens"—the concern has already arisen [18].

Although all of the above uses of surveillance are associated with claims toward a better future, an object of this paper is to ask the question "at what price?" and to stimulate further inquiry into some of these issues.

Embodied in the work presented in this paper is my assertion of "acquisitional privacy," a concept that challenges the right of organizations to capture/record images of an individual,

regardless of what promises are given regarding end use. Tacit in my assertion is the notion of self-ownership [19]. (Some self-ownership pieces are illustrated in Fig. 1.)

A further goal of this paper is to call into question totalitarian visual surveillance. Totalitarian visual surveillance refers to a state of being in which individuals are "seen" by a remote and unobservable entity (human or machine) but do not "see" each other through the apparatus. (This situation calls to mind Jeremy Bentham's Panopticon [20], a structure he proposed for prisons, schools, workplaces and the like, where prisoners, students, employees, etc., could not see or interact with one another, but could

be seen by a potential guard in a specially designed guard tower. The tower was designed so that individuals would not know whether the guard was watching them or even whether there actually was a guard in the tower.)

One example of totalitarian video surveillance is found in department stores where extensive video surveillance is used, yet photography is prohibited. Of all forms of surveillance, totalitarian surveillance is particularly disturbing, as representatives of the video surveillance superhighway refuse to accept the accountability they demand—furthering us toward a Panopticon society in which we are treated more like prisoners than members of a community.



Important to the thesis of this paper are the following ways in which agents and representatives of the video surveillance superhighway defend their infrastructure: (1) Secrecy: the field is often not subject to open debate or peer-review; (2) Rhetoric: “public safety,” “loss prevention,” “For YOUR protection you are being videotaped”; (3) Constancy: department store clerks do not follow shoppers around with camcorders, but, rather, video surveillance is present in a “matter-of-fact” manner, as part of the architecture’s *prosthetic territory*; (4) Higher and unquestionable authority: “I trust you and know you would never shoplift, but my manager installed the cameras,” or “We trust you, but our insurance company requires the cameras”; (5) Criminalization of the critic: “Why are you so paranoid; you’re not trying to steal something are you?”

## REFLECTIONISM

I propose “Reflectionism” as a new philosophical framework for questioning social values. The Reflectionist philosophy borrows from the Situationist [21,22] movement in art and, in particular, an aspect of the Situationist movement called *détournement* [23], in

which artists often appropriate tools of the “oppressor” and then resituate these tools in a disturbing and disorienting fashion. Reflectionism attempts to take this tradition one step further, not only by appropriating the tools of the oppressor, but by turning those same tools against the oppressor as well. I coined the term “Reflectionism” because of the “mirrorlike” symmetry that is its end goal and because the goal is also to induce deep thought (“reflection”) through the construction of this mirror. Reflectionism allows society to confront itself or to see its own absurdity.

One of my goals in applying Reflectionism to the surveillance problem is to allow representatives of the surveillance superhighway to see its absurdity and to confront the reality of what they are doing through direct action or through inaction (blind obedience to a higher and unquestionable authority).

## WearCam as Mirror

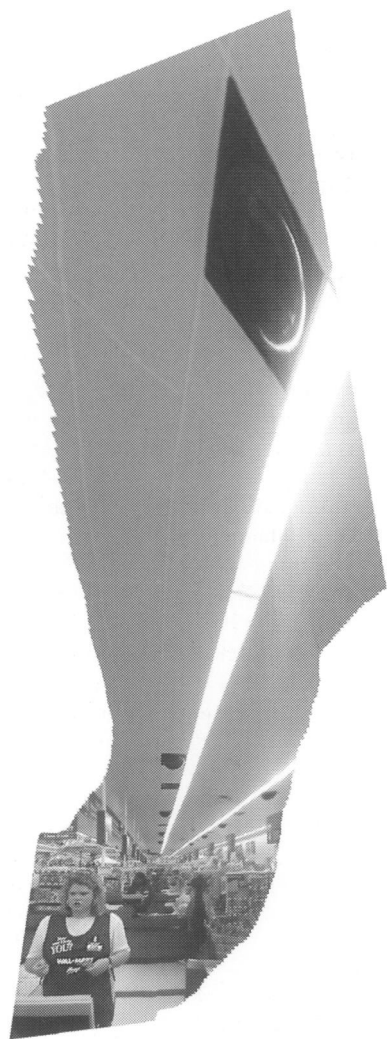
My WearComp invention (wearable computer with visual display means) [24–26] (Fig. 2 and Color Plate A No. 1) formed the basis upon which I built a prosthetic camera called WearCam, which was worn rather than carried and could be operated with both hands

free—and thus while doing other things [27]. In this sense, the video recording/transmission functionality of the apparatus appeared as *incidental* rather than *intentional*. When I wore the WearCam into an establishment, I did not give the impression that my purpose was to record video, partly because the apparatus was less visible than a traditional camera, but, more importantly, because the apparatus did not have the appearance of intentionality. In this way, the apparatus provided a mirrorlike symmetry between myself and those placing me under surveillance (e.g. shopkeepers’ security guards): I was in a position to violate the privacy of representatives of an organization that was placing me under surveillance (e.g. representatives of a department store or the like) without violating their solitude (i.e. without an unusual form of interaction, as might be the case when using a hand-held video camera, where intentionality is very obvious), hence achieving the Reflectionist goal of apparent nonselectivity.

In particular, the apparatus provided a means of taking pictures of representatives of establishments that place customers under surveillance, in such a way that those representatives could not determine whether or not such pictures

**Fig. 2. Evolution of the author’s WearComp and WearCam inventions. (a) The large head-mounted CRT and separate inbound and outbound communications antennae used during the late 1970s, until 1981, were awkward. (b) Waist-mounted televisions of the mid-1980s were a somewhat more comfortable display means but were not constantly in view for the wearer. (c) Small viewfinders from consumer video cameras of the late 1980s made possible an eyeglass-based system, upgraded and improved throughout the early 1990s. (d) Apparatus using newer solid-state imaging technology. (e) First covert embodiment of the WearComp/WearCam invention, built in 1995. This project is ongoing.**





**Fig. 3. Mysterious ceiling domes of wine-dark opacity are visible in this photometric image composite made from 117 images the author captured using a covert embodiment of his WearComp/WearCam invention. He situated the “exploding point” (opposite of vanishing point) to create the visual sense that one of the domes was looming overhead. The photographic collages of Hockney [41] (as well mosaics from aerial photography made by Tony Longson and many others) are similar to the author’s photometric image composites, except that Hockney’s emphasize the cubism afforded by collaging multiple pictures of the same scene, shot from various perspectives, while the author uses his Video Orbits algorithm (proposed in Ref. [42]) to remove all manner of cubism and present a seamless photometric image composite that has a single unified perspective. (Photo and performance June 1995)**

were being taken (just as we never know whether or not a department store surveillance camera is actually capturing an image of us at any given time).

WearCam comprised a computer system that was worn on the body, rather

than carried, and a display means that left both hands free. A wireless connection to the Internet provided offsite backup of all image data, facilitating another aspect of the Reflectionist philosophy—namely, as far as destruction is concerned, to put the pictures beyond the reach of totalitarianist officials. Just as an individual cannot rob a bank and then destroy the video record (because the video is recorded or backed up offsite, or is otherwise beyond the bank robber’s reach), my apparatus of *détournement* (see Fig. 2) put the images beyond the destructive reach of members of the establishment, because of the Internet connection, which allowed for offsite backup of all images at various sites around the world.

An advantage of transmitting images to remote locations is the possibility of having multiple processors work together at various remote sites to enhance the images by regarding each image as a collection of photometric measurements and combining these measurements together to reduce noise, extend dynamic range and tonal resolution, and increase spatial resolution and extent. In one such enhancement, I programmed the computers to use my algorithm to combine images together into a seamless photometric composite (Fig. 3), which provided a still image as a visual record of my gaze pattern. (Note the irregularly shaped image boundary as well as the exceptionally high definition, often in excess of that attainable by photographic means.) My mathematical framework for this processing [28] has been successfully implemented on a large number of computers working in parallel, with a negligible amount of inter-processor communication.

More recently, the advent of the World Wide Web (WWW) facilitated my Wearable Wireless Webcam (1994) and the principle of offsite (off-body) backup was further enhanced. Once the image is distributed via the WWW, it is further beyond the destructive powers of department store security guards and the like, as I no longer know how many copies of my transmitted pictures might have been made. Evidence that might, for example, show that a department store has illegally chained shut its fire exits is not only beyond the store’s ability to seize or destroy, but is also within easy reach of the fire marshall, who, following my directions via cellular phone from the department store, need only have a standard desktop computer with WWW browser in order to see first-hand what my call pertains to.

WearCam-on-the-WWW thus extends this “personal safety” infrastructure and further deters representatives of an otherwise totalitarian regime from being abusive: on one hand, I have collected the indestructible evidence of hostile totalitarian actions, and on the other, my friends and relatives are quite likely to be watching, in real time, at any given moment.

This process is a form of “personal documentary” or “personal video diary.” Wearable Wireless Webcam challenges the “editing” tradition of cinematography by transmitting, in real time, life as it happens, from the perspective of the surveilled (Fig. 4). Furthermore, because I am merely capturing measurements of light (based on the photometric image composite [29], which represents the quantity of light arriving from any angle to a particular point in space), which are then yet to be “rendered” into a picture, I may choose to leave it up to a remote viewer operating a telematic virtual camera to make the choices of framing the picture (spatial extent), camera orientation, shutter speed, exposure, etc. (Fig. 4b). In this way I may absolve myself of responsibility for taking pictures in establishments (such as department stores) where photography is prohibited, for I am merely a robot at the mercy of a remote operator who is the actual photographer (the one to make the judgment calls and actually push the virtual shutter release button). In this manner, an image results, but I have chosen not to know who the photographer is. Indeed, the purpose of these personal documentaries has been to challenge representatives of the video surveillance superhighway who at the same time prohibit photography and video.

These personal documentaries, such as one I call *ShootingBack* [30], typically had two audiences—the audience to which I performed and another, remote, audience. Members of the remote audience knew they were an audience because they were entering a traditional “gallery.” (Even though it was virtual in the sense that it was on the Internet, it was still traditional in the sense that the interaction was analogous to a real-world gallery or museum.) The other audience comprised those who were physically present in front of the WearCam apparatus (e.g. representatives of the surveillance superhighway and customers/patrons of their establishments).

Members of the physically present audience, at first, do not realize that they are an audience. On one level, they



might be regarded as “enemy” (they are being “shot at” in the sense of “shooting back”), while on another level, the performance is directed at them—to educate them, teaching being an act of love and human compassion.

*ShootingBack* was a meta-documentary (a documentary about making a documentary). Since I am a camera, in some sense, I do not need to carry a camera, but in *ShootingBack*, I did anyway. This second camera, an ordinary hand-held video camera, which I carried in a satchel, served as a prop with which to confront members of organizations that place us under surveillance. First, before pulling the camera out of my satchel, I would ask store representatives why they had cameras pointing at me, to which they would typically reply “Why are you so paranoid?” or “Only criminals are afraid of the cameras.” All this, of course, was recorded by my WearComp/WearCam apparatus concealed in an ordinary pair of sunglasses. Then I would open up my satchel and pull out the

hand-held video camera and point it at them in a very obvious manner. Suddenly they had to swallow their own words. In some sense, *ShootingBack* caught “the pot calling the kettle black.”

**Personal Anecdotes.** To further the Reflectionist symmetry, I also experimented with wearing some older, more obtrusive versions of WearComp/WearCam, which I described to paranoid department store security guards as “personal safety devices for reducing crime.” Their reactions to various forms of the apparatus were most remarkable. On one occasion, an individual came running over to me, asking me what the device I was wearing was for. I told him that it was a personal safety device for reducing crime—that, for example, if someone were to attack me with a gun or knife, it would record the incident and transmit video to various remote sites around the world. I found that by taking charge of the situation and throwing the same rhetoric back at

them, even though photography was strictly prohibited I could overtly take pictures in their establishment, while telling them in plain wording that I was doing so. I found that there was a big difference in the way that they responded to a hand-held video camera as opposed to a device that was presented to them as a machine “for purposes of personal safety and reducing crime.” In particular, my approach, which essentially forced them to swallow either their words or their policy, left them tongue-tied, unable to apply their “photography prohibited” policy, confused, bewildered, in what I believed was a state of deep thought—at least they finally began to think about the consequences of their blind obedience.

**WearCam Concept.** A problem with Wearable Wireless Webcam was that people were often too enamored of the technology itself to see the underlying philosophical concept of Reflectionism, so I felt I needed a “low-tech” embodi-

**Fig. 4.** Wearable Wireless Webcam, 1995. (a, left) Raw unedited feed from camera presented as a sequence of still images read from left to right, top to bottom. At the MIT bookstore, a person claiming to be a representative of the bookstore is informing the author that he is not allowed to take pictures in the establishment, but the individual declined to identify himself and did not appear to be wearing a name tag or any other I.D. (b, right) Virtual camera allows viewers on the WWW to select effective camera direction independent of the direction of the wearer’s gaze and effective shutter speed, exposure, etc., independent of the actual exposure selection at time of shooting, because photo-metric image information (as shown in Fig. 3) is captured.





ment of the new philosophy to isolate the concept from its physical realization.

The following are experiments that I have conducted and purposely taken to the extreme in order to (1) illustrate a point and (2) experience reactions and observations first hand. It is not likely that the average reader would go to these extremes but some more subtle variations of these experiments will still provide similar insights or reactions. In the tradition of conceptual art, they are presented in the form of "recipes," or lists of instructions. Some of them are simple enough to allow motivated readers to repeat these performances.

"Maybe Camera": A mere "idea" cannot be patented, but, rather, the idea must first be "reduced to practice." Similarly, an idea cannot be copyrighted; it must first be manifested in some "tangible" form. Conceptual art, however, provides us with a means whereby the idea itself is the contribution. Accordingly, I propose the following:

- Take one rectangular piece of 1/8-in black or dark acrylic, cut to measure 3 × 4 in.
- Obtain a bulky sweatshirt.
- Print the words "For YOUR protection, a video record of you and your establishment *may* be transmitted and recorded at remote locations. ALL CRIMINAL ACTS PROSECUTED!" in large letters, on the front of the shirt. Lay out the lettering so as to

leave room for the acrylic between the two sentences (see Fig. 5).

- Affix the acrylic securely to the shirt.
- Wear the completed shirt into a department store or other location where video surveillance is used but photography is strictly prohibited (this criterion can be determined experimentally even before the shirt is made, by entering the proposed establishment with a camera and taking pictures within said establishment in a somewhat obvious manner).

This particular piece (see also Fig. 6) is called *Maybe Camera—Who's Paranoid?* Another variation of "Maybe Camera" involved making a large number of these shirts, but putting a real camera and transmitter into one of the shirts (I had someone with a repeater in a backpack provide an uplink to my car parked outside the shop, which in turn wirelessly uplinked to the Internet) and having a large group wear the shirts on the surveillance superhighway. Figure 7 depicts me with some family members wearing "Maybe Cameras."

"Probably Camera": Depending on the level of paranoia, if "Maybe Camera" is not "understood" by your audience, then perhaps the following conceptual/performance/Reflectionist piece would be:

- Obtain one miniature (12 inches in diameter or smaller) ceiling dome of wine-dark opacity, together with a camera and pan-tilt-zoom mechanism suitable for that dome.
- Affix dome to backpack, facing backwards, cutting appropriate mounting hole in backpack, leaving sufficient space, and installing appropriate housing for camera and pan-tilt-zoom mechanism. Leave the camera out for the time being.
- Insert a small battery-powered computer equipped with video-capture hardware and means of controlling the function of the pan-tilt-zoom controls automatically.
- Into the pack insert means of wireless communication to/from the Internet or to/from an Internet gateway/server.
- Prepare software to allow the function of the apparatus to be controlled remotely via a WWW page, with ability to capture and display images from the camera if the camera is present. Make this WWW page world-accessible and known to various people around the world.
- Leave the work area and have someone else do the final assembly in your absence, according to the fol-

Fig. 5. Construction of an embodiment of the "Maybe Camera" concept, 1996. The ostensible altruism contained in the message (note how the word "your" is boldfaced) directly "reflects" the signs typically posted on the entrances to department stores and the like (e.g. "For your protection, you are being videotaped").

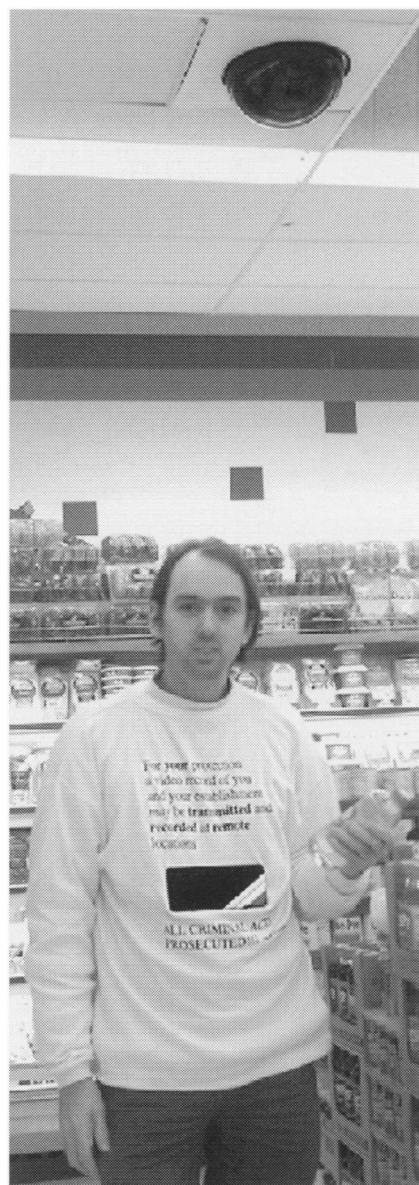
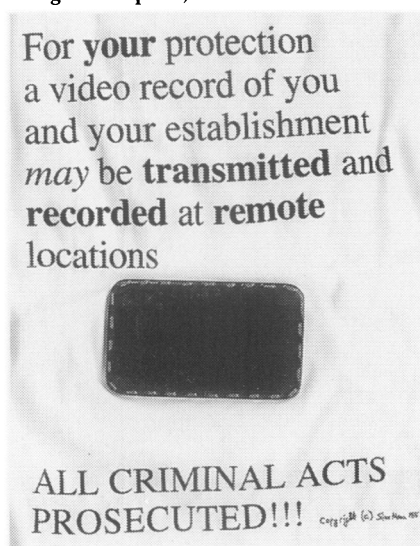


Fig. 6. Author wearing a realization of *Maybe Camera—Who's Paranoid?* 1996. Just as the author does not know what is in the mysterious ceiling dome of wine-dark opacity above his head, and therefore has to be on his best behavior at all times, so too the shopkeeper does not know what is inside the author's shirt, and likewise must be on his or her best behavior at all times.

lowing instructions: Roll two dice.

- (1) If the dice total comes to two or three, insert into the dome a small lightbulb, affixed to the pan-tilt-zoom sensor but connected to it in no way; add sufficient ballast into the pack to make up the difference in weight between the bulb and the camera, so that the wearer cannot determine this difference by weight.
- (2) If the dice total exceeds three, insert the camera, properly mounting it and connecting it to video digi-





**Fig. 7. Firing Squad, 1996.** One of the group is wearing a camera with transmitter, but no one in the group knows who has the real shirt (i.e. the one with the transmitter). Therefore, no one is guilty of knowingly taking pictures within this establishment.

tizer. Verify its operation using a Web browser of your choice.

- Wear backpack together with shirt ("Maybe Camera"), into a record store, preferably Tower Records, where ceiling domes of wine-dark opacity are used. If asked if it is a camera, or what it is, indicate that you are not certain, but point out the domes upon their ceiling and indicate the similarity, so that perhaps it could be a light fixture. (Security guards at Tower Records have informed me that their ceiling domes of wine-dark opacity are "light fixtures.")

This particular piece is called *Probably Camera—Who's Paranoid?*

"Probably Camera" and "Maybe Camera" can be worn together of course, since one uses the front of the body, while the other uses the back.

"No Camera": This conceptual piece involves video time-delay [31], to symbolize the disjointedness between cause and effect that video recording creates:

- Place pinhole camera and microphone into baseball cap, and record video from an establishment where photography, filming and the like are strictly prohibited, but where video surveillance is used and there are documented cases of hidden cameras having been used. While recording video, talk to members of establishment, including manager. Ask whether or not they use video surveillance, and if so, why they are videotaping you without your permission. Ask what their ceiling domes of wine-dark opacity are, if any are present.

- Leave this establishment, and return with the following, but without the camera: (1) flat-panel television screen affixed to shirt; (2) source of previously recorded video material; (3) means of switching between previously recorded material and standard broadcast television channels.
- Play the previously recorded video on the television screen, and if you are informed that photography, filming or the like is prohibited, indicate that there is NO CAMERA, and that what you are wearing is merely a television. Switch through the various

channels, indicating that one of them (the one playing the previously recorded material) looks like it "must be a local channel—a VERY local channel."

This piece is called *No Camera—Who's Paranoid?*

### **My Manager**

*My Manager* borrows from the Stelarc/Elsenaar tradition in performance art [32]. *My Manager* allows participants, via Radio TeleTYpe (RTTY), to become managers and remotely contribute to the creation of a documentary video in an environment under totalitarian surveillance (where photography, video, etc.—other than by the totalitarian regime—is prohibited).

In *My Manager*, I am metaphorically merely a puppet on a "string" (to be precise, a puppet on a wireless data connection). I might, for example, dutifully march into the establishment in question, go over to the stationery department, select a pencil for purchase, and march past the magazine rack without stopping to browse through the magazines, because I am not permitted by "my manager" to stop and browse. In this example, I have been sent on an errand to purchase a pencil for a higher and unquestionable authority. When challenged by the department store's clerks or security guards as to the purpose of the cameras I am wearing, I indicate that what I am wearing is a company uniform and that my manager requires me to

**Fig. 8. Primitive Identity established through a permanent/semi-permanent bonding with a prosthetic device, 1996.** (Left eye was held closed during photograph to prevent damage from unmediated electronic flash.) In this piece, the older (more primitive) apparatus seen in Fig. 2c was chosen because it was the most amenable to a longer term "cyborgian bonding." Bonding with a past device was found to be easy—the mapping was re-learned quickly.





wear the apparatus (the uniform) so that she can make sure that I do not stop and read magazines while I am performing errands on company time. Sometimes I remark: "I trust you, and I know you would never falsely accuse me of shoplifting, but my manager is really paranoid, and she thinks shopkeepers are out to get her employees by falsely accusing them of shoplifting" [33].

Just as representatives in an organization absolve themselves of responsibility for their surveillance systems by blaming surveillance on managers or others higher up their official hierarchy, I absolve myself of responsibility for taking pictures of these representatives without their permission because it is the remote manager(s) together with the thousands of viewers on the World Wide Web who are taking the pictures.

The subjects of the pictures—for example, department store managers, who had previously stated that "only criminals are afraid of video cameras" or that the use of video surveillance is beyond their control—either implicate themselves of their own accusations by showing fear in the face of a camera or acknowledge the undesirable state of affairs that can arise from cameras that function as an extension of a higher and unquestionable authority.

If their response is one of fear and paranoia, I hand them a form, entitled RFD (Request for Deletion) which they may use to make a request to have their

pictures deleted from my manager's database (I inform them that the images have already been transmitted to my manager and cannot be deleted by me). The form asks them for name, social security number and why they would like to have their images deleted. The form also requests that they sign a section certifying that the reason is not one of concealing criminal activity, such as hiding the fact that their fire exits are illegally chained shut.

It is my hope that the department store attendant/representative sees himself/herself in the bureaucratic "mirror" that I have created by being a puppet on a (wireless) "string." My *Manager* forces attendants/maintainers/supporters of the video surveillance superhighway, with all of its rhetoric and bureaucracy, to realize or admit for a brief instant that they are puppets and to confront the reality of what their blind obedience leads to.

### **WearCam as *Cyborgian Primitive***

In the following experiments, I have purposefully taken a principle to its extreme to show just how far out of balance the surveillance superhighway has gone. In particular, I have constructed a camera as a permanent body fixture in order to challenge, balance and reflect the elements of the video surveillance superhighway and the way that they are protected from being questioned by becoming permanent fixtures of our ar-

chitecture and urban-planning infrastructure.

An early version of *Cyborgian Primitive* involved my growing my hair through fine mesh in a skull cap and then "locking" it on the other side (hair locking may be accelerated by teasing in bee's wax to cause the hair to tangle together permanently). After I used conductive/metallic hair dyes (to help make my hair form part of a ground-plane for a transmitter), my hair was sufficiently "damaged" to lock quite easily. The skull cap formed a substrate upon which other devices could be mounted. In this manner, I could not reasonably be asked to remove the apparatus, because that would require shaving off my hair. This necessary subversion of the body provided a reasonable barrier to requests by others that the apparatus be removed.

A more recent variant of *Cyborgian Primitive* depended on modifying the brain rather than the body. I based these experiments on something I have called "mediated reality" and proposed as a method of conducting scientific experiments in visual perception, as well as for prosthetic purposes [34]. As a prosthetic, the apparatus I describe in Fig. 2 of an MIT technical report [35] allowed me to computationally augment, diminish or otherwise alter the perception of reality for the purposes of attaining a heightened sense of awareness, seeing better or compensating for a visual deficiency that cannot be corrected with ordinary (pure-refractive optical) eyeglasses.

Other researchers have experimented with the re-configuring of visual reality (Stratton experimented with optical upside-down glasses [36] and Kohler [37] and Dolezal [38] with left-right reversing prism glasses), but what is unique about my mediated-reality approach is that it is based on computational apparatus rather than optics (e.g. lenses, prisms and mirrors). Thus, my visual experience can be recorded and transmitted to remote locations, thus allowing others to augment, diminish or otherwise alter my perception of visual reality.

As have other scientists, I found that an adaptation to the apparatus occurred and that, after some time, I developed a dependence on the apparatus. Removal of the apparatus would result in my inability to see properly, as well as sensations of nausea, dizziness and disorientation. With this deliberate modification of the visual system, involving the development of alternate neural pathways through the process of certain kinds of very long-term visual adaptation, one

**Fig. 9. The author (at left), together with the rest of the "SafetyNet," 1995. Such SafetyNets may engage in collective Diffusionist performance pieces. Some of the units worn by the participants are NETworked via TCP/IP, to work together to increase safety and reduce crime, but not all these units are on, transmitting images. Can you tell which ones are operational? In some sense, this collection of "Maybe Cameras" (i.e. one does not know which ones are transmitting) is a Reflectionist questioning of Bentham's Panopticon. Just as surveillance puts the prisoner on his or her best behavior at all times, the "Maybe Cameras" could be used to put police officers, department store owners and other officials on their best behavior at all times.**





may attain a permanent or semi-permanent bonding with the apparatus, in the sense that others cannot reasonably ask that it be removed. In the spirit of Reflectionism, WearCam was made to function as a true extension of the mind and body, as a third eye (or second pair of eyes, in the case of some two-camera systems I have described in my MIT technical report [39]).

Beyond the fact that a totalitarianist asking that the device be removed is asking the wearer to violate or subvert his or her own body, there is also the obvious legal responsibility the totalitarianist must accept for the prospect of the wearer's abrupt exposure to his or her original, or natural, neural pathways and the possibility of any brain damage or onset of flashbacks that might result from a sudden re-instantiation of the old (temporarily or semi-permanently weakened) neural paths.

Thus, when asked to remove the apparatus, if in fact it even could be removed (e.g. if it were not permanent or semi-permanent), one might merely present the totalitarianist attendant with a form to sign accepting all responsibility for any damage. This use of forms (e.g. an individual presenting officials with forms) is itself a Reflectionist gesture.

I recently used a joint mental and physical bonding (permanent/semipermanent head cap) in a self-ownership piece called *Primitive Identity*. In this piece, I defined myself as self + prosthetic device in all manner of official portraiture (e.g. Fig. 8), regardless of any requirements that eyeglasses and the like may not be worn during such portraiture.

## "DIFFUSIONISM"—A SECOND OPTION IF REFLECTIONISM FAILS

In the event that my Reflectionist philosophy should fail to have the desired impact (e.g. should it fail to raise sufficient awareness to make a meaningful reduction in the inappropriate use of video surveillance), I propose an alternative philosophy, "Diffusionism." The goal of Diffusionism is to subvert the totalitarian nature of surveillance through a proliferation of wearable "Maybe Cameras."

As Foucault notes, it is not essential that the guard in the tower be watching a particular prisoner, or even that there be a guard in the tower; it is only necessary that the prisoner not know whether there is a guard watching in the tower. Similarly, to subvert Panopticon, it

would not be essential that the guard be watched, but just that there be a possibility that the guard could be spotted by a "prisoner" at some time.

To this Diffusionist end, I have created a wireless communications infrastructure capable of supporting a networked community of hobbyists wearing a similar apparatus. During one performance piece, I, together with a group of others willing to participate, went out shopping one day, wearing such apparatus (thus, those at the department store needed to confront not just one, but many of us). The picture I took of this group was of such popularity that we recently re-enacted the event (Fig. 9).

Part of my Diffusionist goal is enhanced by finding everyday uses for wearable cameras—for example, cameras that automatically recognize faces, for individuals with visual or memory disability [40] (we all suffer from difficulty remembering faces), as well as wearable, tetherless computer-mediated reality for the public at large.

While one might be inclined to think that the inevitable commercialization of this invention may mark the détournement of this détournement, Diffusionism is put forth as a détournement of a détournement of a détournement (as in the equation Diffusionism = détournement<sup>3</sup>).

To this end, my goal is to turn WearCam into a useful and commercially viable everyday object that can help us see better, avoid getting lost (automatic directions combined with object recognition, global position systems [GPS] and video overlays), and remember names and faces better. Thus, these very utilitarian applications of WearCam may serve as a détournement of utilitarianism itself.

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8. David Rokeby, "Camera-Based Performance Spaces" (1982), <<http://www.vividgroup.com/vivid/next.htm>> and <<http://www.interlog.com/~rokeby/>>.

9. In Rokeby's earlier system the user is in a dance/performance space—that is, a space where one expects to be observed, as opposed to a private space where one might have the desire not to be observed.

10. Andrew Wilson, Aaron Bobick, Lee Campbell, Elvis the Monster, Jim Davis, Freedom Baird, Stephen Intille, Arjan Schutte, Claudio Pinhanez, and Yuri Ivanov, "Kids Room" (1987), <<http://www.white.media.mit.edu/vismod/demos/kidsroom/>>.

11. Sr. Consumer Correspondent Hattie Kauffman, *CBS Good Morning* (television program), 3 July 1996.

12. Kauffman [11].

13. MIT Media Laboratory, "Augmented Smart Chair," <<http://www.white.media.mit.edu/vismod/demos/smartchair/>>.

14. Barry Winfield, "Buick Riviera," *Preview* (January 1994) pp. 124–127.

15. See Ref. [13].

16. Joe Constance, "Nowhere To Hide: Holographic Imaging Radar May Soon Be Uncovering Hidden Dangers at U.S. Airports," <<http://www.ingersoll-rand.com/compair/octnov96/radar.htm>>.

17. Constance [16].

18. This issue was discussed on an E-mail list moderated by Lauren Weinstein, "Privacy Forum Digest" (28 October 1996), <[http://wearcam.org/privacy/\\_forum/\\_digest/\\_nakedradar.html](http://wearcam.org/privacy/_forum/_digest/_nakedradar.html)>.

19. By self ownership, I mean that the same protections (e.g. copyright) governing the fruits of our labor (that which we intentionally put forth as a commodity) could also be applied to aspects of ourselves, such as our physical appearance, and other information that we generate unintentionally, just through our natural existence.

20. Michel Foucault, *Discipline and Punish*, Alan Sheridan, trans. (New York: Vintage, 1977). Originally published as *Surveiller et punir* (Paris: Gallimard, 1975).

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22. Tom Ward, "The Situationists Reconsidered," in Douglas Kahn and Diane Neumaier, eds., *Cultures in*



23. "[Détournement] . . . is the art of appropriating common objects or images from their usual cultural contexts and resituating them in an incongruous, disturbing, and disorienting fashion in order to confront, question, or challenge society's stereotypes or biases." From W. Ted Rogers, in Sunil Gupta, ed., *Disrupted Borders: An Intervention in Definitions of Boundaries* (London: Rivers Oram Press, 1993). Détournement is short for "détournement of preexisting aesthetic elements." See also <[http://ctheory.aec.at/detournement\\_for\\_fun.html](http://ctheory.aec.at/detournement_for_fun.html)>.

24. Steve Mann, "Wearable Computing: A First Step toward Personal Imaging," *IEEE Computer*, 30, No. 2 (Feb. 1997) pp. 25–32. Also published as the feature article of the February 1997 entry in <<http://computer.org/computer/backissu.htm>>.

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26. I first developed WearComp in the 1970s as a "photographer's assistant" for controlling sources of illumination. This effort evolved into a new system of creating expressive images based on the linearity and superposition properties of light.

27. S. Mann, "Wearable Wireless Webcam," 1994; currently at <<http://wearcam.org>>.

28. S. Mann and R.W. Picard, "Video Orbits of the Projective Group: A Simple Approach to Featureless Estimation of Parameters," *IEEE Transactions on Image Processing*, 6, No. 9 (September 1997). Also publishing as Tech. Report 338, MIT Media Lab, Perceptual Computing Section (Cambridge, MA: 1995).

29. Steve Mann, "'Pencigraphy' with AGC: Joint Parameter Estimation in Both Domain and Range of Functions in Same Orbit of the Projective-Wyckoff Group," *IEEE International Conference on Image Processing (ICIP 96)* (Lausanne, Switzerland: September 1996). Also published as Technical Report 384, MIT Media Lab, (Cambridge, MA: December 1994).

30. Steve Mann, "ShootingBack: Personal Imaging in Personal Documentary," 1996, unpublished manuscript. See also <<http://wearcam.org/shootingback.html>> or <<http://18.85.20.100/shootingback.html>>.

31. Other artists have also experimented with video time-delay but in different contexts. For example, Dan Graham uses video time-delay together with mirrors, etc., to create a delay between cause and effect. His *video feedback* involves both senses of the word "feedback": (1) the cameras "sees" the screen, which is displaying the output from the camera, and (2) the users who see themselves on the screen adjust their behavior according to this psychological "feedback."

32. Both Stelarc and Elsenaar explore body control systems that use electrical stimulation to cause their muscles to move in response to an external input. See Stelarc's official web site, Australia, 1997, <<http://www.merlin.com.au/stelarc/>>; and Arthur Elsenaar, 1997, <<http://www.desk.nl/~acsi/WS/artists/elsenaar.htm>> and <[http://wearcam.org/previous\\_experiences/arthur\\_elsenaar/](http://wearcam.org/previous_experiences/arthur_elsenaar/)>.

33. There are well-documented cases where shopkeepers have falsely accused their customers of shoplifting, so my assertion is not as absurd as it might seem. It is quite reasonable that individuals keep their own video records of their experiences in shops, as a sort of "black box" recorder in case such an accusation should arise. In some cases, officials have raped or murdered patrons of their establishments, so it seems reasonable that officials should not be the only ones to have video records (e.g. that they could erase). In one well-known murder case: "On March 16th, 1991, 15 year old Latasha Harlins entered a Korean owned grocery store to purchase a carton of orange juice. Soon Ja Du, the store owner, accused her of shoplifting even as Latasha attempted to pay for the juice. After a struggle in which Du tried to grab her book bag Latasha placed the juice back on the counter. As Latasha turned to go, Du shot her in the back of the head, killing her." From documentary video "Hands on the Verdict: The 1992 L.A. Uprising," produced for Deep Dish

T.V. Coordinating producers: Liz Canner and Julioia Meltzer. See also "Korean Grocer Convicted in Shooting," *New York Times* (12 October 1991).

34. S. Mann, "Mediated Reality," Tech. Report 260, MIT Media Lab, Perceptual Computing Section (Cambridge, MA: 1994).

35. Mann [34].

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37. Ivo Kohler, "The Formation and Transformation of the Perceptual World," Vol. 3 of *Psychological Issues*, (Vienna: International Univ. Press, 1964) Monograph 12.

38. Hubert Dolezal, *Living in a World Transformed*, Cognition and Perception Series (Chicago, IL: Academic Press, 1982).

39. Mann [34].

40. Steve Mann, "Wearable, Tetherless Computer-Mediated Reality: WearCam as a Wearable Face-Recognizer, and Other Applications for the Disabled," Tech. Report 361, MIT Media Lab, Perceptual Computing Section (Cambridge, MA: 2 February 1996). Also published in *AAAI Fall Symposium on Developing Assistive Technology for People with Disabilities, 9–11 November 1996, MIT*, symposium proceedings. See also <[http://wearcam.org/aaai\\_disabled.ps.gz](http://wearcam.org/aaai_disabled.ps.gz)>.

41. D. Hockney, *Hockney on Photography: Conversations with Paul Joyce* (London: London Cape, 1988).

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