
Layered Surveillance

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Abstract

Artist Annabel Manning explores the world of immigration and identity, and explores imagery related to border crossings and surveillance. Computer Scientist Celine Latulipe explores embodied, collaborative interaction. The intersection of these two worlds leads to research in embodied collaborative interaction and an interactive art exhibit in which participants can explore both static images through interactive layers, and moving video through interactive surveillance lenses. Participants can explore alone or with others, using gyroscopic mice to control different aspects of the artwork. The participants are led, through interaction, to contemplate the (in)visibility of the immigrant and the agency of surveillance.

Keywords

Interactive Art, Collaborative Art, Interactive Video.

ACM Classification Keywords

H.5.2 Information Interfaces and Presentation: User interfaces, Interaction styles.

General Terms

Design

Introduction

The presentation of an artist's work can take many forms. For an artist working in two dimensions creating

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various kinds of prints, the presentation typically involves hanging the work in a gallery for individuals to view in a static, often solitary, manner. However, there are other ways for this work to be experienced, and art installations aim to increase the engagement of the viewer in the artwork. Digital technology has been supporting and in some cases, driving, the creation of more interactive art installations. It can be tricky to balance the use of technology. Fancy effects can easily detract from or overpower artwork, especially if the work has many nuanced subtleties. Many installations strive to use technology in such a way that allows the work to be featured, with the technology playing a supportive role. While this is perfectly acceptable, such installations don't tend to push technological boundaries. A more interesting approach is to treat the technology as an intrinsic player in the artwork. While this is much more challenging to do, the results can be sublime when successful.

In our work we aim for sublime interaction with artwork, where the technology is very tightly linked to the artistic goals. This is achieved through a very tight, collaborative interaction between the artist and the coder. The art drives the development of the technology, while the technology also drives the development of the art in a very cyclical fashion. The work we describe here is called Layered Interaction, and consists of two separate but related presentations of work combined into a single interactive art installation. Up to four people can interact with the artwork of Annabel Manning using gyroscopic, wireless computer mice. The artwork is projected onto a large screen or wall, and by moving about in the space in front of the projection, the participants control various aspects of the artwork. Specific elements of the artwork

are only enabled through collaborative engagement, other elements are controlled individually. The work and the interaction will be described in detail here.

Our goal in creating this work is to create a sublime, interactive and collaborative experience for the audience that allows them to fully engage with the content in line with the artist's intentions. In this paper we describe Annabel Manning's artistic process, the two separate works in the installation and the technology behind them. We then discuss the philosophical aspects of engaging in such work and our vision of how this collaboration between art and technology works.

Related Work

There are many examples of interactive, multi-disciplinary art installations, and indeed a whole conference devoted to such work in Europe (ARS Electronica). An early version of our interactive lenses work was presented at the (re)Actor3 Digital Live Art Conference in Liverpool [2]. Snibbe and Raffles have written about how to design installations that involve cameras and projections [5]. Maynes-Aminzade et al. described a number of experimental performances that involved the audience in an interaction [4]. Loke et al. provide a nice description of possible frameworks and approaches to understanding movement in interaction design [3]. While their work is related to ours, our installation uses a relatively familiar remote-control based interaction, and relies less on whole-body or gestural input.

In general, there are many interactive, embodied systems that rely on vision or sensor-based interaction. Our installation works are the first to make use of off-

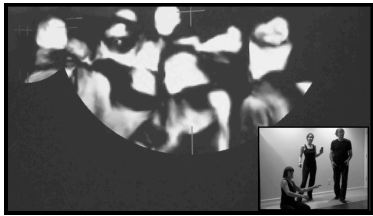


Figure 1: A screen capture from the Interactive Lenses work, with three people manipulating lenses shown in inset.



Figure 2: A screen capture from the Interactive Lenses work, with the targeting cross-hairs turned off. This image shows how the lenses blend together when they overlap.

the-shelf gyroscopic mice for collaborative audience interaction with artwork.

Artistic Process

Annabel Manning is an artist working in North Carolina, who has had recent exhibits in Los Angeles, Boston, Germany, and England. Her current artwork is a series of drawings, paintings, projections, moving images, and installations reflecting critically on publicly accessible digital or print images depicting Latino immigrants under surveillance on the U.S./Mexico border. Manning believes artists are important players in current debates about immigration because they provide settings where people can experience and reflect on the complexity of immigration.

Manning starts with digital or print news photos and videos, which she then reworks using digital and non-digital drawing and painting. For example, she may print out a video capture of Latinos crossing the border, enhance the texture and interactions among them, draw and paint on it, scan it back in and so on until her own image emerges. In the resulting images, the immigrants are accompanied by their shadows or converged with them, depending on the source of light (e.g. infrared surveillance cameras produce white figures generated by the heat of the targeted Latinos).

Once Manning is satisfied with her images, she uses Latulipe's symTone software to create narrative movies using a two-handed Ken Burns technique to select areas of interest. She also uses the dual-cursor software to adjust tonal qualities for each area of interest, and the software then interpolates the tonal changes as the movie plays. This allows Manning to create very expressive narrative video installations that

can be shown in galleries. To encourage viewers to experience and reflect on the border-crossing experience of Latino immigrants, Manning and Latulipe have taken this work further and developed the installation pieces that are presented here.

Installation

The Layered Surveillance Installation consists of two separate programs, which are run through a script from an Apple laptop. Both programs make use of a set of eight gyroscopic wireless mice connected to the laptop via a USB hub. The mice are paired in both installations and marked so that the installation facilitator can hand the pairs of mice out to participants. Each mouse is marked as either *Left* or *Right* in order to ensure that participants hold the mice in the correct hands, as holding the mice in the opposite hands would negatively impact the interaction. The installation does not require a specific number of participants, and there is no specific start or end to the interaction, so that participants can come and go individually or in groups. The facilitator has three jobs: to distribute the mice as individuals come and go, to switch between the two sets of work, and to distribute printouts of the interactive artwork to participants.

Interactive Lenses Work

In the Interactive Lenses work, participants are engaged in a video montage of the artwork. Three of the four possible participants control surveillance lenses using the pair of mice they have been given. By moving the two mice around, the participants control the size and position of a circular lens (see Figures 1 and 2). Inside the lens, the video image is easily visible, although not particularly bright, while outside the lens, the video content is almost completely obscured in

darkness. Thus, the lenses act similar to searchlights, allowing the participant to 'see in the dark'. A feature of the lenses is a cross-hair located in the middle of each lens. The cross-hair may lead participants to feel they are controlling a gun or a camera, but tends to be construed as a gun. This was purposefully added to the lens to lead participants to an awareness of the dangers encountered by immigrants illegally crossing the border.

A fourth participant is able to interactively control tonal features of the video montage. By moving the two mice, this participant controls the minimum and maximum input and output tone ranges in the video, similar to the Levels tool in Adobe Photoshop. This bimanual tone-range control technique was introduced by Latulipe et al. [1], but is applied in a more subtle and exploratory manner in the installation. As this fourth participant affects the tones in the video, features can be made much more visible inside the lenses controlled by the other participants, or made to disappear, depending on what is done to the tone ranges. In addition, a solarizing, photo-inversion affect can occur when the minimum output tone range exceeds the maximum output tone range, causing dark pixels to map to light pixels and vice-versa. The inverted tones suggest infra-red imagery.

Four participants can collaboratively explore the video narratives using the three lenses and the tonal manipulations. As multiple lenses overlap, the content in the overlapping areas becomes more clear and bright, mimicking the effect of multiple spotlights focusing in the same area. In addition, the cross-hairs change color when the center of two lenses overlap, to show that the lenses have effectively converged. When

three lenses converge, the save and export feature is activated and the current screen image is captured, printed and uploaded to Flickr¹. This feature can also be activated by the facilitator, and is accompanied by an audible camera click.

Software

To create moving videos of her artwork, Manning used the symShow software that was created by Latulipe. This bimanual software requires the use of two mice, and allows Manning to easily manipulate the tonal features of her images using the symTRC bimanual tone-reproduction curve feature and the ToneZone tone range manipulation feature. These features were part of the symTone application presented by Latulipe et al. in 2006 [1]. The symShow software is an extension of symTone that allows a user to select an area of interest to feature during a slideshow. This is commonly referred to as the Ken Burns Effect, where specific parts of a still image are featured in a video using panning and zooming. In the symShow software, this has been turned into a bimanual symKBE technique, where the user selects a rectangular area using two mice and two cursors. The bimanual version allows a user to very quickly select a number of different areas of interest, which means that a narrative video can be created from a static image very quickly and easily.

Initially, Manning used symShow to create interactive videos with changing tonal features. These animated versions of her artwork have been displayed on LCD screens in galleries and shown online. This is an example of technology supporting the artist, but not playing an equal role in the artistic process.

¹ www.flickr.com/interactivesurveillance



Figure 3: A sequence of images from the Interactive Layers work.

Part of the motivation in creating the installation was that Manning enjoyed the process of manipulating the images with two hands using the ToneZone, symTRC and symLens tools in symTone. For example while using the ToneZone tool, Manning could make figures in her image appear, disappear or invert into solarized negatives. These actions were extremely compelling and Manning wanted her audience to experience the act of making figures or features appear and disappear in her images. Additionally, Manning was interested in a different use of the symLens feature in symTone. The lens is a circular area whose size and position is controlled by two cursors, and inside the lens is the original version of an image allowing a user to compare an original and a modified version of an image. Manning enjoyed using this feature to see a different version of her images, and also wanted her audience to experience this feeling of targeted exploration. It was also clearly relevant to the content of Manning's images, and the surveillance that takes place at the US-Mexico border.

To address these ideas, Latulipe modified the symShow software to create the Interactive Surveillance Lenses installation. The software is written in C++ and OpenGL, and is used to run the videos and drive the interaction of participants using the wireless mice.

Interactive Layers Work

The interactive layers work consists of a number of interactive images and was created as a Processing script. As with the Interactive Lenses work, four participants can interact with the art, each using a pair of wireless mice. By moving the mice, each participant controls a different part of the image. The interaction affects the brightness, transparency and level of detail

of the part of the image each participant controls. The images are typically figural works, and each participant is typically controlling the appearance of a figure in the image. The images represent immigrants at the border, and the interaction makes specific figures in the images slowly appear, disappear and become more or less salient (see Figure 3). In addition, the interaction causes level of detail changes where specific elements (such as facial features) slowly emerge or disappear.

The cause and effect of the interaction is not obvious and encourages exploration and curiosity. The collaborative aspect of the interaction makes it challenging to determine what effect a particular participant is having, since multiple changes are happening simultaneously in the image when there are multiple participants. While this confuses some, the interaction is meant to be exploratory and visually provocative, and participants typically are intrigued by the constantly changing image.

As with the Interactive Lenses work, there is collaboration in the sense that multiple participants can explore and affect the image simultaneously. However, there are also features that are activated when the participants together change the layers in specific ways. For example, in one image, the background completely turns black, making the figures appear ghost-like, when all participants have made their figure-layers almost fully transparent.

Each image that is displayed has been split into a number of separate layers based on figural separation and each layer has multiple versions corresponding to different levels of detail. By moving two mice there are four possible parameters that can be controlled and



Figure 4: People manipulating interactive layers in front of a large screen. The large size of the screen here (this was taken in a large dance studio, where the cyclorama was used as a projection screen) greatly enhances engagement in this work.

these are mapped to the tonal aspects (brightness, contrast and transparency) and the level of detail in each layer. As with the Interactive Lenses, there is the ability at any time to save and print a particular version of the artwork, at which point the captured screen shot is also uploaded to Flickr, continuing the hyper-circulation of these images that originated online.

Discussion

One of the most interesting aspects of this interactive art installation is the close back-and-forth interaction between the artist and the coder. The artist (Manning) needed to have some sense of what the code does, how the devices interact and what was possible, while the coder (Latulipe) needed some artistic sensibility in order to understand what interaction effects would be most compelling and would work best with the art. We feel that some of the interactions that participants were able to achieve with the artwork were sublime, and this is due to the tight coupling between the content of the artwork, the artist's intentions and the technology.

An interesting aspect of the work that has emerged is the power of the large screen. We have had a number of informal opportunities to stage this work for small groups of people, and the effectiveness is strongly correlated to the size of the screen, see Figure 4.

We have come to believe, through the process of continuous collaboration, that sublime interactive art requires the technology to be an equal partner in the artistic process. Simply using technology as a tool is not likely to yield the surprising results that can be derived and experienced when technology is used in new ways. Furthermore, by using art as a driving force for the development of interactive technology, new

devices and techniques will emerge that may inform the development of more pleasurable products.

Conclusion

We have presented Layered Surveillance, an interactive, collaborative art installation that leads participants to explore artwork depicting immigrants crossing the border. In this work, a circular interaction of art driving technology and technology driving art is apparent, and both the technology and the artwork are equal partners in the installation. We believe this balance allows participants to discover sublime images within the artwork through their embodied, collaborative interaction.

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