

## **The Work of Artists in a Databased Society: net.art as on-line activism**

By Ricardo Miranda Zúñiga, January 2002

### Introduction

Over the last ten years, the Internet has embedded itself in the daily lives of a vast number of people. As a new telecommunication technology, it allows the common individual to engage in a cybernetic system that is globally networked. Today, however, a race goes on to establish the social dynamics of the Internet as a public arena. Will cyberspace become a highly monitored and regionalized control space or will the Internet retain its radical potential for independent endeavors and ideological exchange? The political implications of the Internet as a social network present rich issues for creative and critical cultural production.

The nature of the Internet as a network of connected computers to exchange information engenders a sense of liberty and freedom in the individual. Early in its development, mainframe teams established host-to-host protocols such as Telnet and File Transfer Protocol (FTP) that decentralized computer networking between independent users from the main frame.<sup>1</sup> As the network grew it evolved into a new, democratic public sphere of communication via a globally expansive routing system and a vast array of on-line applications, amongst them electronic mail, and the world wide web.<sup>2</sup> The individual was able to interface with an enlarged public, and a new dialogical space emerged.

Given the numerous forms of exchange possible via the Internet, on-line activity parallels Nancy Fraser's re-articulation of Jürgen Habermas's public sphere as put forth in his 1962 book, The Structural Transformation of the Public Sphere. Habermas presents the public sphere as a bourgeois arena for exchange where citizens may discuss common affairs, a model based in the old town hall. In the essay, "Rethinking the Public Sphere" (1993), Nancy Fraser updates and expands the Habermasian public sphere beyond institutionalized public forums to include the market place and the domestic space (specifically in relation to domestic violence). Whereas, Habermas places market relations and domestic issues within the private sector, Fraser argues that, in doing so, these arenas of human interaction are restricted from "legitimate public contestation."<sup>3</sup> Fraser's re-articulation expands the public sphere beyond the bourgeois domain to a space that is "open and accessible to all." As the Internet becomes increasingly commonplace and interweaves itself into general daily life in such forms as list serves, chat rooms, gaming communities, a host of multi-user domains it springs to life a multiplicity of publics by Fraser's definition.

Each public sphere is part of a civil domain that is governed by a set of laws and policies. Therefore, just as any civil, public space, the Internet must have its own set of policies that mirror those of our physical space. Amongst the on-line policies and regulations currently being established are decisions pertaining to appropriate policing and monitoring of cyber space, and determining the boundaries of privacy in a networked society.

The very nature of the Internet presents a highly efficient means of surveillance, as a networked electronic system that interfaces logical indexing machines, the computer. The ability to digitize nearly all types of records in conjunction with the computer's indexing and networking efficiency has established the database as the most advanced archival utility.

Use of such emergent technologies has been a long time goal by policing authorities. In the essay "The Body and the Archive," Allan Sekula traces in detail the use of photography to document, categorize and archive the human body by early criminology. As the body became a subject of the archive through photography, the fundamental problem of volume became apparent: "The early promise of photography had faded in the face of a massive and chaotic archive of images." The electronic database's vast storage capabilities solves the problem of volume. Hence, the photograph once used to document the body and help establish identity is replaced by data. And as various types of data such as our home address, our shopping patterns, our level of institutionalized education, our employment and income, for example, are monitored and stored data becomes a basis of identity. The electronic network used to transfer data becomes a tool of investigation due to its potential for surveillance. The questions then arises: how far will police, federal and even corporate monitoring of the electronic sphere extend? How will we ever know its parameters? Is it a matter of trust or open systems or regulatory institutions? Where and how will the lines of personal and civil rights be drawn in a networked society?

The questions surrounding on-line privacy are complex and encompass a wide number of issues such as ownership, which in itself introduces a chain of other questions. It is impossible to present an answer to these involved questions as they will continue to arise. However, I do contend that unless non-governing independent groups protect the Internet as a space for independent production, dissemination and open discourse, the radical potential of the Internet will be consumed, largely through its very nature. Therefore, if there exists today an artist avant-garde, looking to merge art with daily social life, it is the growing number of socially active artist engaged in cyber resistance as a critical practice in which the network and the database represent tools for engagement.

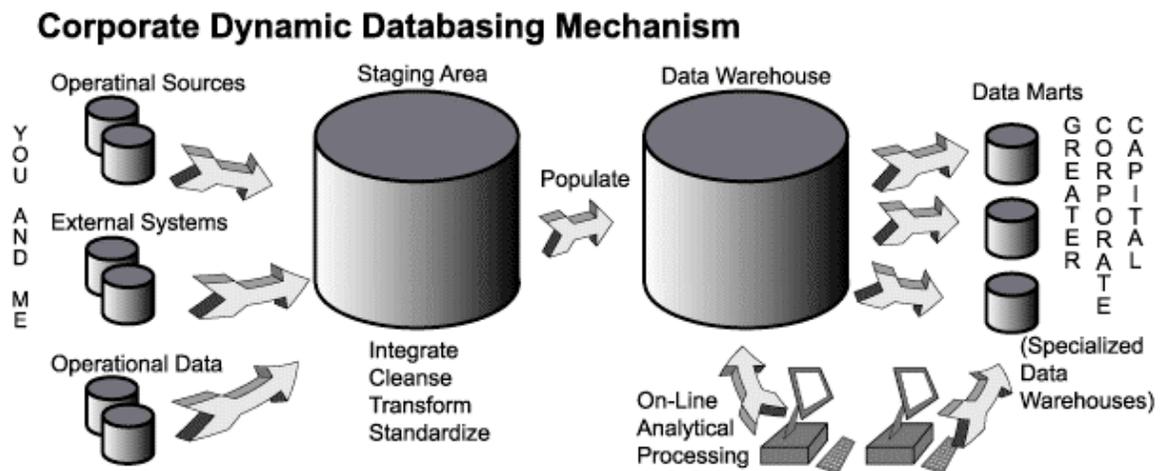
I will present two primary forms of resistance as executed through two artist projects. First, TO INFORM: Brooke Singer exposes her own electronic data to enlighten a general public of one's freely available data. Second, TO SUBVERT: iSEE, a collaborative project between the Institute for Applied Autonomy and the Surveillance Camera Players makes use of the database structure to subvert the monitoring of the public sphere.

#### The Electronic Structure, a new public archive

It is of the utmost importance to recognize that the Internet is not an isolated electronic sphere, but that it is used to statistically analyze society. By tracking the movements of the individual, determining one's economic status, identifying one's personal tastes, the Internet is used as a corporate tool to design popular culture and even predetermine the physical geographic locations of subcultures to target...ever wonder why you only see

malt liquor adds in poor and minority neighborhoods? The Internet has corporeal effects (yes, even more so than television). The network increasingly interweaves the virtual and real. Unlike most of its predecessors, computer technology for processing information succeeds in part because of its ability to store, transmit, and process a very wide range of information types. And as information becomes increasingly dynamic due to new operating systems, software and database languages designed to interface various applications and databases to build information warehouses, corporate goals and federal surveillance become increasingly efficient. The new Oracle 8i is even capable of adding multimedia data to its warehouse, presenting new possibilities to the photo archive.

Currently there exists a strong corporate push to get consumers to use the web as a personal storage bin. As artist Brooke Singer points out “our lives are moving more and more into the digital prompted by new technologies and the promise they hold or are told to hold which enable corporate and federal surveillance. For instance it looks like the music we listen to whether at work, home or in the car even will be accessed via the web in some way. What does this mean that some corporate provider will most likely be able to know what music we listen to, when, for how long, which songs we repeat over and over etc. Digital TV is a big promise too. Maybe its vaporware so far but there is a big push for it, so the programs we watch will be equally surveyed and analyzed. But it offers hope of interactive TV...more stuff like people’s choice award or what? In the push to digitize everything we are asking for our movements and choices to be put under the microscope. In the end the data gathered will only be used to manipulate movements and desires. That is why it is collected and stored in the first place.”<sup>4</sup>



The corporate data warehouse contains a wide variety of data used for decision support and analytical processing. Relational database systems integrate workers and disparate pieces of information. For example, many operational systems used in production to run day-to-day business operations of a company may dynamically load new data into the warehouse in batch mode on a periodic basis via a network direct path option.

In addition to the data a company may already own, it can purchase data from external data providers, to add to its warehouse. A company may buy information about

socioeconomic demographics to more closely monitor and target consumers. By adding customer demographic data, selected marketing can be performed, targeting those customers most likely to respond to a sales promotion. Demographic data can be used to help choose a location to place a new retail store. The data warehouse facilitates highly sophisticated analysis, reporting, on-line analytical processing and data mining.

Data mining is part of the knowledge discovery process. By using statistical techniques, vast quantities of data can be transformed into useful information. Data is like the raw material extracted from traditional mines: when turned into information, it is like a precious metal. Data mining allows business to extract previously unknown pieces of information from their warehouse and use it to make important business decisions.<sup>5</sup>

The data warehouse has become such a prominent tool for marketing that corporations will go to surreptitious lengths to acquire more statistics. In January, the New York Times reported that “thousands of Internet users who installed popular software for sharing music and other computer files also unwittingly accepted a program that tracked their Web surfing habits... The program collects information about sites visited over the last two days to better place ads.”<sup>6</sup>

Of course, data analysis and exchange extends far beyond commercialism. Have you recently become a client of a multi-state system for electronic financial transactions operated by transportation authorities to shorten and economize your commute? Be aware, your information is shared with your auto insurance company, and you are being tracked.

Are you a responsible citizen who has registered to vote? Those pesky data providers make use of you voter registration for profit. In fact, if you have filled out an on-line or on the street questionnaire that does not state that your privacy will be respected, and “this information will not be shared,” you have given away perfectly good personal merchandise.

The data self may have much more direct consequence upon an individual. In The Electronic Disturbance (autonomea, 1994), the Critical Art Ensemble poses the scenario of one attempting to acquire a bank loan. The person enacts all the appropriate social conventions as a loan applicant to give the impression of economic security – attire, and formal etiquette. However, the “loan officer” is primarily concerned with the individuals credit history: “P’s electronic double reveals that s/he has been late on credit payments in the past and that s/he has been in a credit dispute with another bank. The loan is denied; end of performance.”

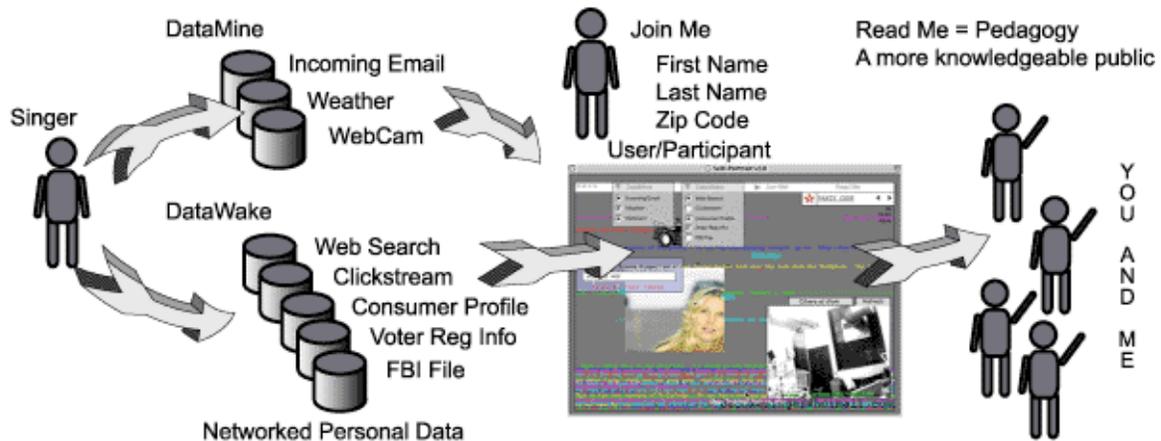
### To Inform: Revealing the Data Self

It is this data-based identity, this data self that artist Brooke Singer constructs as her continually evolving self-portrait. The evolution of net.art over the last number of years has largely consisted of a movement away from narrative, in the traditional sense of using the Internet to communicate and exchange real experiences or fictions based in reality,

toward constructions based in data – that is working with the new bit-based reality that we live with, in conjunction with our real space. In other words, the move is largely toward visualizing and mapping the vast Internet. Brooke Singer's Self-Portrait (v2.0) or SPV2, a project launched in October 2001, is part of this evolution in net.art.

Derived from the tradition of Western painting, the portrait was once used solely by the aristocracy to display an individual's wealth and power. In the mid-nineteenth century, the photograph expanded the possibilities of portraiture to the petit-bourgeois. In SPV2 Brooke Singer updates the portrait to the information age. In an age when our data-selves may carry more significance than our real, blood-pumping and breathing selves, Singer has thoroughly investigated various databases accessible on the web to create an on-line application cum portrait out of her very own data.

### Brooke Singer's Self-Portrait v2.0, a dynamic data body portrait



SPV2 offers the user a selection of various data, related to the artist, which will load into the browser as a visual collage. Along the top of the pop-up window that presents the project, one is offered a row of categories: DataMine, DataWake, Join Me! and ReadMe. DataMine and DataWake are drop-down menus that list various data packets that will be visualized within the window. Within DataMine you have a selection of data that Singer generates as part of her every day life or is merely part of her environment: Incoming Email, Webcam and Weather. Within DataWake you have a selection of data generated around her by external entities: Web Search, Clickstream, Consumer Profile, Voter Registration Information and Singer's FBI file. As the user makes data selections, the Self-Portrait grabs data from the chosen source, deposits the data into a visual representation and displays it to the user. One may layer the various visual depictions to eventually achieve data chaos.

The fact that Singer has chosen to reveal these files, particularly the self generated files such as the Webcam and Email, points to the delight of many Internet participants who choose to reveal their private life to a vast anonymous audience. The concept that many people enjoy the attention of a public stage and make use of the Internet for that purpose is not new. But the juxtaposition of DataMine and DataWake makes explicit the

complexity of the Internet as a sphere that we help compose for our enjoyment, though it may have regulating and normalizing effects.

This dichotomy is not unlike the double system of photographic portraiture as Sekula describes “a system of representation capable of functioning both honorifically and repressively.” Photography functions honorifically in that it documents and memorializes “the ceremonial presentation of the bourgeois self,” and repressively in that it entrenches a social hierarchy by documenting and defining the *other*. Both the *other* within western culture itself by documenting the physiognomy of the criminal<sup>7</sup> and in Oriental practice by documenting the savage and lesser races. Have you purchased your credit report lately? Are you quite sure that you would qualify for a new credit line? Where does your data self put you in the social scale of approval?

Singer reminds us that the Internet is an increasingly corporate space with such icons as the Microsoft Passport Butterfly. In SPV2 the MSN butterfly comes to life and flies out of the browser when one chooses Incoming Email. It reappears later once the email has choked the browser full of email to sweep away the text to create a new space for more incoming information. The Internet began its commercial transformation in 1979, the year the National Science Foundation (NSF), the once proprietors of the Internet agreed to sell part of its new virtual frontier to Compu Serve. “Fifteen years later [Compu Serve] claimed 3.2 million users in 120 countries and was part owned by Time Warner. The NSF, finally, in 1995 handed the backbone and its management over to the private telecommunication giants Sprint, Ameritech, and Pacific Bell which became the gatekeepers of the principal access points” (Winston 333). This is an all too familiar pattern of mass media, a pattern that has highly limited independent production in radio and television, in both technologies, the dialogical potential was consumed by corporate enterprise (please view notes for elaboration).<sup>8</sup>

By publicly revealing her data-self, Singer turns the user into a data-voyeur while giving the user a glance at the sort of data that exist within the Internet in relation to each one of us. To further drive this point, Singer has also included the Join Me! category which allows users to enter one's own name and/or zip code to effect the visual representation and give one just a taste of her/his own data-self. In effect, the applied value of Singer's work is information. The project takes the first step of activism – it informs its viewer/participant – of just how open one's history may be for public inspection.

Although, once viewer enters her/his name and zip code the information one gets back is limited to weather and an image grabbed from Google, the viewer is rewarded for participating by gaining access to view past Join Me logs. As Singer explains: When entering the logs, you see other's information and its more than weather and image. There is also potentially birthday information and descriptions of type, income based on demographics. You are rewarded for participating with this access but also you realize that your information will now be viewable to the next Join Me participant. You are now not only a voyeur but also an object of the viewing/dissection. Participation usually makes you see or feel the benefits, but hardly ever the consequences.”

## To Subvert: Reversing Surveillance

If Singer's SPV2 presents the first activist step through awareness and pedagogy, how can art and the electronic network be used to take the second activist step, action?

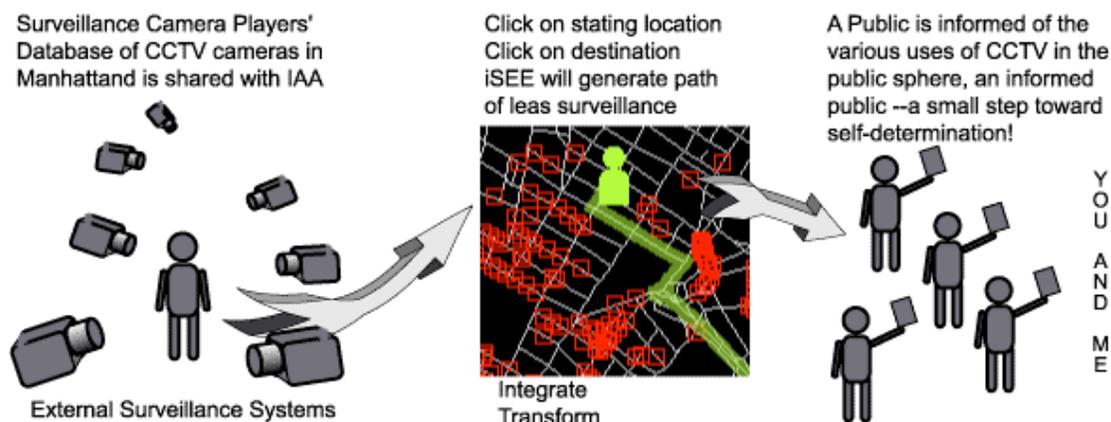
Over the last three years the Institute for Applied Autonomy (IAA) has been searching for tools that turn the camera upon the authoritarian figures that impose surveillance onto the corporeal public sphere. IAA "an organization concerned with individual and collective self-determination" asks itself, "How can we monitor surveillance?" Most recently, Germany's ZKM, Center for Art and Media, offered IAA the opportunity – funding and a deadline – to produce the project *iSEE*, as part of the exhibition titled CTRL [SPACE], an exhibition that uses Jeremy Bentham's conception of the Panopticon as a means of curatorial departure.<sup>9</sup>

Once the exhibit was set in place IAA approached the New York Surveillance Camera Players (SCP) to collaborate by permitting IAA to make use of the SCP's mapping of all closed circuit television cameras (CCTV) in the Manhattan borough. A couple of years ago the SCP had a team of people document all CCTV surveillance cameras in the streets of Manhattan.

Using the data provided by the Surveillance Camera Players, the IAA constructed *iSee*, "a web-based application charting the locations of closed-circuit television (CCTV) surveillance cameras in urban environments. With *iSee*, users can find routes that avoid these cameras – paths of least surveillance – allowing them to walk around their cities without fear of being 'caught on tape' by unregulated security monitors."<sup>10</sup> Granted that this data is now outdated and from the onset contained an unknown margin of error, the collaboration does not take away from its symbolic, pedagogical and potential.

*iSEE* is composed of both an on-line mapping application and an essay discussing the public use of CCTV surveillance cameras. Although *iSEE* is primarily a pedagogical discourse and a symbolic gesture engaging a wide audience about CCTV, it appears that the application is as well being used practically, as users are mapping routes, zooming into the map and printing the path of least surveillance.

## **Institute for Applied Autonomy, *iSEE*, a database for self-determination**



In contrast to Singer's SPV2 which depends upon the dynamic data existing in networked databases to stir questions of on-line privacy in its viewer/user, iSEE tackles the issue of optical surveillance in "real" space. When asked which form of monitoring has the greatest significance today, IAA responded that public optical surveillance will be electronically networked. Although currently most surveillance cameras are single channel, new applications are being designed to interface surveillance camera documentation with various network databases.<sup>11</sup> "CCTV is evolving and continues to be developed by corporate and university research through face recognition."<sup>12</sup> Beyond face recognition, we have seen software that studies human gestures and activity to figure out what one is doing. If the software interprets one's gestures as suspicious, well you may be picked up." Hence, these seemingly disparate forms of surveillance on-line versus physical public space are not distinct issues, but rather will lead to enhanced surveillance of an enlarged public sphere – physical and virtual. To IAA physical and virtual surveillance represent a continuum toward a surveillance society, under the guise of national security, the fight against crime, and antiterrorism.

The subtitle of iSEE is "v.911: 'Now more than ever'" and the phrase "Now more than ever" is in direct protest to the USA Patriot Act, the anti-terrorism measure signed by the Bush administration following the events of September 11<sup>th</sup>, 2001. The law strongly sets back the U.S. citizen's ability to protect individual liberty, particularly for immigrant residents and citizens. Amongst the various provisions set by the new law are a strong reduction of judicial supervision of federal telephone and Internet surveillance by law enforcement authorities. And it expands the ability of the government to conduct secret searches, including on-line investigation and monitoring.

On January 4<sup>th</sup>, the New York Times reported the first case directly influenced by the USA Patriot Act in which a federal judge in Newark, New Jersey ruled that evidence surreptitiously gathered by the FBI about Nicodemo S. Scarfo's reputed loan shark operation can be presented in a trial later this year.

U.S. District Judge Nicholas Politan said last week that it was perfectly acceptable for FBI agents armed with a court order to sneak into Scarfo's office, plant a keystroke sniffer in his PC and monitor its output...Late last year, news leaked about an FBI project code-named "Magic Lantern" that would install surveillance software remotely using well-known backdoors in browsers, e-mail clients and operating systems... The flap started last week, when news reports began to appear about an FBI project code-named "Magic Lantern" [that] reportedly works by masquerading as an innocent e-mail attachment that will insert FBI spyware inside your computer.<sup>13</sup>

The judge went on to state that each day, advanced computer technologies and the increased accessibility to the Internet means criminal behavior is becoming more sophisticated and complex.... As a result of this surge in so-called 'cyber crime,' law

enforcement's ability to vigorously pursue such rogues cannot be hindered where all constitutional limitations are scrupulously observed...

The position of the judge and the work of the Institute for Applied Autonomy present a social dialogue on authoritative power that illustrates Michel Foucault's observation on power as a dynamic force:

What makes power hold good, what makes it accepted, is simply the fact that it doesn't only weigh on us as a force that says no, but that it traverses and produces things, it induces pleasure, forms knowledge, produces discourse. It needs to be considered as a productive network which runs through the whole social body, much more than as a negative instance whose function is repression.

The IAA will do its part in keeping the discourse alive as there are plans to further develop iSEE which is only one part of a much larger project. IAA would like to make greater practical use of iSEE data in real time protest, so that marching activists may inform one another of police locations via the customized mapping application on handhelds. Such use would avoid potential disruption of protest. IAA would also like to map CCTV surveillance camera use in other cities such as London, and Seattle, two cities where surveillance cameras are wide spread across the public sphere. Lastly, IAA plans to develop a handheld kit with GPS receivers that allows operatives anywhere to document a CCTV camera when spotted by wirelessly feeding the data to a remote database. Therefore the documentation and surveillance of public surveillance would be entirely decentralized.

The IAA looks to subvert corporate and governmental use of the Internet as a mechanism of social analysis and surveillance by turning it into a tool to make the actions of public protest for self-determination more efficient.

#### The Internet as a sustained dialogical space through cultural production

The movement to merge art with daily social life is the legacy of the revolutionary avant-garde, a legacy that is bound to the rise of technological invention in modern society. Print, photography, the telephone, radio, film, video, and the Internet have each awakened a vision of artistic production embedded in the broad social fabric of the public arena. The tendencies of the technologically driven avant-garde have been socialist – aiming to debunk the art object from its pedestal through mass production and perhaps more importantly to free electronic media into a dialogical public sphere.

Hans Magnus Enzenberger in his 1974 essay/manifesto, “Constituents of a Theory of the Media”<sup>14</sup> presents the following table to summarize the social dichotomy of the media:

Repressive Use of Media	Emancipatory Use of Media
Centrally controlled program	Decentralized program
One transmitter, many receivers	Each receiver a potential transmitter
Immobilization of isolated individuals	Mobilization of the masses
Passive consumer behavior	Interaction of those involved, feedback
Depoliticization	A political learning process
Production by specialists	Collective production
Control by property owners or bureaucracy	Social control by self-organization

If we apply Enzensberger’s set of emancipatory objectives to the Internet, the Internet indeed represents a dialogical vehicle more so than any other media.

However if we allow corporate surveillance and federal policies allowing greater monitoring of cyber space the Internet’s dialogical potential will be consumed by a decentralized panopticon. The public sphere no longer only implies the embodied street space, as it now encompasses the virtual space of the Internet. Hence, new forms of cultural production that make use of emerging technologies must assimilate and subvert the corporate and governmental means of documenting, indexing, and monitoring the public domain to enact contestation. Brooke Singer’s SPV2 and the Institute for Applied Autonomy’s iSEE, present two alternative uses of the Internet and the Database as tools that provoke and enable activism through independent production and dissemination.

Brooke Singer's Self-Portrait (v2.0) is available at: <http://www.bsing.net/>  
 And use Institute for Applied Autonomy’s iSEE at: <http://www.appliedautonomy.com/>

<sup>1</sup> Brian Winston documents the early history of the Internet in his book Media Technology and Society, MIT press, 1999

<sup>2</sup> Mark Poster elaborates upon “CyberDemocracy” as a space where “individuals construct their identities...a ‘democratization’ of subject constitution because the acts of discourse are not limited to one-way address and not constrained by the gender and ethnic traces inscribed in face-to-face communications.” What’s the Matter with the Internet? Poster, University of Minnesota Press, 2001, pg.184

<sup>3</sup> Nancy Fraser presents the concept of “public arenas of citizen discourse and association” in explaining Jurgen Habermas’s theoretical definition of the public sphere in her essay, “Rethinking the Public Sphere A Contribution to the Critique of Actually Existing Democracy” included in The Phantom Public Sphere, edited by Bruce Robbins, University of Minnesota Press, 1993.

<sup>4</sup> Email interview with Brooke Singer.

<sup>5</sup> Much of this description is based the use and structure of Oracle 8i as presented in Fundamentals Database Systems and Oracle 8i by Ramez Elmasri Navathe Shamkant V. Navathe, Addison Wesley Longman, Inc. 1999.

<sup>6</sup> "Music Software Users Installed Tracking Program Unknowingly" by The Associated Press, NY Times, January 5, 2002

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<sup>7</sup> Sekula pg.347: "...this archive of images of the body lies in the fact that by the mid-nineteenth century a single hermeneutic paradigm had gained widespread prestige. This paradigm had two tightly entwined branches, physiognomy and phrenology. Both shared the belief that the surface of the body, and especially the face and head, bore the outward signs of inner character." Where you may have once been displaced by your image, you may now be displaced by your data.

<sup>8</sup> In radio Bertolt Brecht's suggestion of its use for dialogue was ignored: "radio is one-sided when it should be two-. It is purely an apparatus for distribution, for mere sharing out. So here is a positive suggestion: Change the apparatus over from distribution to communication. The radio would be the finest possible communication apparatus in public life, a vast network of pipes." – Brecht "The Radio as an Apparatus of Communication", *Radiotext(e)*, *Semiotext(e)* #16 (Volume VI, Issue 1), pg. 15, 1993. And in the world of television the 1960s heralded the first consumer video equipment introduced by Sony, media artists and activists immediately sprung upon it. Portable video presented immediacy rare in network television. In the pages of *Radical Software* and in the alternative movement's 1971 manifesto, "Guerrilla Television," written by Michael Shamberg and Raindance, they outlined their plan to decentralize television so that the medium could be made by as well as for the people. Adopting a sharply critical relationship to broadcast television, they determined to use video to create an alternative to the aesthetically bankrupt and commercially corrupt broadcast medium. – Boyle, D. 1990 "A Brief History of American Documentary Video," essay published in *Illuminating Video: An Essential Guide to Video Art*, edited by Doug Hall and Sally Jo Fifer, Aperture in association with the Bay Area Video Coalition, p.55

Due to the expense of video production and broadcast, such idealization of cable and video has been marginalized to the extent of public access television stations (that now run on badly outdated equipment due to the rise of corporate cable enterprise). The distribution of independent video productions has as well been marginalized to small video banks that must overprice their collections or independent video rental stores that struggle to survive against the Blockbuster monopoly.

<sup>9</sup> "In its exploration of the historicity of surveillant practices in their relationship to changing logics of representation, CTRL [SPACE] will offer both a state of the art survey of the full range of panopticism --in architecture, digital culture, video, painting, photography, conceptual art, cinema, installation work, television, robotics and satellite imaging-- and a largely unknown history of the various attempts to critically and creatively appropriate, refunction, expose and undermine these logics." – ZKM web site, <http://on1.zkm.de/zkm/e/>

<sup>10</sup> from the IAA web site, <http://www.appliedautonomy.com/>, currently featuring iSEE

<sup>11</sup> However current surveillance cameras melded with face-recognition systems don't appear to pose much of a threat:

"Operator logs obtained by the ACLU show that the system not only has not produced a single arrest, but it also has not resulted in the correct identification of a single person from the department's photo database on the sidewalks of Tampa... Tampa police detective 'fessed up that the system was such a waste of time that cops stopped using it." Reported by Declan McCullagh, "Face Recognition Needs a Lift," *wired.com* Jan. 5, 2002

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<sup>12</sup> “Facial recognition has been in development for decades, but recent advances in computer power and software have made the systems less expensive and more accurate — though just how accurate remains a subject of debate.

Most systems work by taking pictures of faces, comparing them to a template and making dozens of measurements of each one, including factors like the distance between the eyes... The mathematical description of those features is stored in a database, to be compared with other.” Reported by John Schwartz in “New Side to Face-Recognition Technology: Identifying Victims” NY Times, January 15, 2002

<sup>13</sup> “Judge OKs FBI Keyboard Sniffing” by Declan McCullagh, NY Times January 4, 2002

<sup>14</sup> Originally published in 1974 in “The New Left Review,” the essay is included in Electronic Culture, edited by Timothy Druckery, Aperture, 1996.