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PLAYBACK: THE ACT OR PROCESS OF REPLAYING A RECORDING

by
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Each hour there are thousands of security cameras recording our public places. The millions of hours of saved surveillance footage creates a strange and fascinating record of our daily lives. The authors of these videos create them not with the ideas of an artistic compositional scheme or narrative. Instead, they are determined by a desire for maximum visual efficiency.

This thesis is a series of urban documentaries in simultaneous play-back. These recordings are the simulation of a surveillance system upon a site in Houston, Texas. The system uses the qualities of surveillance by recording the site through different variables such as frame rate changes, motion detection, variable fields of view and multiple viewings of an event. These variables reconfigure both the spatial and temporal character of this urban condition that results in a new architecture—an alternate city.
Introduction

1 film : film plan
2 film : film plan
3 film : film plan
4 film : film plan
5 film : film plan

Bibliography
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And to my son, Laszlo, to whom this is dedicated.
The thesis began with an interest in defining public space in a time when security is a priority. The concern is how public space remains as public domain under the scrutiny of total security. Public domain is a place completely open to all social groups of different backgrounds with dissimilar interests. Here ideas are exchanged, negotiations are created and at moments space is temporarily appropriated by any of these groups. Public space is space of contention. It is a place of usual habitants and a place of explorers. In both cases the space of one is remade for the other.

We understand the idea of public space as a part of our public sphere, where the cultural identity of the city is manifest and created. It is no longer the traditional cafe or city park. The public spaces are the non-places of the cities, the in-between destination spaces. They are situated in-between the home and the office, in-between the hotel and the amusement park.

The in-between is the place where we interact and surrender our private selves in exchange to see and be seen by others. One spectacle is in exchange for another spectacle. It is out of our immediate control.

A common material to the in-between is video surveillance. It has become its own infrastructure linked to the airwaves, funneled into homes, maintained remotely and stored indefinitely. As an example, in New York City, new maps of the city were created to avoid the incidental recordings by surveillance cameras. These maps of the city are not about the shortest distance between two places but about the path of least surveillance. This existing infrastructure has an effect on the way we see ourselves in our cities.

The millions of hours of video footage creates its own intervention within the city. These authorless films have their own framework. This framework runs through a program concerned about maximizing visual efficiency. The efficiency is created from the negotiation between maximum view/optimal views versus the hard drive memory to store the information. This negotiation determines how much video is recorded, how it's recorded and how long the information is stored. Banks keep video surveillance for the length of time it takes a check to clear its accounts; grocery stores keep video surveillance for the length of time it takes to report injury from an accident; retail stores keep information for the length of time to determine a shop lifting theft; and airports are encouraged to keep video surveillance indefinitely.

Angle of view
the maximum scene angle that can be viewed through a lens.

Archiving
the processing of removing older video from a DVR and saving it via another storage device for later use and varies according to type of program and installation. For example, many retailers receive fraudulent credit card usage claims that appear on a credit card statement a month or more after the event.

Audio
there are stricter laws regarding the practice than that of recording video. some retailers that use audio recording include businesses vulnerable to hold-up like fast food restaurants. if a customer leaves to record audio, clear and visible signage must be posted in view of the public stating that audio recording is in use on premises. A business should consult with their own legal counsel before proceeding with the recording of audio on their premises.

Bandwidth
(1) the frequency range of a video signal, (2) the amount of information that can be carried by a signal path.

Camera
converts the visible scene captured by a lens into an electronic signal and transmits that signal to a monitor for viewing.

Depth of field
the area of focus before and behind a video image subject.

DVR
digital video recorder

FOV (Field of view)
the size of area captured as an image by a camera lens.

FPS (frames per second)
the standard for measuring the rate of analog video playback speed. a rate of 30 fps is considered real-time speed and a rate of 24 fps is considered animation speed. at 12-15 fps, the human eye can detect individual frames causing video to appear jerky.

Flux
continued flow; constant or frequent change; rate of flow of fluid.

Frame
a single still image in a sequence of images that, when displayed in rapid succession, creates the illusion of motion. the more frames per second (fps), the smoother the motion appears.
The efficiency of the surveillance video has an aesthetic of its own. Where the cinematic camera can be assigned more perceptual features of voyeurism and storytelling the qualities of the surveillance camera seem indifferent to the environment it creates. The cinematic city is also part of a constructed and stylized narrative. Although the surveillance city is also part of another construction, its narrative is much more geometric. Its rules follow schedules, frame rates, and hours of the day.

The in-between site of this project is the Shepard Plaza. Its location is north of the 59 freeway between Greenbriar Drive and Shepard Drive and south of Richmond Street. Its location in the city and the types of crowds that frequent the Plaza make this one of the more urban experiences in Houston.

There are five filming plans and six different films produced from the project. Each focus on either pedestrian traffic, vehicle traffic or both. Each considers the times of day and the week. The object of the film plan is to set up a surveillance system with program for creating total coverage of the site using the qualities and elements of surveillance (see definitions to the right). The films are ways of viewing what type of architecture/urbanity is produced by this documentation. Some examples are how frame rates affect the way a person occupies the space or how camera angles manipulate the recorded time of an event.

The possibility of the video surveillance of Shepard Plaza being broadcasted into the homes of local residents would have what effect on their conception of the neighborhood? If this information were accessible from our homes would it be an opportunity for interaction between the residents and the city as the site? Does the city become its own billboard or its own reality show for the local neighborhoods? When small elements of change happen, do the local neighborhoods become aware and react to the change. Does the city itself become the spectacle? These are the ideas that have surfaced after the final presentation. The main question asked in the presentation was, "who is the audience?" This question is what I hope to answer in projects to come that will be influenced by the work I did this semester.
The camera is attached to the Sandman building, approximately 20' high, on a ladder which acts as the tripod. The frame of view of the camera situates the Stag's Head entrance and the entrance to the parking lot within the frame.

The camera is attached to a tripod in front of Warehouse video. The angle of the camera is parallel to the ground approximately 18" high. It's frame of view includes camera one, the entrance to the parking lot and Sandman Drive. The Stag's Head is not in the view.

Purpose

The purpose of film one is to max out the view of the east exit/entrance of the parking lot with coverage from two cameras. Camera 1 has a wider view of the parking lot because of its placement above Camera 2. Therefore, its framerate is reduced to 1fps. The example shows that the vehicle is in the frame of Camera 1 longer but is recorded in less frames.

appropriate definitions:

FPS (frames per second) the standard for measuring the rate of analog video playback speed. A rate of 20 fps is considered real-time speed and a rate of 24 fps is considered animation speed. at 12-15 fps, the human eye can detect individual frames causing video to appear jerky.

Motion/activity the amount of scenery in an image will affect that image's file size. The images of a white room with no one in it will take up less space than images of the same sized room with a lot of boxes, shelves and pictures in it. Adding motion to the scene increases the file sizes necessary to capture the images. the more motion, the more hard-drive space required to save those images.

Resolution
(1) the amount of information in each frame of video, normally represented by the number of horizontal pixels times the number of vertical pixels.
(2) the measure of the extent to which detail is distinguishable on TV screen. resolution is determined by the limit to which the lines of a test pattern are distinguished by the naked eye.
frame rate: \( 5 \text{fps} \text{(mini-DV camcorder)} + 5 \text{fps} \text{(mini-DV camcorder)} \)

time of day: 9am - 5:30pm + Friday 7pm - 10pm
frame rate: 5fps (mini-DV camcorder) + 5fps (mini-DV camcorder)

time of day: 6am - 6:30am + Friday 7pm - 7:30pm

@monitor 1- frame occupation

@monitor 1- frame occupation
frame rate: $5fps_{(Mini-DV~camcorder)} + 5fps_{(mini-DV~camcorder)}$

time of day: Sat. - 9:30am - Friday 7pm - 10:30am
Camera one is located in Amy's Ice Cream behind the cash register. The focus of the camera is on the employees and not of the customers. The footage captured by the camera is a found object, that is broadcasted on the airways.

Camera two location

Camera two is placed in the parking lot adjacent to Amy's Ice Cream facing west for a close view of the parking lot. Its approximate height is 18" above the ground and its FOV is 180 degrees.

recording device

The recording device is located inside the Starbucks across the Shepard Curve. Static is created by the passing traffic, so the receiver is moved around continuously to avoid the interference to capture clearest picture. The maximum frames the recorder can capture is 1/12 seconds.

Purpose

Film 2 is a simultaneous interior and exterior video. The surveillance footage captured by a remote receiver is situated across the street in Starbucks Coffee and gets some interference from the cross traffic, see the example. The interior footage is a found object picked up from the broadcast airways.

appropriate definitions:

Audio there are stricter laws regarding the practice than that of recording video. some markets that use audio recording include businesses vulnerable to hold-up like fast food restaurants. if a customer wants to record audio, clear and visible signage must be posted in view of the public stating that audio recording is in use on premises. A business should consult with their own legal council before proceeding with the recording of audio on their premises.

Bandwidth:
(1) the frequency range of a video signal. (2) the amount of information that can be carried by a signal path.

Camera converts the visible scene captured by a lens into an electronic signal and transmits that signal to a monitor for viewing.

Hard drive storage factors that affect the duration of storage: resolution recorded, recorded image rate, amount of activity in view, amount of cameras recording, hard drive size.

Real-time in computing, an operating mode under which data is received, processed and the results returned quickly enough to seem instantaneous. in video, real-time also refers to effects and transitions that happen without interrupting rendering.

Remote video allows the user the ability to be anywhere they have to be, while giving them a window to what is going on on-site, at any time of day. remote video can be user administered or user central station monitored.
surveillance camera
12 of surveillance camera

1/125 21.8 minutes of surveillance video
frame rate: 1 frame/12 sec.

recording device

- area with high traffic that disrupts signal

starbucks coffee

camera 1

- mini DV camcorder
- FOV <180 deg
- 36" above ground

camera 2

5 fps

depth of field
depth of field

- Starbucks Coffee
- Recording device
- Amy's Ice-Cream

Monitor 1 - Exterior view of camera 2

Laptop computer as the recording device. The software is configured to record at a max 1 frame/12 sec and a min. of 1 frame/60 min.

The receiver must be pointed towards the broadcasted signal. The best result is higher than 36" above the ground. Since the receiver is located across a busy street, the traffic interferes with the signal.

The receiver is plugged into an electrical outlet as well as the USB video capture adapter which is plugged into the laptop computer.

Greenbrier Drive

Monitor 1 - Exterior view of camera 2

Frame rate: \( \frac{1}{12} \text{sec}_{(recorder)} + \frac{5}{fps_{(min-DV \text{ recorder})}} \)

Time of day: 1pm Friday
Cameras one are placed on adjacent sides of the North building, 18" above the ground on a tri-pod, and placed at the northwest entrance. The purpose of these shots is to catch the traffic coming off of Richmond street and pedestrian traffic from the front parking lot. The side cameras are to show pedestrian traffic from Greenbriar Drive which will enter the second camera's frame coming around the corner to the entrance of the parking area.

camera two location

To achieve maximum view of the corridor, the cameras two are placed on top of the sconce attached to the exterior. It is placed to be almost parallel to the wall to give the wall a prominent part of the frame. This is to emphasize the narrow view of the sidewalk/corridor.

Purpose

The purpose of film three is the operation of total coverage of the north parking lot. The film switches back and forth to alternate time views of activity. The views keep still images of the scene until activated by motion, switching off after the motion has left the scene. This technique is used to save hard drive memory by recording only the differences in a scene. The presentation showed multiple views of all cameras and switched off and on to different scenes. The following example shows the day scenes and what would be recorded if these were a video.

appropriate definitions:

Angle of view
the maximum scene angle that can be viewed through a lens.

Archiving
the processing of removing older video from a DVR and saving it via another storage device for later use and varies according to type of program and installation. for example, many retailers receive fraudulent credit card usage claims that appear on a credit card statement a month or more after the event.

Motion/activity
the amount of scenery in an image will affect that image’s file size. The images of a white room with no one in it will take up less space than images of the same sized room with a lot of boxes, shelves and pictures in it. Adding motion to the scene increases the file sizes necessary to capture the images. the more motion, the more hard-drive space required to save those images.

Multiplexers
a video multiplexer collects full-screen pictures from up to 15 cameras and displays them simultaneously on a monitor. operators have the option of displaying any camera full-screen or multiple cameras in reduced size. multiplexers work by recording 30 frames per second, then sequencing through all connected cameras and capturing images. for example, a 16-channel multiplexer recording 16 cameras will retrieve 1.875 images per second, per camera. (30 images/16 cameras = 1.875)
monitor 3-cameras 1A & 2A

remote camera for recording 1 fps

degraded depth of field camera 2

monitor 3- cameras 2B & 1C

frame rate: 5fps (mini-DV camcorder) + 1fps (mini-DV camcorder)
time of day: 9am, 6pm, 8pm Friday
frame rate: \( 5fps_{(mini-DV camera)} + 1fps_{(mini-DV camera)} \)

time of day: 3am, 6pm, 8pm, Friday
frame rate: $\frac{5}{6}$fps (mini-DV camcorder) + $\frac{1}{6}$fps (mini-DV camcorder)

time of day: 8am, 9pm, 6pm Friday

monitor 3 cameras 1A & 2A

depth of field
overlapping frames
area of motion detection
Camera one location

Camera one is located outside the vacant building off Greenbriar and the parking lot on the sidewalk. The camera faces north to Richmond with part of the frame looking through the demolished storefront. The height of camera one is aligned with the height of camera two with its frame of view overlapping two.

Camera two location

Camera two is located adjacent to camera one inside the vacant building. Access to the building is through the demolished store front. The camera is rotated to overlap with camera one's frame of view.

Day one: Building completely empty with no storefront. Full access to the interior.

Day two: Storefront partially installed. Lower part 30" above ground not installed which allows access to the interior.

Day three: See 4B

Purpose

Film four is made up of multiple views, multiple filming days, and a changing scene. The various filming days show the various traffic changes with pedestrian traffic on Sunday, construction work on Monday and late afternoon traffic on Thursdays. The structure of the film fits the views typically seen on surveillance video showing multiple cameras. The changing scene is the demolished storefront that gradually fills in so to exclude access to the interior in the final shoot. The following pages show various frame rates between the interior film and the exterior film. This creates a play-back that can not be simultaneous, approximately one second difference between the two. The second example shows a multiple view of traffic, both front and back.

appropriate definitions:

FPS (frames per second) the standard for measuring the rate of analog video playback speed. A rate of 30 fps is considered real-time speed and a rate of 24 fps is considered animation speed. At 12-15 fps, the human eye can detect individual frames causing video to appear jerky.

Motion/activity the amount of scenery in a scene will affect that image's file size. The images of a white room with no one in it will take up less space than images of the same sized room with a lot of boxes, shelves and pictures in it. Adding motion to the scene increases the file size necessary to capture the images. the more motion, the more hard-drive space required to save those images.

Multiplexers a video multiplexer collects full-screen pictures from up to 16 cameras and displays them simultaneously on a monitor. Operators have the option of displaying any camera full-screen or multiple cameras in reduced size. Multiplexers work by recording 30 frames per second, then sequencing through all connected cameras and capturing images. For example, a 16-channel multiplexer recording 16 cameras will retrieve 1,875 images per second per camera. (30 images/16 cameras = 1,875)

film four
Plan view of camera placement during demolition.

Frame rate: 1fps (mini-DV camcorder) + 5fps (mini-DV camcorder)

Day one: Sunday, December 14th

Time of day: 9am - 5:30pm Sunday, Monday
3pm Thursday
monitor 4- cameras 2B & 1C

frame rate: $1 \text{fps (mini-DV camcorder)} + 5 \text{fps (mini-DV camcorder)}$

day two: Sunday, Wednesday, December 17th

time of day: 9:30am - 9:30am Sunday, Monday, Tuesday, Thursday
frame rate: \(1 \text{fps (mini-DV camcorder)} + 5 \text{fps (int-09 camcorder)}\)

time of day: Begin - 9:30am Sunday, Monday
3pm Thursday
**Monitor 4 - East Elev. Cameras 1 & 2**

- View obstructed, not covered by camera 2
- Area of overlapping frames images appear in both camera frames
- Vacant building
- Limit to frame of camera one avoid camera two in frame

**Monitor 4 - North Elev. Cameras 1 & 2**

- Camera 1 view behind section cut
- Area of overlapping frames images appear in both camera frames

**Frame Rate:** $1fps_{(mini-DV camcorder)} + 5fps_{(mini-DV camcorder)}$

**Time of Day:**
- 9am - 10am Sunday, Monday
- 3pm Thursday
frame rate: \[ 1\text{fps}_{\text{mini-DV camcorder}} + 5\text{fps}_{\text{mini-DV camcorder}} \]

time of day: 9am - 9:30am Sunday, Monday 3am Thursday

c. monitor 4- south elevation cameras 1 & 2
The camera is attached to the vacant building across from the Stag's Head restaurant on the south side facing west. The FOV is cut short by the wall and the overhang, obscuring the entrance to the Stag's Head.

The camera is attached to the vacant building across from the Stag's Head restaurant on the west side facing south at the corner of the building, approximately 18" above the ground. The FOV shows the view through the window as well as the reflection of adjacent traffic.

Purpose

The purpose of film five is to cover the traffic on Sandman Dr. from the Shepard curve and the side street adjacent to the cameras. At this time the parking lot adjacent to the Stag's Head Restaurant becomes an extension of Shepard's curve for people to reach Greenbriar. In trying to cover the traffic, pockets, or gaps, are created between the cameras views. In the scene the subject can occupy both cameras, enter and exit the frames simultaneously or not be present for brief moments.

appropriate definitions:

FPS (frames per second) the standard for measuring the rate of analog video playback speed. A rate of 30 fps is considered real-time speed and a rate of 24 fps is considered animation speed. At 12-15 fps, the human eye can detect individual frames causing video to appear jerky.

Motion/activity the amount of scenery in an image will affect that image's file size. The images of a white room with no one in it will take up less space than images of the same sized room with a lot of boxes, shelves and pictures in it. Adding motion to the scene increases the file sizes necessary to capture the images. The more motion, the more hard-drive space required to save those images.

Scene the objects or area to be observed and the total environment in which they exist. The hard drive requirements are determined by what exists in the scene: the amount of motion and activity, recorded image rate, resolution requirements and the amount of cameras needed to record the scene.

film five
frame rate: $1fps_{(recorder)} + 5fps_{(mini-DV camcorder)}$

time of day: afternoon
frame rate: $1 \text{fps}_{\text{recorder}} + 5 \text{fps}_{\text{ink-DV camcorder}}$

time of day: afternoon
frame rate: $\text{fps}_{\text{recorder}} + 5\text{fps}_{\text{mini-DV camera}}$

time of day: afternoon


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