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Master's Thesis

Academic Year 2015

Amplified Art:

Participative Information System Using Shadow Interaction

and Projection Mapping on Two Dimensional Artworks.

Graduate School of Media Design

Keio University

Eria Chita Bestari

A Master's Thesis

Submitted to Graduate School of Media Design. Keio University

In partial fulfillment to the requirements for the degree of

Master of Media Design

Eria Chita Bestari

Thesis Committee:

Professor Masahiko Inami	(Supervisor)
Associate Professor Kai Kunze	(Co – supervisor)
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Abstract of Master's Thesis of Academic Year 2015

Amplified Art ; Participative Information System using Shadow and Projection Mapping on Two Dimensional Artworks.

Category: Design

Summary

This paper introduces *Amplified Art* by using shadow interaction, a system to amplify the experience of viewing two-dimensional artworks such as paintings by applying projection mapping on the artworks. Using the shadow of the user to interact, the system then orchestrate an audiovisual narration as a function of the visitor's interest. The objective of this study is to create a product for art exhibition information system. It focuses on the artwork's viewing experience and tries to provide art exhibition audience a tool to better appreciate the artworks by providing customized information according to the audience's knowledge in an engaging and interactive way. Enhancing the audience's experience without overwhelming them with digital devices.

Index terms – Information interface, Museum information system, Interactive, Projection mapping, Shadow interaction.

Graduate School of Media Design, Keio University

Eria Chita Bestari

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Sincerely,

Eria Chita Bestari

Chapter 1 Introduction

"What makes people passionate, pure and simple, is great experiences. If they have great experience with your product and they have great experiences with your service, they're going to be passionate about your brand, they're going to be committed to it. That's how you build that kind of commitment."

Jesse James Garrett - "What the Heck is User Experience Design??!! (And Why Should I Care?)"

1.1 Background and Motivation

For the past decade, museums have been developing their way of presenting the artworks with entertaining experiences. Museums are keen on presenting their collections in a more appealing and exciting manner to attract visitors. Some recent surveys in Europe show that about 35% of museums have already started (June 2003) developments with some form of 3D presentation of objects (Tsapaori, 2003). This trend can be seen in science and history museums to attract visitors of all ages. Although art museums and galleries are also starting to adapt to these new technologies, still the experience in art exhibitions are relatively passive. Some of the visitors come to art exhibitions to find inspiration, to learn, whereas others come just for leisure. Although it is impossible to fully satisfy all types of visitors, it may be possible to design a system that is engaging to all the visitors.

Media communications has been in constant development due to the advancement of media technology. From the conventional printing press to digital media, it has changed the society and culture. It has made a great transformation in how we communicate. We now live in an era of near unlimited information and can access it in a matter of seconds. Both personal and mass communications will change and adapt as a result of the emergence of new technology. But this development in communication technology has both positive and negative effects. For example, a major problem today, given new media such as Youtube and mobile gaming,

especially adolescents seem to have trouble focusing and taking time to understand background information indulging in art (Chan & Rabinowitz, 2006). It is more and more challenging for exhibition organizers and museum curators to attract audiences and find suitable means to let the audience communicate with the art pieces.

1.2. Study Objectives

In this thesis, I aim to study the development of information system in art exhibitions. Why more and more venues are developing towards customized and interactive systems. I aim to understand what experience visitors want and also fulfill the artist's objectives. And from that, propose a system that can maximize the artwork appreciation no matter the background or knowledge of the individual that is viewing the artwork. I aim to improve art exhibition services to existing visitors and attract new audiences. Anderson Hans Christian believed that enriching the experience of your visitors by helping them to learn more and deepening their enjoyment of what you have to offer (Anderson, 2005).

1.3. Contributions

In using devices that has screens for augmented reality information system, the main problem that arise is, how the users actually became more distant with the artwork and more fixated on the device screens which are distracting from, rather than enriching the artworks that are on display. Looking both at a screen and the actual artwork can interrupt the pace of the experience as they require a shift of attention from the screen and then move to observe the actual artwork. Multiple objects are competing for attention.

This thesis evaluates how we can design a system that can enrich both the learning and entertainment experience without taking away the visitor's attention from the artworks that are displayed. Towards this goal I contribute the following:

1. Exploration of the design space, evaluating if and what kind of information exhibition and museums visitors want to receive when experiencing an art piece. To this end I conducted interviews and (online) questionnaires.

2. Design and Implementation of an initial prototype of "Amplified Art" an interactive art system focusing on projection and direct manipulation. In this prototype, I chose to approach information systems to curate two-dimensional artworks such as painting or drawings. Two–dimensional art exhibitions are considered as a passive experience, therefore this research's objective is to introduce a system to further engage visitors and amplify their experience in art exhibitions.

3. Exploration of Interaction Modalities and Iterative Design Improvements to "Amplified Art".

4. Conduct user studies to evaluate the usability and functionality of the current "Amplified Art" prototype

1.4 Thesis Outline

This thesis is structures to several chapters, and each described as follows:

- Chapter 1 presents the background and motivation of this study, objectives and the contributions it will have on art exhibition's information system.

- Chapter 2 discusses the theoretical background of this thesis, it will explain about exhibition design, the current situations of an art exhibitions and visitor experience. Also in this chapter, a few related works that were used as a reference in designing the system are mentioned.

- Chapter 3 will explain about how to approach this study. What are the necessary methods to acquire information to create Amplified Art.

- Chapter 4 will explain what is Amplified Art. Describing it's concept and the setup of this system in detail.

- Chapter 5 discusses the prototype's experiment, and the results of the evaluation, followed by discussion.

- Chapter 6 completes the thesis with a conclusion and future studies, how can this system be implemented or improved in the future.

Chapter 2 Theoretical Background

2.1 Exhibition Design

Exhibition design is the process of developing an exhibit from a concept through to a physical, three-dimensional exhibition. It is a continually evolving field, drawing on innovative, creative and practical solutions to the challenge of developing communicative environments that 'tell a story' in a three-dimensional space. Exhibition design creates environments that communicate with people by melding communication design and the built environment. Exhibition design is an integrative process that involves a large number of factors (such as environmental graphic design, print graphics, electronics and digital media, mechanical interactive, lighting, audio, interior design, architecture), requiring exhibition designers to work in multidisciplinary teams (Lorenc et al., 2008).

Exhibits in art museums play the role of a dominating lecturer. When walking into an art exhibit, visitors only expect to communicate with artwork and the theme of the exhibit visually and mentally. Vision is useful for quick digestion, but weak in facilitating deep art interpretation. Additionally, these exhibits are typically aimed at adults because it is difficult to keep children and teenagers' attention onto passive content. However, museum interactivity and art education research have shown that hands-on activities and social interactions greatly improve effectiveness of exhibits (Beale, 2011; Wachowiak & Clements, 2001).

Exhibition environments are usually located at places of intense social interaction. A host of people gathering around and interacting with the exhibition environment makes exhibition design unique and dynamic. However, the dynamic of groups also helps establish rules for designers. When working on projects, designers need to decide who their viewers will be. These rules also impact exhibition design. "It is important to work with a client to determine the types of visitors they already attract, as well as those they want to bring in" (Lorenc et al., 2008).

5

The understanding of exhibition design is changing over time. Exhibitions are now judged on the quality of their stories and presentation instead of the collections they display. Storytelling has become recognized a very powerful way to communicate ideas. Designers have moved exhibition design toward immersive environments and large-scale spectacle, both of which help tell stories by creating affective and sensory experiences. Although human tour guides in museums probably will never be replaced, tools from new technology (such as touchscreen kiosks, personal digital devices, apps, and the Internet) are enriching visitor experience. Therefore, experience design and participatory design work effectively in exhibition design, especially when interactive elements make passive exhibitions dynamic and help to enhance visiting experiences. The goal of exhibition design is to inform and promote this topic of each exhibit to audiences. Furthermore, it enhances visitor experience by providing an immersive and communicative environment with a compelling story and dynamic interpretive techniques. This provides a powerful tool to museums for creating appealing educational exhibits: "The desire to be surrounded by a story in a public space, to be told stories dynamically, and to have an interactive experience blended with real environments will forever drive design decisions" (Lorenc et al., 2008).

Museums can establish themselves as centers of excellence, show casting original objects which makes positive difference to people's lives (Christian, 2006). Having said that, it all depends on getting more and more people often through the door and convince them with exciting programs and challenging exhibitions that museum visit can offer not only educational experiences second to none, but also fun and entertaining.

2.2. Development of information systems in art exhibitions

One of the possible roles of a curator is to act as a gracious host between the artwork and the audience-to provide a "platform" for the audience to be able to appreciate the artworks.

Museum design is a content-driven, informative, educational, and entertaining. Exhibitions in museums can either be in place for decades or travel around in a relatively short time. In general, the interpretive techniques must be accessible to all types of audiences. A combination of static/passive and dynamic/interactive components provides diverse audiences with multiple layers of information to get into the story. History museums mainly use artifacts, text, and archival images to answer the question "what happened before?" in a linear chronological path. Science museums try to translate dry and confusing scientific concepts into a story that the public can easily digest. The story can be told using multimedia and interactives in various ways. Children's museum use a large amount of interactions in colorful exhibits, which engage children to learn through creativity and experimentation. These exhibits challenge children physically, socially, and emotionally (Lorenc at al.,2008).

However, art museums have not found it easy to provide interactive visitor experiences. Exhibition design in art museums is in some sense limited, because their focus is not on teaching broad concepts, but rather on displaying collections of objects (such as paintings, sculptures, multimedia works and installations) that visitors can only interact with through passive observation. (Kegeng Liu, 2013)

A museum's function is to collect, preserve, and present information and knowledge for the public to appreciate and learn from. To compete with the entertainment industry, modern museums are attempting to move away from the perception that they are boring educational institutes by becoming active learning centers where people, especially young children, can discover new knowledge about the world and challenge themselves (Falk & Dierking, 2000). As media technology progressed, we develop an expectation to see more engaging experiences. Other fields are in constant race bringing new engaging interactivities such as in advertisement, interior design, entertainment and the movie industry. Now art museum and gallery visitors have come to expect more engaging activities in art exhibitions. In order to

stay appealing to the public, art exhibits try to keep up with the latest media technology so they would not fall behind.

In the beginning, information of the artwork is typed and printed in the form of signs and text labels that are placed across the exhibition and exhibit catalogues. Then they developed into audio tour. Exhibitor provides a recorded spoken commentary usually through a handheld device. It provides a background, context and information on the things being viewed. Traditionally, they are given or rented at the place of the exhibition, but more recently they can be downloaded to the visitor's smartphone via internet. These guide tours does not give the visitors a choice of which they preferred to see and have to listen and for how long.

After the audio era, they now developed to multimedia electronic guides where they can add visual and textual content into the device. It may provide customized content corresponding to the visitor's personal preferences. These systems are usually in the form of a handheld device with headphones, a digital pen and a display.

They can be operated in several ways:
1. Push or touch button systems, the visitor enter a code number corresponding to the artwork's code to retrieve the information.
2. Location aware systems, the device can sense the position of the visitor and receive the information of the related content automatically.
3. Line of Sight Aware Systems uses state of the art technologies, some may include artificial intelligence. They sense the location and the target object and provide information of the artworks.

More recently and now are in a trend is smartphone tour. It has the advantage that most visitors already own a smartphone, so the exhibitor do not need to provide a handheld device. The visitors may download the appropriate software or application before hand. The content usually provide text, audio, and visual

information but now new development have been seen by adding augmented reality.

Art exhibition using augmented reality technology can be said to be as the most recent development. It is a live direct or indirect view of a physical, real world environment whose elements are augmented by computer generated sensory input such as audio, visual and graphics. The technology enhances the viewer's perception of reality. Adding a simulated graphics into the real world through the screen of their handheld devices.

2.3 Interactive Media

The idea of interactive exhibits could be traced back to 1889, when the Urania in Berlin contained visitor-activated models and was popularized in the 1960s when the New York Hall of Science, the Lawrence Hall of Science and the Explotarium all started adopting interactivity into their exhibits. Those hands-on exhibits are usually presented through some technological media: for example, an exhibit with a device involving physical activity that the visitor can operate is added to the main display (Witcomb, 2006). These interactive programs successfully attract people to spend more time manually manipulating components of exhibits (Hinrichs, 2008). However, interaction in the museum context is different because it not only provides a playful experience but also allows the visitor to become more engaged with the material. The museum world can be treated as part of a contemporary language of the mass media (Witcomb, 2006). Especially in the twenty-first century, interactive media (such as the Internet, smart phones, and video games) have become a main part of people's lives. One-way instruction is gradually replaced by interactive communication that offers an immersive learning experience.

Spaces that achieve poetic and affective responses through a highly aesthetic form of exhibition are also working with notions of "immersion" and "experience." Compared to science museums and centers that incorporate a large amount of

interactive exhibits, art museums and galleries are still struggling with this issue. Various art museums have also begun to explore the possibility of interactive exhibits especially for children. For example, at museums such as Art Museum of Western Virginia and Arizona Museum for Youth, exhibitions displayed A variety of styles of presentation, conceptual approaches and educational philosophies but all incorporated a variety of sensory experiences and interactive elements to attract the interest of children, encourage creative thinking and enhance learning about visual arts. Some exhibits examined the processes of art production, the tools and techniques of artists; others explored the formal elements such as pattern, line, color, or the subjects which fascinated the artists. (Simpson, 2002)

These examples demonstrate that art museums and galleries are beginning to include more interactivity into exhibits to make art more accessible to the visitor. However, they still have a long way to go compared to science museums and natural history museums. They have a great deal of room to use interactivity to improve the visiting experience. It is important for that art museums make this change, because interactivity in museums is not just a trend. Rather, interactive exhibits will be a key tool in engaging visitors and creative immersive educational experiences for them. When designing interactive exhibits, designers and museum experts usually utilize discovery and constructivism as pedagogies to construct interactivity in the context of the museum. In modern museums, these two pedagogies work together to promote the construction of meaning. Compared to the didactic expository model (when the visitor can only receive information passively) and stimulus-response model (when the visitor can only stimulate one correct answer to get response), the discovery approach empowers the visitor to explore opened results. The focus is on exploration rather than on getting the right. Andrea Witcomb calls these interactions "dialogic interactivity". She explains that dialogically interactive exhibitions tend to make an effort to connect with visitor by representing aspects of visitors' own cultural backgrounds and using open-ended narratives. (2003). Some exhibitions have incorporated visitor comments into the exhibition space and a few art museums have even encouraged visitors to add their own labels to displayed works (Nashashibi, 2002).

Another approach towards museum interactivity is "play", which integrates games, interactions and learning to create immersive visiting experiences (Beale, 2011). Games enable discovery and also allow the museum to become a social space so that it can facilitate co-experience. In games, the player is more important than the objects in the context of the museum1. "Often games enable the audience to be in charge, gaining a closer relationship to the museum objects or stories" (Beale, 2011).

There seems to be crisis in modern art and its reception. Due to the introduction of video and recently of web-art, the borders between what was considered an artwork once and what is called art today are continuously changing. There is a marked tendency to abandon the old concepts of beauty as the sole criterion of good art and to replace it with a more general concept of pleasure and more cognitive concepts of interest and stimulation. As a result, art appreciation more than ever before requires explicit information processing, which is reflected in Gehlen's (1960) contemptuous thesis of a 'need for commentary'. Psychologically, all these developments require new explanations of why people are searching for challenge in art : These explanations should be based in understanding the psychological mechanisms which make processing of art such a fascinating and reinforcing experience.

2.3 Audience Participation

"even centers and museums designed to encourage more active involvement in issues and collections, and committed to introducing new technologies and the like, often enhance an individual's interaction" Christian Heath, Dirk Von Lehn, Jon Hindmarsh, and Jason Cleverly, "crafting participation: Designing Ecologies, Configuring experience," 2002

Participative or interactive systems are fundamentally challenge since participation is not for everyone. Some may expect passive pleasures or may simply lack the

confidence to risk doing "the wrong thing" in such context. Even with the simplest level of navigation and choice, then the question must be asked of the audience's motivation for doing this or that and whether the experiences are rewarding. There is a tension between solo viewing and group viewing in any museums or art galleries and surprisingly, those who visit galleries together often squeeze themselves uncomfortably onto seating specifically designed for one person in order to share the same viewing (graham 1997,70). Another challenge for staging a whole exhibition interactive is the amount of time and energy for the active audience to experience the artwork.

In cultural heritage and science museums there has been documented many types of engaging interactive installations including tangible user interfaces and augmented reality installations. In this types of museums this is acceptable since the communication is targeted at supporting efficient and engaging learning experiences within culture, history or natural sciences. Thus the interactive installations themselves become objects of the subjects. In art museums, however, the artworks themselves should constitute the main visitors experience. Traditionally this has been left room for small additional discrete signs, a catalogue or perhaps an audio guide explaining about the artist or an explanation of a specific piece of artwork and the inspiration behind it. A main issue in the communication strategy for art museums is to avoid disturbing the pure art experience with the communication means chosen.

2.5. Art Appreciation

There are no scientifically comprehensive theory that explains what psychologically constitute art appreciation experience. The quality of experience depends on the knowledge of the viewer. Evaluating a work of art requires a combination of objective and subjective opinion that requires certain knowledge. To be able to experience and understand, the audience must receive the artist's conception of

their piece. What is aesthetically pleasing or not depends also on the subjectivity and taste of the viewer. Aesthetic preferences are affected by familiarity. Moreover, modern and contemporary art requires a more detail interpretation than other arts. The better the understanding of the artwork, the more likely it is for the audience to appreciate the artworks.

2.6 Related Works

1. Videoplace – an Artificial Reality

Videoplace – an artificial reality is a system developed by Myron Krueger, Thomas Gionfriddo, and Katrin Hinrichsen from the University of Connecticut. They created a system that combines a participant's live video image with a computer graphic world. The system also coordinates the behavior of graphic objects and creatures so that they appear to react to the movements of the participant's image in real time. Videoplace is a computer graphic environment in which the participant sees his or her live image projected on a video screen. It may be alone on the screen, or there may be images of other people at different locations. In addition they may be graphic objects and creatures which interacts with the participant's image.

In terms of human-computer interactions, they believed that there are two technologies that are bound to be replaced. First, the keyboard will be replaced by voice input. Second, screen displays will likely be removed from a desk to placing it on the wall, making touchscreens awkward. So their paper described that Videoplace can be used to duplicate any touch screen capability. In the Videoplace system, the user's hands can be used for any traditional graphics application. Since the system can detect when a person's hand touches a particular object, pointing and selection can be controlled.

2. Put-That-There: Voice and Gesture at the Graphics Interface

This research by Richard A. Bolt of Massachusetts Institute of Technology involves the user commanding simple shapes about a large screen graphics display surface. Because voice can be augmented with simultaneous pointing, the free usage of pronouns becomes possible, with a corresponding gain in naturalness and economy of expression. Conversely, gesture aided by voice gains precisions in its power to reference. He believed that voice and gesture inputs at the graphics interface can converge to provide a concerted, natural modality. Put-That-There's setup was staged in a room the size of a personal office, a chair is placed facing a projected wall where a user can sit down and interact with the display by pointing at an area and giving voice commands.

3. Communicating Art through Interactive Technology: New Approaches for Interaction Design in Art Museums

There are a lot of works that uses interaction activities as a means of engaging the visitors, one of them was by Kortbek & Grønbæk, Communicating Art through Interactive Technology: New Approaches for Interaction Design in Art Museums. They explored the possibilities of communicating art through the use of technology and to minimize disturbance of the artworks, they applied four main approaches in the communication:
1. Gentle audio augmentation of artworks.
2. Conceptual affinity of artworks and remote interactive installations.
3. Using the body as an interaction device.
4. Consistent audio-visual cues for interaction opportunities.

They concluded that the installations are received well by the visitors, who perceived exhibition and communication as a holistic user experience with a seamless interactive communication.

Chapter 3 Approach

The system is designed for the user's experience, therefore I need to understand art exhibition visitor's needs, expectations, and personality. I decided to conduct an information collecting consisting of a field observation, survey, interview and a user study to acquire an insight on how the product should be designed.

3.1. Field Observation

I felt it was necessary to observe how visitors behave and interact with the objects that are displayed in the exhibitions, the flow of the visitors, and the types of people inside the exhibitions.

1. Observation at Miraikan Science Museum

Miraikan is a national museum of emerging science and innovation located in Odaiba, Japan. The museum shows permanent displays and exhibitions that provide people with hands-on contact and technology. Visitors can experience the technological progress of today, from simple day-to-day questions, to the latest technologies, the global environment, and space exploration as mentioned in their official website.

The venue was relatively big and the objects that are shown are conveniently spaced out, so there was no queue and visitors can enjoy peacefully.
The museum was indeed filled with interactive systems that visitors can enjoy. There were interactive projected walls and floors, augmented holograms that can response to tangible objects such as the visitor's hands, multi-touch screen to explain earth's geological information, and many more. Because people expect to be awed by new technologies and came to the museum for that experience, it can be seen that the visitors are generally open-minded and are willing to try things that are new to them. Visitors vary in ages, from toddlers below the age of one, to elderly visitors. But mostly, the visitors consist of families with small children. While most

of the children do not think twice before trying on an interaction, it can be seen in a few number of adults hesitate before exploring interactions especially when it requires performing gestures in front of other people. According to Graham and Cook in Rethinking Curation, "if the element is perceived to be of low potential value, the visitor is likely to search for another element. Once something of potential value is found, visitors narrow or focus their attention and if the value is sufficiently high, visitors will engage or become deeply involved with the exhibit element" (Graham & Cook, 1997). In other words, visitors tend to assess whether the fruitage of the interaction is worth the effort.

2. Observation at The National Museum of Western Art

The second field observation was a "Michaelangelo Buonarroti - The Making of a Genius and the 500th Anniversary of Sistine Chapel" exhibition in The National Museum of Western Art in Ueno, Japan. The exhibition displayed over 60 items, including sculptures, drawings and a 1:1 scale reproduction of the Sistine Chapel. The exhibition provided audio guides both in Japanese and English translations for the visitors, yet no more than half of the visitors took the audio guides. The demographics for the exhibition consist a large number of elderly visitors and only a few of what appears to be college students.

The atmosphere of the exhibition was stiff, it does not encourage the visitors to have discussion or even interact with one another and the rules of viewing the artworks were very strict. Photography was prohibited, the flow of the exhibition was determined and there was exhibit staff in all corners of the room. This was because the items were extremely precious and was made by a famous maestro in art history. The original Sistine Chapel painting was painted directly inside a chapel and for that reason, the museum compensate by displaying a 1:1 reproduction print of the painting. The painting was too elaborate that they need to reproduce another print and cut it into a dozen pieces and had captions describing each portion. It was difficult to enjoy the piece as a whole and there was no service to accommodate visitor's questions. I start to understand why the demographic was leaning towards

elderly visitors, the exhibition was difficult to enjoy for people with lack of knowledge about the art and there are no new experience to attract younger demographics. According to Josaphine Bosma in Art as Experience ; Meet the Active Audience. 2006, "the best way to capture the attention of the audience is by showing hospitality, by creating playful and interesting spaces of engagement " (Bosma, 2006)

3.2. Survey

I conducted a survey of 28 who have at least visited one art exhibition in the past 6 months. Respondents range between the age of 20-44 years old. The goal of this survey was to understand their expectation and the reason visiting art exhibitions. They were asked 10 questions, about their experience in art exhibitions and they were exposed to 3 paintings then asked what aspect of these painting that they are interested in.

The following are the results of the survey:

Fig. 1 User's age question

Do you have formal education in visual arts? or occupation revolve around the art world?

Answered: 28   Skipped: 0

Answer Choices		Responses	
▾ Yes, in fine arts / art history / art critism / painting / multimedia etc		32.14%	9
▾ Well.... in film / design / crafts / fashion etc		35.71%	10
▾ No formal education, but I like making artworks		17.86%	5
▾ No formal education, but I enjoy looking at artworks		14.29%	4
▾ Other (please specify)	Responses	0.00%	0
Total			28

Fig.2 User's background question

19

How often do you visit an art museum / gallery?

Answered: 28   Skipped: 0

	1 - 2 times	3 - 5 times	5 - 10 times	10 - 15 times	15 > times	Total	Weighted Average
in 6 months	46.43% 13	21.43% 6	14.29% 4	3.57% 1	14.29% 4	28	2.18
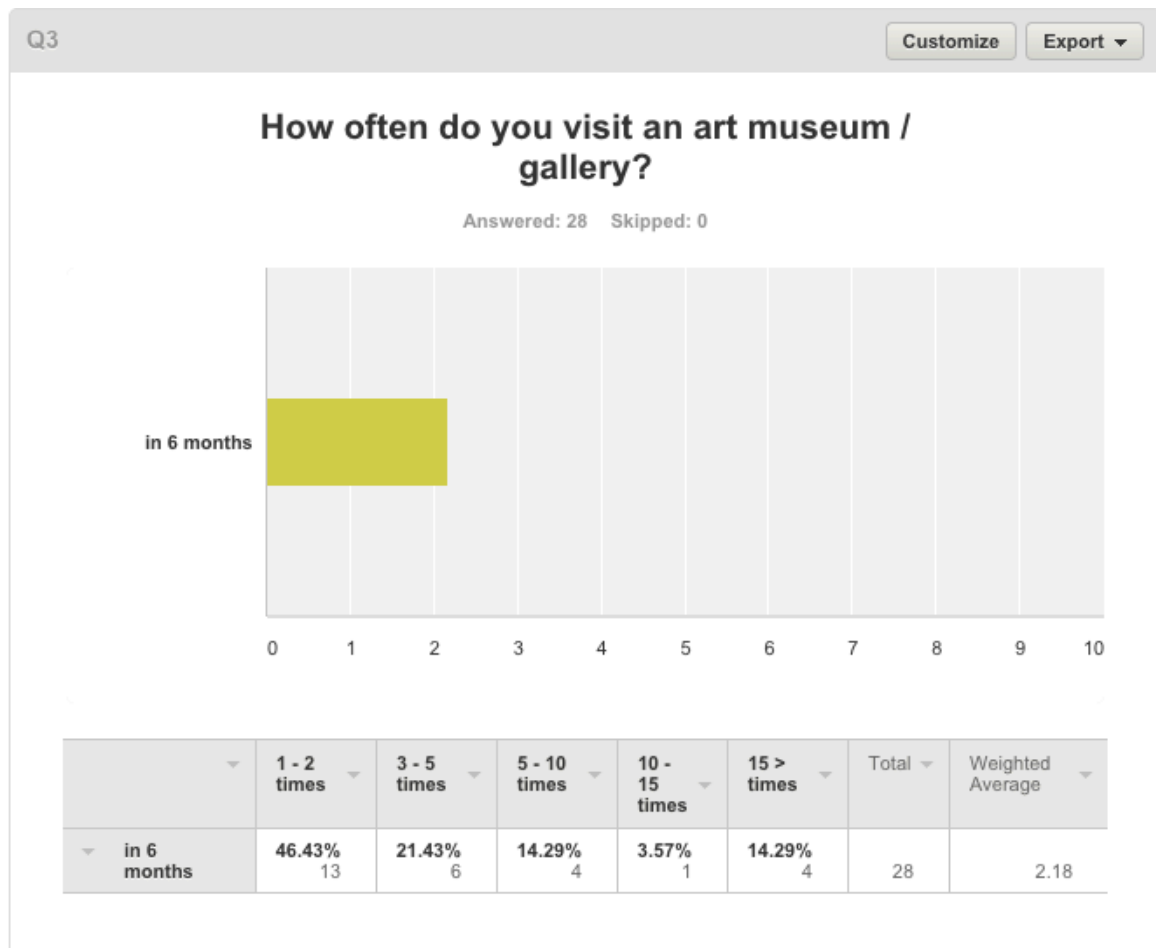
Fig. 3 Art exhibition visiting frequency

20

Customize Export ▾

Why do you visit art museums / galleries? (you can choose more than 1 and rank them)

Answered: 28   Skipped: 0

	1	2	3	4	5	Total	Score
I want to keep up with new art trends	27.27% 6	31.82% 7	18.18% 4	9.09% 2	13.64% 3	22	3.50
looking for inspiration	50.00% 12	41.67% 10	4.17% 1	4.17% 1	0.00% 0	24	4.38
just to enjoy beautiful things	25.00% 6	25.00% 6	37.50% 9	4.17% 1	8.33% 2	24	3.54
learn about history	0.00% 0	17.65% 3	17.65% 3	47.06% 8	17.65% 3	17	2.35
socialize	18.18% 4	4.55% 1	18.18% 4	27.27% 6	31.82% 7	22	2.50

Fig.4 Reason of visiting art exhibition

What do you think about the information system in most art museum / galleries, where informations about the artworks are typed then printed and posted on the wall or printed in pamphlets?

Answered: 28   Skipped: 0

Answer Choices		Responses	
▼	I take my time to read them all and it's a good way to explain to the audience	14.29%	4
▼	I just read briefly to understand the general idea	50.00%	14
▼	too lazy to read them all, i'll interpret the artwork myself	25.00%	7
▼	i dont care what the artworks mean, I'm here to enjoy the beautiful aspects of the works	7.14%	2
▼	Other (please specify) Responses	3.57%	1
Total			28

Fig.5 Current information system impression

Customize   Export ▼

Are you satisfied with this system?

Answered: 28   Skipped: 0

	Very satisfied	Satisfied	Neutral	Not really	I hate it	Total	Weighted Average
satisfaction	0.00% 0	14.29% 4	25.00% 7	60.71% 17	0.00% 0	28	3.46
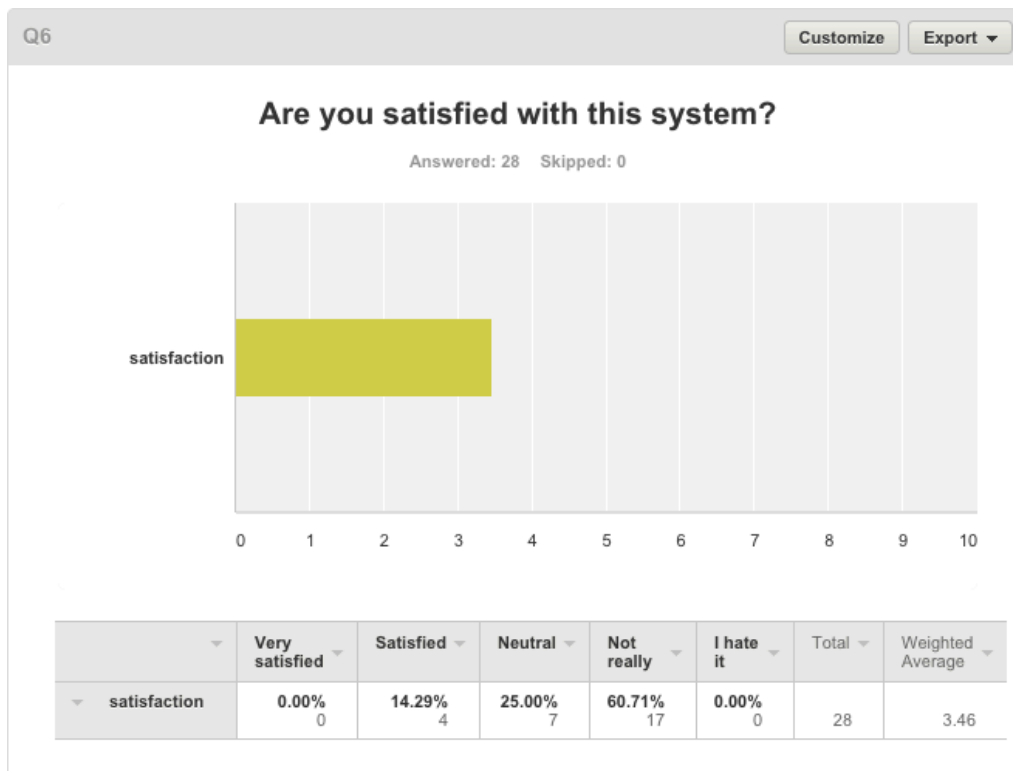
Fig.6 Current information system satisfaction

Customize   Export ▼

Will you be interested in an interactive tool that gives you the ability to choose what information you want to know about the artworks?

Answered: 27   Skipped: 1

Answer Choices	Responses	
Yes	100.00%	27
No	0.00%	0
Total		27

Fig. 7 Interactive tool interest

23

Q8 | Customize | Export ▾
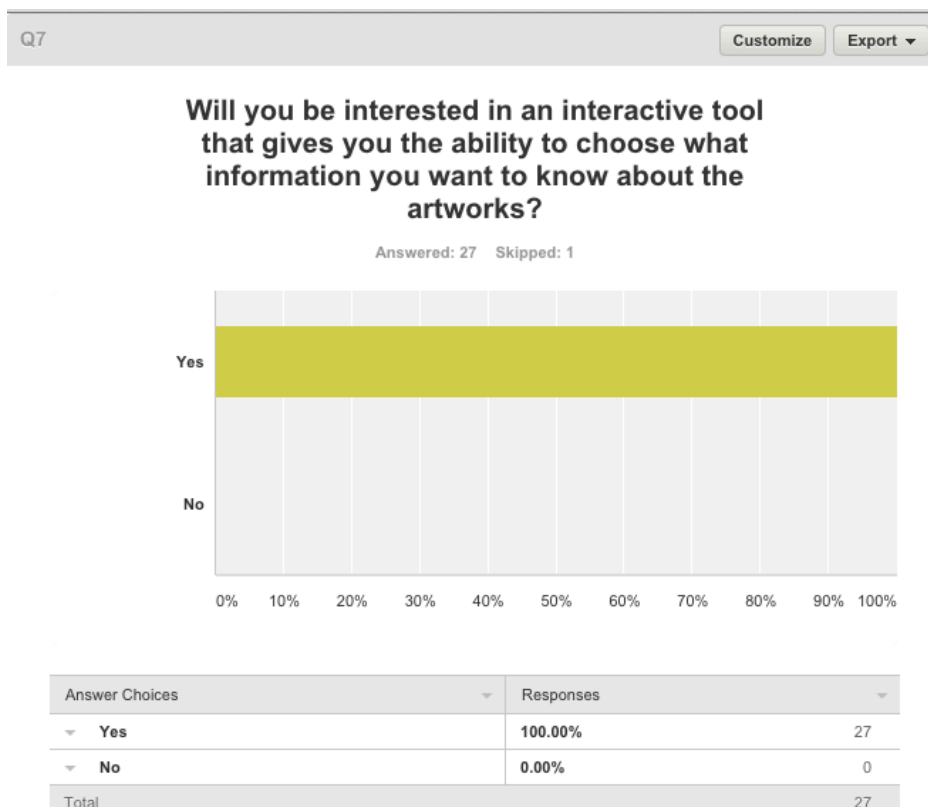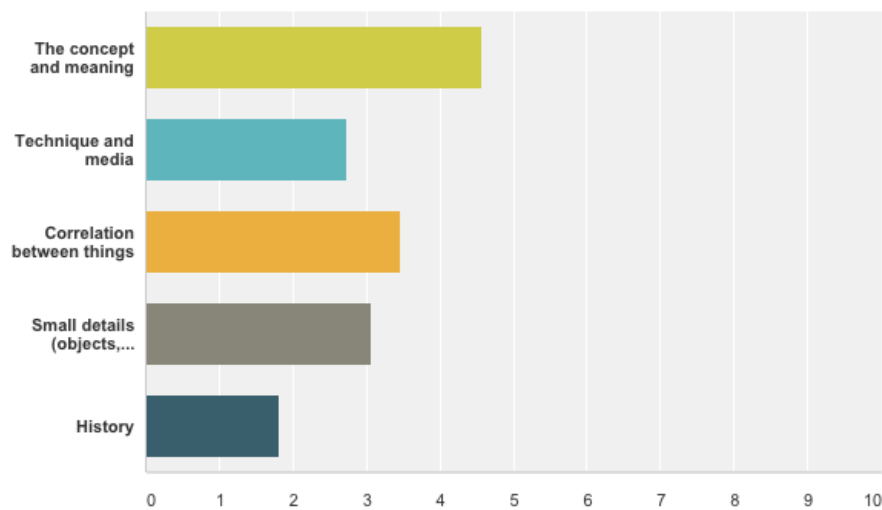
if you see this work in an art museum or gallery, what information would you like to know about? (you can choose more than 1 and rank them)

Answered: 28   Skipped: 0

	1	2	3	4	5	Total	Score
The concept and meaning	75.00% 21	14.29% 4	7.14% 2	0.00% 0	3.57% 1	28	4.57
Technique and media	10.53% 2	10.53% 2	36.84% 7	26.32% 5	15.79% 3	19	2.74
Correlation between things	4.17% 1	58.33% 14	20.83% 5	12.50% 3	4.17% 1	24	3.46
Small details (objects, person etc)	14.81% 4	25.93% 7	25.93% 7	18.52% 5	14.81% 4	27	3.07
History	0.00% 0	0.00% 0	25.00% 4	31.25% 5	43.75% 7	16	1.81

Fig.8 Kozyndan painting interest

24
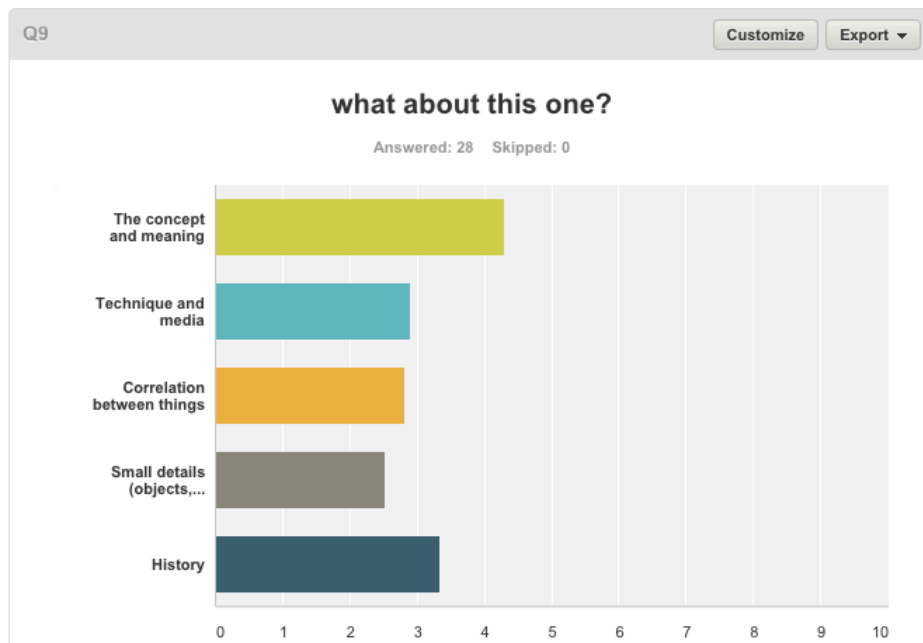
	1	2	3	4	5	Total	Score
The concept and meaning	55.56% 15	29.63% 8	7.41% 2	3.70% 1	3.70% 1	27	4.30
Technique and media	23.81% 5	9.52% 2	23.81% 5	19.05% 4	23.81% 5	21	2.90
Correlation between things	0.00% 0	22.73% 5	45.45% 10	22.73% 5	9.09% 2	22	2.82
Small details (objects, person etc)	4.00% 1	24.00% 6	12.00% 3	40.00% 10	20.00% 5	25	2.52
History	26.92% 7	26.92% 7	19.23% 5	7.69% 2	19.23% 5	26	3.35

Fig.9 Gunawan Kartaprana painting interest

25

and this one?

Answered: 28   Skipped: 0
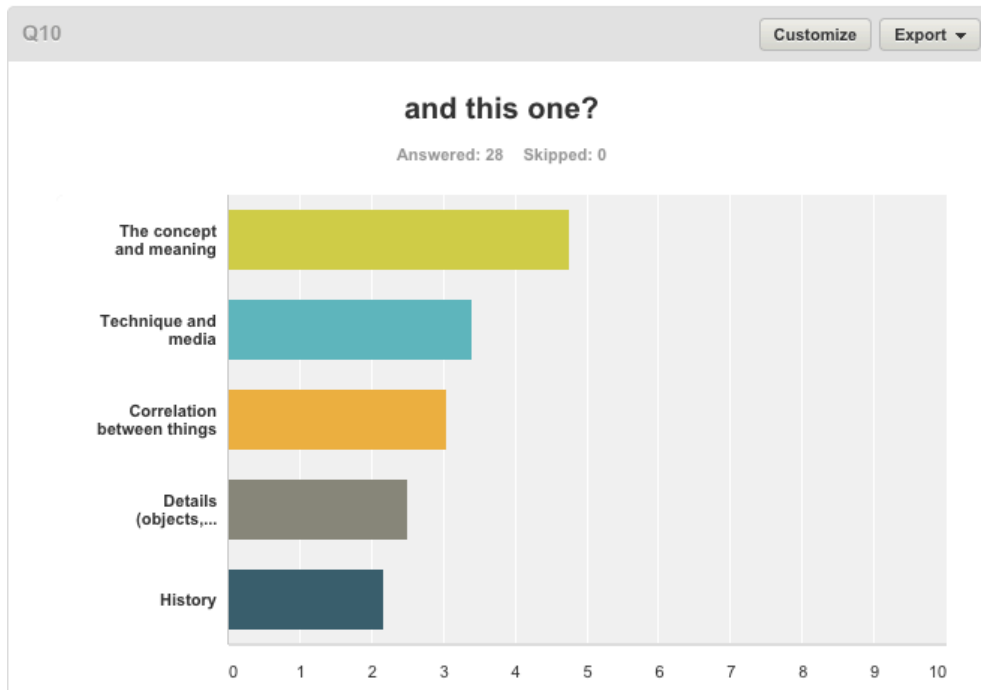
	1	2	3	4	5	Total	Score
The concept and meaning	82.14% 23	10.71% 3	7.14% 2	0.00% 0	0.00% 0	28	4.75
Technique and media	20.00% 4	30.00% 6	30.00% 6	10.00% 2	10.00% 2	20	3.40
Correlation between things	4.76% 1	23.81% 5	42.86% 9	28.57% 6	0.00% 0	21	3.05
Details (objects, shapes, colors etc)	0.00% 0	30.77% 8	11.54% 3	34.62% 9	23.08% 6	26	2.50
History	0.00% 0	22.73% 5	18.18% 4	13.64% 3	45.45% 10	22	2.18

Fig.10 Kandinsky painting interest

26

In the questionnaire, the respondents were showed 3 paintings with different styles, and were asked what aspects of the painting interest them and rank them. Those aspects were the concept of the painting, the technique or media, correlation between objects, details of objects, and the historical information. The results show that in all 3 paintings, the concept and meaning of the painting rank first. But for the second, third, fourth and fifth rank, each painting have different outcomes and they do not relate to the user's background. From that data, I was able to see that the interest points for a painting was subjective depending on the respondent's taste, knowledge and personal appreciation.

From both the field observation and the survey, I found similarities that made it possible to classify them into 3 groups.

1. Casual visitors: they come to art exhibition only for leisure, to look at beautiful objects for refreshments. They do not care much about deepening their knowledge about the artworks.
2. General concept: these people make up of the majority of the participants. They are interested in the whole concept of the artworks, but don't bother to know the small details inside the artworks.
3. Art enthusiasts: These people are interested in every single detail of the artworks, they do not mind spending plenty of time absorbing information they can get.

According to Dean, he generalizes museum visitors in three categories. The first category includes what he calls the "casual visitors": people who move through a gallery quickly and who do not become heavily involved in what they see. Casual visitors use some of their leisure time in museums but do not have a strong stimulus or motivation to deepen their knowledge about the objects on display. The second group, the "cursory visitors" show instead a more genuine interest in the museum experience and their collections. According to Dean, these visitors respond strongly to specific objects that stimulate their curiosity and wander through the gallery in

search of further such stimulus for a closer exploration of the targeted objects. They do not read every label nor absorb all available information, but will occasionally read and spend time in selected areas or with selected objects of interest they encounter in the galleries. The third group is a minority of visitors who thoroughly examine exhibitions with much more detail and attention. They are learners who will spend an abundance of time in galleries, read the text and labels, and closely examine the objects. Dean attributes differences between "people who rush", "people who stroll", and "people who study" to different prior experiences and educational level. Yet he states that it is important for museums to be equipped to communicate with and interest all visitors by scaling and designing an exhibit so that it offers entertainment to the "stroller" as well as an opportunity to deepen knowledge for the "learners" (Dean, 1994)

In order to attract all types of visitors, I must design a system that can satisfy their expectations and pleasantly surprise them with an interesting element.
A successful audience need to provide multiple experiences: aesthetic and emotional delight, celebration and learning, recreation and sociability (Kotler & Kotler, 2005)

3.3 User Test

To create this system, a user test is needed to determine what kind of interaction is applicable and can amplify the art viewing experience. I attempted to use a few devices including eye tracking device and infrared flashlights and came to a conclusion that they cannot fulfill I's objectives of the system. I then decided to user shadow interaction considering the users already know how to produce shadows using their hands and it is likely for them to feel a sense of embodiment because perceive shadows as an extension of their bodies. I set up a painting with a light projected on it. Users were asked which part of the painting they would like to know about and how would they inform that selection with just using their hand gesture and the shadow that is cast upon the painting. I them what gesture would feel natural to them if they wanted to interact with the painting.

From 10 respondents, I observed there are 2 most occurring gestures. First was pointing with the index finger at a certain area of the painting, and second is pinching like what they would do in a digital screen.

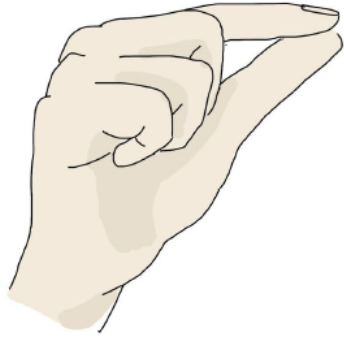*Fig.11 Participant producing hand shadow on the painting*
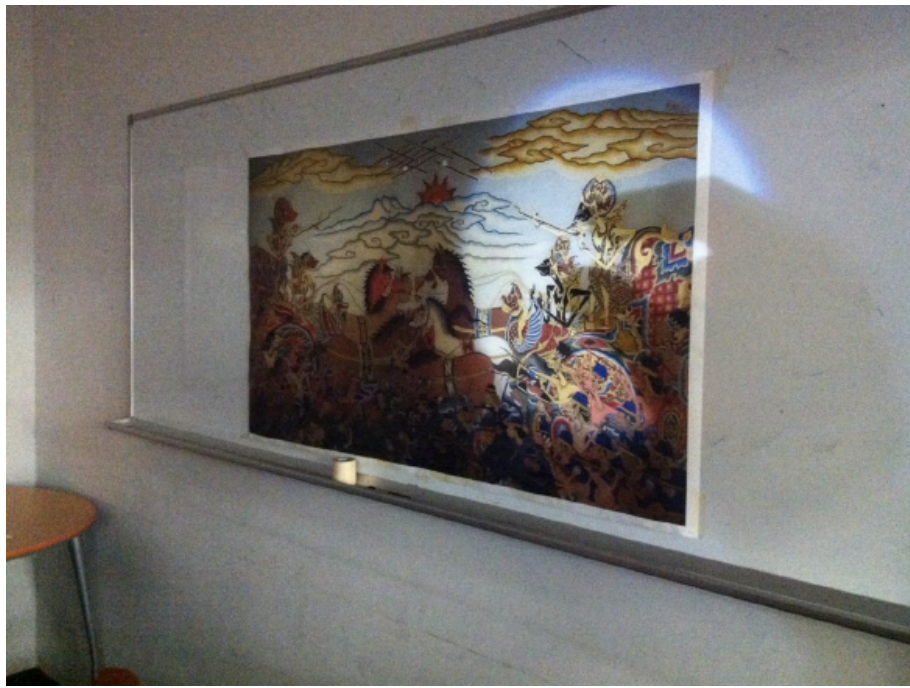
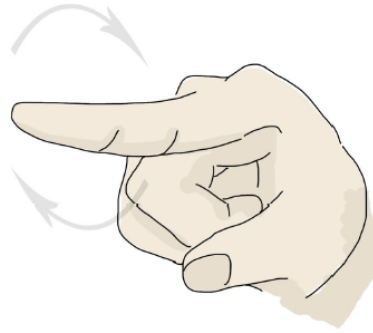*Fig. 12 Shadow produced by participant*

Fig. 13 Pinching gesture

Fig. 14 Pointing gesture

| Fig. 15 Pinching illustration | Fig. 16 Pointing illustration |

Establishment of hypothesis

From the investigation mentioned above, I was able to extract a number of important points:

1. The users expect interesting engagement to keep their interest and to stimulate them to explore more about the works.
2. The users may be able to appreciate the artwork if they have enough knowledge about the art.
3. To maximize the experience of art viewing, the user should be able to have intimate time with the art without distractions of other devices.
4. Most of the visitors prefer a time alone with the work.
5. The system should as easy as possible to use so the users are not intimidated and embarrassed to try.
6. When there is a potential value that they can acquire, the visitors are likely to stay and explore further.

Chapter 4 Amplified Art

In regards of the subjectivity of art mentioned in chapter 3, E.H Gombrich wrote a comprehensive book about the story of visual discoveries of art styles differ in different periods of time. He argues against the idea of mimesis as imitation, rejecting Ruskin's notion of the 'innocence of the eye'. He believed that and the idea that stylistic change in art is the result of changes in straightforward modes of seeing and sense impressions, Gombrich draws on the psychology of representation to show how stylistic change is rather dependent on the conceptual framework, the models and traditions in which the artist lives. In short, the perception of an individual towards art is subjective, so it is a challenge to get the artist's point across to the viewers, also to provide information of what the viewers find interesting. An information system may be needed to help the viewers understand the art in order to appreciate and enjoy.

For that reason, I designed Amplified art, an information system that allows audience to obtain custom information system about aspects of the artworks the users are interested in, while directly interacting with the art to amplify their experience and enjoyment.

4.1 System's Design

This is a system that amplifies the visitor's experience using visual and audio narration according to the visitor's interest. It offers a new type of entertaining and informative art exhibition experience without taking away the visitor's attention away from the actual artwork that is displayed by projecting the information directly onto the artwork. The visitors can choose what information they would like to see and hear by using their shadows as a pointing tool. By extracting handheld devices and wearable devices, I believe that it can give a better experience without distractions. This prototype was designed only for one user to create an intimate time with the painting and customized experience for the user.

In this prototype, I used a contemporary painting that was painted in a traditional Indonesian puppet style. This elaborate painting was by an artist named Gunawan Kartaprana in 2010, about the battle of Bharatayudha folklore that is assimilated with a historical story of modern Indonesia and the struggle to reclaim their land from the Dutch occupation. I decided to use this painting because it is very elaborate and difficult to understand that visitors would need some guidance to enjoy the artwork.

*Fig. 17 Painting by Gunawan Kartaprana, 2010*

4.2 The System

The system consists of: the user, the user's shadow, an Alienware laptop with Windows operating system, Windows Kinect gesture recognition device and a small Qumi Samsung projector. The gesture recognition device is placed under the painting facing the user, with 1,5 meters distance from the user, a good distance for the user to be able to look at the painting as a whole. To create this system, it will need 2 lights projected on the artwork. First is the projection mapping from the projector, second is the light source in order to cast a shadow for the shadow interaction. When these 2 lights are projected at the same time, it created too much light disturbance and for that reason, I decided to use the projector to serve both of

the tasks. The projector is 50cm to the right of the user so that the user will cast only the shadow of their hand and not their body. Because this prototype is intended only for one user, the distance of the projector with the user is quite near, therefore creating an environment that encourage one user setting.

I used Unity 3D software to design the interaction to project onto the artwork. The interface was designed so that the user can point at a certain points of the painting to acquire information. The Windows Kinect tracked the area where the tip of the user's index finger falls onto the painting. Next, trigger points were placed on that area to launch the information.

From the user test explained in chapter 3, there were 2 most occurring gestures that the users provided when asked to interact with the painting. The gestures were pointing with the index finger, and pinching gesture similar to using a touchscreen smartphone or tablet. After considering these 2 gestures, I chose to go along with the pointing gesture because it is simpler for the user to do and easier for the gesture recognition device (Windows Kinect) to recognize. When the shadow of the user's finger hover at any of these trigger points, these points light up to inform the user that it is interact-able. When they hover there for 3 seconds, the information of that specific object will be played in the form of projection mapping and audio.
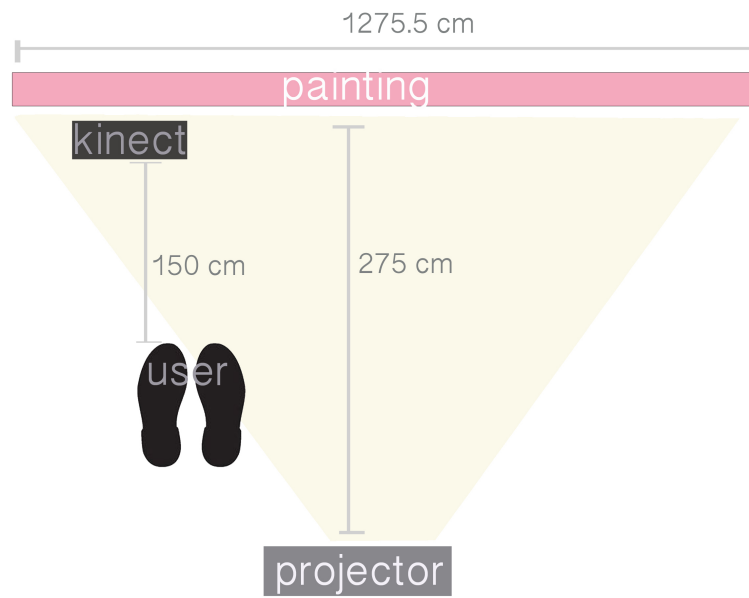
Fig.18 Setup illustration
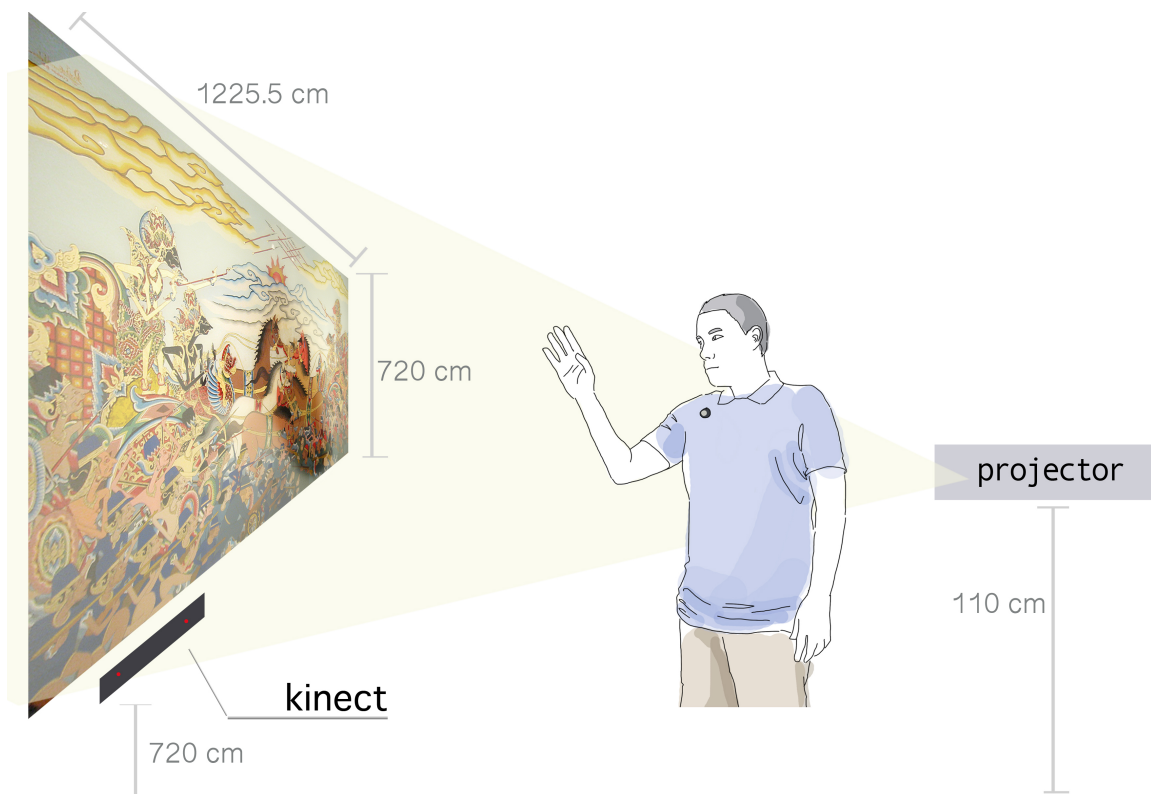
Fig.19 Amplified art illustration

In this prototype, there are 7 trigger points that can be chosen and can provide information in the form of an animation that will be projected to the painting. 3 of the trigger points are in the form of a signage located under the paintings, and 4 trigger points on objects on the painting itself.

These trigger points consist of :

1. General concept, that will explain about the overall brief concept of the painting.
2. Media, that will explain about what media and techniques were used to create this painting.
3. Artist, that will explain about who was the artist that created this painting and a brief information about the artist.
4. Objects and people in the painting, can tell the user what or who it is.
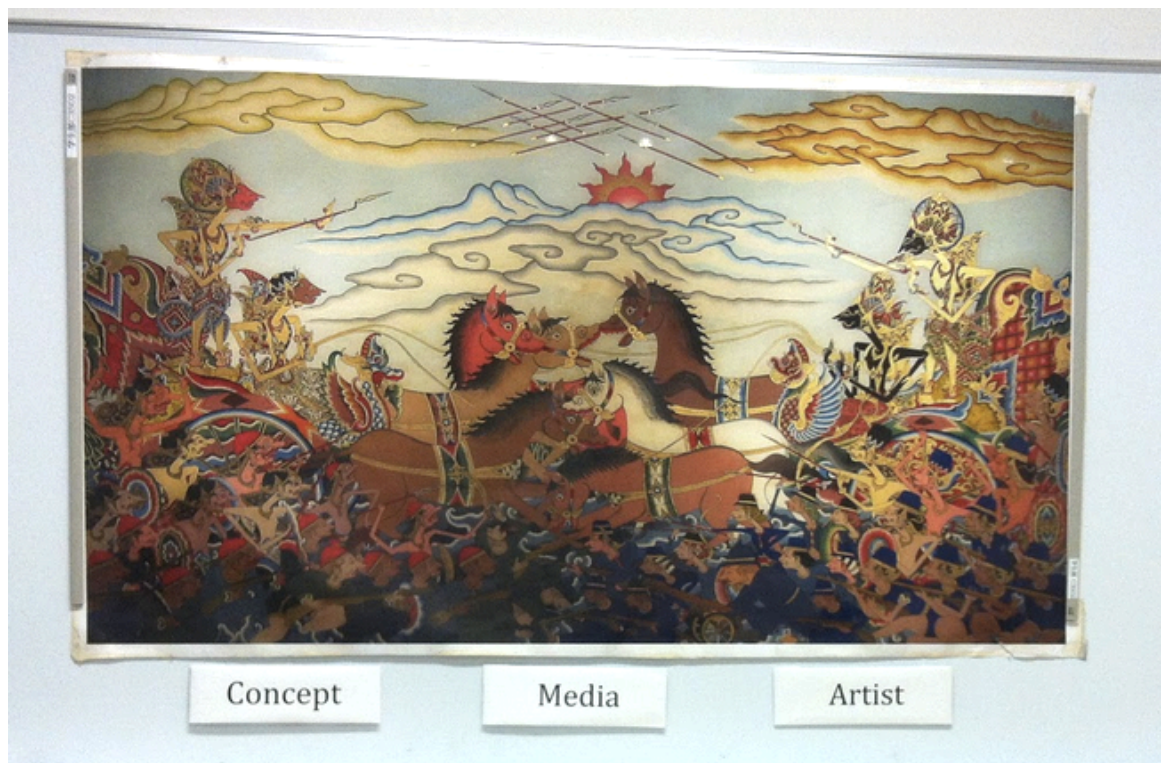
Fig.20 Signage under the painting

By hovering the user's index finger at any of these 7 trigger points for 3 seconds, the user can choose what information they would like to see and hear.

4.2.1. Shadow Interaction

I believe that using the user's own hand shadow as a tool would be an effective choice considering the users are already familiar with their own shadow because it is a daily life phenomenon when there is a light source and an object, therefore will feel natural and intuitive to the user. Because it feels like an extension of the user's body, it can act like a bridge between the digital and the physical world. There were two choices of using shadow interaction. The first one is using the user's real shadow and an artificial shadow created by the system. Both have their advantages and disadvantages. In this first prototype, I decided to use a real shadow for this system. The decision of using a real shadow over artificial shadow is that the user will have a stronger feeling of intuitiveness knowing the shadow they cast is truly an effect from their own body. The experience of one's own shadow interacting and able to give effect to the virtual world may result to an impression of wonderment, therefore making the device exciting to use. Another reason is, artificial shadow made by a program may experience lag that can reduce the quality of the user's experience. The advantages of using an artificial shadow are; the shadows can be customized, and there is no need to synchronize between shadow and the gesture-tracking device.

4.2.2 Projection mapping

Once the users choose a certain object or button, a video animation is then projected onto the painting using a projection mapping method. Projection Mapping uses everyday video projectors, but instead of projecting on a flat screen, light is mapped onto any surface, turning common objects of any 3D shape into interactive displays. More formally, projection mapping is "the display of an image on an arbitrarily complex surface". Projection mapping has many alternate names including the original academic term "spatial augmented reality" and "video mapping" (Jones). Projection mapping can be used for advertising, live concerts, theater, gaming, computing, decoration and anything else you can think of. Specialized software or

just some elbow grease can be used to align the virtual content and the physical objects.

Projection mapping or video mapping uses common entertainment technology in a new, innovative way. It is a technique that consists of projecting video images on buildings, façades, structures or nearly any kind of complex surface or 3D object to shatter the viewer's perception of perspective. The projector allows bending and highlighting any shape, line or space. It creates astonishing optical illusions, a suggestive play of light and turns a physical object into something else by changing its perception of form.

Projection mapping is quite new and it is flourishing nowadays. The reason of its success is that the public gets somehow emotionally involved in the show. It is not just "another cool visualization", but it is surprising and exciting and involves physical as well as virtual space.

Using projection mapping method, the information of the artwork is projected onto the actual art. The motivation for using projection mapping is so that the users can feel focused on the artwork without the shift of attention to another device for example an audio guide, tablets, smartphones or other information devices. Because the animation is customizable, it can be tailor-made to fit the theme and goal of the exhibition. It can be a calm soft spotlight to highlight certain points of the artwork, and it can be designed to be dynamic and lively animation.

4.2.3 Information Content

In this prototype, the system provides 7 video animations that explains different aspects of the painting. The users may choose to know about the concept, media, artist information, and 4 details inside the picture by just hovering their index finger at the desired area for three seconds. The design of the animation was a simple spotlight directed at the object that is being explained by the audio information. It is made as simple as possible to avoid the feeling of disrupting the painting.

Below are the details of the animation that the users can choose from:

1. Concept.

When the users touch the "Concept" button under the painting, an animation is projected to explain about the general story of the painting. Indonesian folklore story of Bharatayudha battle and the history of modern Indonesia, and their struggle to reclaim their land from the Dutch occupation. The animation shows how these 2 events correlates with each other.

Fig.21 Concept animation

2. Media.

When the "Media" button is touched, the animation explains that the painting is a contemporary painting but painted in the manner of a traditional Indonesian shadow puppet style. The animation also showed pictures of Indonesian shadow puppets on the right side of the painting.

Fig. 22 Media animation

3. Artist.

When the "Artist" button is touched, an animation appears to explain about the artist's biography and his achievements in the art world. The picture of the artist, is shown on the right side of the painting along with his other works.

Fig.23 Artist animation

4.   Details.

There are details in the painting where the users can touch. In this prototype there are four which are the main characters of this story Arjuna, Kresna, Karna and Salya the animation explains who they are and how significant these characters are to the story.

Fig.24 Details of the painting animation

Chapter 5 Experimental Evaluation

In this chapter the author will test the prototype, to confirm the effectiveness of the system and what features need to be corrected or discarded. Observing the user's feedback and impression when using Amplified Art. When the experiment is completed, there will be a discussion regarding what works and what doesn't, this can be a base to explore further regarding shadow interactions and projection mapping in the future.

5.1 Prototype experiment

There were 19 people who participated in the experiment from the age of 21 – 36 years old with diverse background. They were asked to stand in front of the artwork and to enjoy the artwork while listening to an audio explanation about the general concept of the work, a common information system used in art exhibitions. After that, they were asked to enjoy the artwork while using the Amplified Art system, giving them the exact same content as the audio guide. Without explaining to them the goal of this system, they were asked to stand at the determined spot, and play around and explore the system themselves.

Fig.25 User choosing an information about a detail of the painting

Fig. 26 User choosing information about the artist's biography

Fig. 27 User listening to the audio explanation

Fig. 28 User browsing her finger around the painting

After the experiment, they were asked about the experience only using the audio guides and compare it to the Amplified Art. Then, given a questionnaire consisting of 7 questions. They were asked to write down their experience and comments in their own words, the author held short interview to break down what they have written.

5.2. Experiment Result

Out of 19 people, only 1 person actually listened the audio guide properly. 4 people admits they never take an audio guide in a real art exhibition and did not make an effort to listen. The rest lost interest on the explanation after a few seconds. On contrary, when using the Amplified Art system, their focused narrowed and actually listened to the explanation, curiosity rose, and they understand better about the artwork.

The users reacted enthusiastically to the system and were quite surprised by the shadow interaction. Most of the users were intrigued by the fact that their own actual shadow can affect a digital object, and a few mentioned having the feeling of owning superpowers. This impression made the users excited to explore what can

they do with this system. At first they hovered their hand shadow across the painting to see which points are interact able, and then immediately began playing the system, trying every possible trigger one by one. The users seem to get more and more confident and comfortable using their shadow after selecting the second information. Generally, the system worked smoothly when the user stand exactly in a determined position or else their shadow and the gesture-tracking device would not match.

The following are the results of the experiment and interview.

Q1	How often do you visit art exhibitions in a year?	# people
	More than 12 times	2
	6 times	3
	3 times	7
	once	4
	Less than once	3

Q2	Does your background have something to do with art?	
	Yes, formal education in art/ I am in the art field	4
	Creative or design education / profession	5
	No creative background but confident in my knowledge in art	4
	No creative background, know nothing about art	6

Q3	How was the general experience of the system?	
	"Interesting "	8
	"I liked interacting with the actual painting"	6
	"I liked having control over which information I want"	4
	"I liked the interaction more than the painting itself"	1

Q4	Was it engaging?	
	"Yes it was fun and enjoyable"	9

	"I became more curious about the artwork"	2
	"Nicely surprised"	5
	"I want to stay longer looking at the artwork"	2
	"It was effortless and easy"	4
	"It was difficult to control"	2

Q5	Do you like interaction using physical based interactions?	
	"I liked the illusion of touching the artworks"	6
	"Merging physical and virtual was brilliant"	3
	"I felt like having superpowers"	3
	"I feel awkward when doing movements in front of other people"	2
	"Physical interaction creates engagement"	4
	"Skeptical about the limitations in the real environment"	2

Q4	Was the system effective for providing you with information?	
	"Yes, I felt focused on the artwork"	4
	"The animation made it easier to understand"	5
	"Yes, it was effective"	9
	"Interesting, but not enough to entertain"	1

| Q5	Which do you prefer? Conventional information systems or this system?	
	"This system is better"	8
	"Both, depending the type of artworks"	2
	"Conventional systems do nothing to hold my attention"	5
	"Never bothered to pick up audio guides"	3
	"It's 2015, we expect to be engaged in creative ways"	1

Q6	What do you think of using shadow to interact?	
	"Intuitive"	9
	"Obscuring with the exhibit"	1

"Quite new"		1
"Creative"		2
"I liked not having to carry or wear devices"		4
"I had to figure out how to use the first minute"		1
"I don't need the shadow, maybe just a cursor is enough"		1

Q7	Critics and suggestions?	
	"Make the animation more dynamic"	1
	"Add music or audio effects"	1
	"The room was too dark"	3
	"Multiple users maybe interesting"	2
	"Improve precision"	1

Table 1. Questionnaire and interview results

As shown on the table above, we can understand the user's impression of using Amplified Art system. There are a total of 72 positive comments (87.8%), and 10 negative comments (12%).
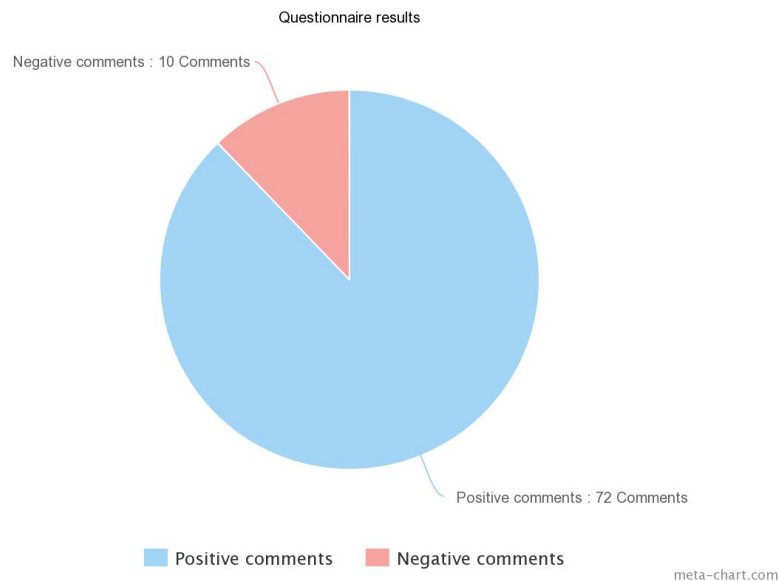
Fig 29. Positive and negative comment comparison pie chart

5.3 Discussion

The overall impression towards the system was the users felt engaged to play with the system and are interested to learn more about the meaning of the art that was displayed. The users felt an increase of appreciation towards the artwork substantially because they have a better understanding about the painting.

Art is one of the most subjective perceptual experiences and perhaps, this unique and highly variable personal experience what makes art so attractive. Personal taste and knowledge plays a great role in art appreciation. And for that reason, this system was designed for one user only. Creating an intimate time with the artworks where an individual can interact depending on their personal selection.

Each user generally take about 2-3 minutes on the system, it can be said that the experience of looking at a painting is similar to enjoying an interactive video art where the audience may have a nominal or compulsory duration. This compulsory duration can serve both as a benefit and a problem in a real environment because the users do have an intimate time to focus and enjoy the artworks without being interrupted but the system is intended for one user only that will effect time limitation. All experiment participants decides to stop because they ran out of objects to choose, not because of boredom, which is a good sign that they are still interested to explore further.

The user have to stand exactly in a determined position or else their shadow and the gesture tracking device would not match, but when they are standing at the correct spot, the system worked smoothly. This can be a problem when the system is placed in a real art exhibition environment because museum staffs need to be present to guide the users.

Another problem that the system encountered was using projection mapping, the light condition must be stable and quite dim which can make the visitors feel uncomfortable and have difficulty in seeing the actual painting. This problem have a

potential to defy the main purpose of building this system which is to amplify the experience of enjoying the artwork. Limited to indoor exhibitions because of the need for a stable light condition for the projection to be visible.

There is also concern toward the destructive effects of the projection light being projected on the artwork. According to a number of artwork preservation researches, generally any light can lead to deteriorating of an artwork. Visible light has a generally slow effect, whereas invisible light such as ultraviolet and infrared light can destroy an artwork in a relatively fast pace. For now this problem has no solution besides locking the artwork in an air tight, dark container. Amplified Art's light projection is customizable, the light intensity can be changed according to the condition of the artwork. The brightness of the light can toned down mimicking a soft spotlight in an art exhibition and can also be turned up when needed to be.

At this moment, this first prototype of Amplified Art may not replace current information systems in art exhibitions due to a number of reasons, for example the possible destructive effect of the light, the artists might not welcome the idea of an animation projected to their artwork, and other technical difficulties. But Amplified Art is possible to serve as an additional interactive activity that is implemented on a replica next to the authentic art, and become an interest point in an art exhibition.

Chapter 6 Conclusion and Future Studies

6.1. Conclusion

This thesis focused on formulating the concept, designing the system and creating a prototype. The author has observed museums and conducted a survey to understand what the visitors expect in an art exhibition, and from those findings formulated a base to design the system. The author introduced a system based on shadow interaction and projection mapping and believes that this interface can amplify the audience's experience and appreciation of an artwork. It provides a customized-information according to the audience's preferences and knowledge in an engaging way. The author has demonstrated that shadow interaction can be a choice of interaction that is interesting and engaging. A working prototype of the system was built and tested by subjects from diverse backgrounds in a room that simulates an art exhibition.

The author has demonstrated that shadow interaction can be a choice of interaction that is interesting although it has a number of problems that needs to be fixed. The prototype was tested, and was proven to be achieving the goals and proving the hypothesis, although the effectiveness in a real art exhibition environment could not be determined because it was never tested in a real art exhibition.

6.2. Future Studies

By using projection mapping as an outcome, it may be possible to be implemented not just for 2-dimensional artworks, but also on 3-dimensional works such as sculptures and because the nature of projection mapping has the ability to be applied on 3-dimensional surfaces.

The author believes that this shadow interaction combined with projection mapping system have a lot of potential to be explored further and can be applied in other areas besides art viewing.

 The possible applications include:
- Advertising, such as digital signage, interactions in shop windows or product launching campaigns.
- Entertainment, interactive activities in theme parks, exhibitions, and more.
- Public information systems.
- Educational purposes, an interesting tool for presentation.
- Media art

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Appendix

A.1. Survey Questionnaire

1. What is your age?

SurveyMonkey Certified

○ 18 to 24

○ 25 to 34

○ 35 to 44

○ 45 to 54

○ 55 to 64

○ 65 to 74

○ 75 or older

2. Do you have formal education in visual arts? or occupation revolve around the art world?

○ Yes, in fine arts / art history / art critism / painting / multimedia etc

○ Well.... in film / design / crafts / fashion etc

○ No formal education, but I like making artworks

○ No formal education, but I enjoy looking at artworks

○ Other (please specify)

[   ]

3. How often do you visit an art museum / gallery?

	1 - 2 times	3 - 5 times	5 - 10 times	10 - 15 times	15 > times
in 6 months	○	○	○	○	○

4. Why do you visit art museums / galleries? (you can choose more than 1 and rank them)

⇅	I want to keep up with new art trends
⇅	looking for inspiration
⇅	just to enjoy beautiful things
⇅	learn about history
⇅	socialize

5. What do you think about the information system in most art museum / galleries, where informations about the artworks are typed then printed and posted on the wall or printed in pamphlets?

○ I take my time to read them all and it's a good way to explain to the audience

○ I just read briefly to understand the general idea

○ too lazy to read them all, i'll interpret the artwork myself

○ i dont care what the artworks mean, I'm here to enjoy the beautiful aspects of the works

○ Other (please specify)

[   ]

6. Are you satisfied with this system?

	Very satisfied	Satisfied	Neutral	Not really	I hate it
satisfaction	○	○	○	○	○

7. Will you be interested in an interactive tool that gives you the ability to choose what information you want to know about the artworks?

○ Yes

○ No

8.

if you see this work in an art museum or gallery, what information would you like to know about?
(you can choose more than 1 and rank them)

⇕	The concept and meaning

⇕	Technique and media

⇕	Correlation between things

⇕	Small details (objects, person etc)

⇕	History

9.

what about this one?

⬍	The concept and meaning
⬍	Technique and media
⬍	Correlation between things
⬍	Small details (objects, person etc)
⬍	History

%2fG9%2bUcNiA1fjQDlvkKpNBBpCs%3d#
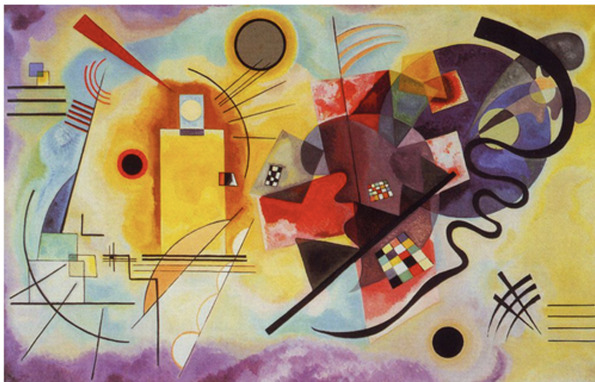
10.

and this one?

⬍	The concept and meaning
⬍	Technique and media
⬍	Correlation between things
⬍	Details (objects, shapes, colors etc)
⬍	History

A.2 Experiment Questionnaire

Amplified Art Survey

1. How often do you visit art exhibitions in a year
1. More than 12x
2. 10x
3. 6x
4. 3x
5. 1x
6. <1x

2. Does have your background have something to do with art?

1. Yes, formal education in art / I am a professional artist
2. Creative and design education / profession
3. No creative background but is confident in my knowledge in art
4. No creative background, know nothing about art, but they are pretty

II.
Draw a line to answer.

Example
        Bad   Excellent
          1 --------------- 2 --------------- 3 --------------- 4--------------- 5

1. How was the general experience of the system?

        Bad   Excellent
          1 --------------- 2 --------------- 3 --------------- 4--------------- 5

why :

2. Was it engaging?

        Bad   Excellent
          1 --------------- 2 --------------- 3 --------------- 4--------------- 5

Why :

3. Do you like physical based interaction systems?

            Bad   Excellent

1 --------------- 2 --------------- 3 --------------- 4--------------- 5

why :

4. Was the system effective for providing you with information about the art?

          No   Yes

1 --------------- 2 --------------- 3 --------------- 4--------------- 5

why :

5. Which do you prefer? Conventional information systems such as audio guides or this amplified art?

Conventional systems   Amplified Art

1 --------------- 2 --------------- 3 --------------- 4--------------- 5

Why :

6.What do you think of using your own shadow as a tool?

            Bad   Excellent

1 --------------- 2 --------------- 3 --------------- 4--------------- 5

why :