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### Human Behavior centered Museum Guided Tour System

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# **Human Behavior centered Museum Guided Tour System**

Yenmin Chen

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School of Design

MFA Industrial Design

Rochester Institute of Technology

College of Imaging Arts and Sciences

Rochester, New York

September 2008

Human Behavior-Centered Museum Guided Tour System

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MFA Industrial Design

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2/9/13

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## Abstract

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As new technologies appear, many devices or tools become more and more powerful. New technology also gives us more options to choose from in our daily lives, not only in ways used for school, but also with the devices used to surf the Internet. Certainly, we have more variety available in the various aspects of our lives, such as entertainment, education, work etc.—but new technology brings with it more problems, too. If new technology doesn't come with new thinking, life may not be better than before.

Some designers focus on human factors too much; they forget to consider how people connect in this world. Hence, a lot of products on the market are convenient to use, but not effective, or they are easy to learn, but not easy to use to complete the work.

This project redesigns an electronic museum guide device through human-behavior design theory.

# Introduction

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## **Background**

As digital technology is growing, there are many tools that are becoming more powerful. Not only the computer, but also other new technologies and products have increasingly different functions. New technology gives us more options with entertainment, education and work. In other words, we could formerly reach one goal requiring many steps, but we can now reach many goals at one time with one step.

## **Problem**

Although we can now do many works by powerful computer at one time, sometimes it means that we may have to deal with a significant problem, such as an unsuitable user interface and too much information.

## Introduction

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### **Why do we have so many unsuitable user interfaces?**

Some user interface designs focus on human-centered and display design, but rarely focus on human behavior, also called “human action.” One command, or target, can be accomplished using various methods, or actions under different types of situations and environments, but some interface designers restrict themselves in a limited hardware design, like keyboard and mouse. They does not notice that there are still a lot of types of human behavior can be considered as an “interface”.

### **Where is the creative interface?**

If designing an interface focuses too much on the human-centered concept and content, the user interface may have some weaknesses. Focusing too much on human-centered concepts and content ignores differences in human behavior. In other words, a specific command may require several steps. It means there may be better methods that a designer has not yet explored, or the ways the designer chooses may simply not be good enough.

## Introduction

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Sometimes human-centered concept put too much enthusiasm on a reasonable relation between human and computer. It's a good strategy I can say, but the human behavior is the "relation" between human and computer. If we missed the research of human behavior, the design may not have too much humanity.

### **Too deep?**

What does "deep" mean? The "depth" of the menu means the number of the "clicks" or "layers." Focusing too much on the menu design, or system design, will sometimes lead to some defects. Too many functions may require a great number of elements (such as icons, buttons, and so on), or commands, and the result of this is a too-deep menu. Too many layers result in a lot of "next step" or "back" actions. If a user executes an incorrect operation, he will be asked to cancel it and redo all of them.

### **Objective**

This project designs a digital museum tour guide device through human-behavior design theory.



# Introduction

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## **Technology**

Image recognition system:

An image recognition system includes a database system and hardware device. A database of reference images is first generated and stored, then each identified image took by the hardware device, or test image, is compared to the images stored in the library until a match is found. The database server is screened for possible matches by comparing the factors for the test image to the descriptors in the reference images in the database. After screening, the possible result will send back to hardware device.

Indoor position system:

An indoor positioning system is a term used for devices used to wirelessly locate objects or people inside a building. Any wireless technology can be used for locating, like Wi-Fi, RFID, and so on. Instead of using satellites, because satellite's microwaves will be attenuated and scattered by roofs, and walls, Global navigation satellite systems are not suitable to establish indoor location.

# Human behavior design

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## **Why human-behavior design?**

Do you ever notice that some non-human-centered design objects are not so successful in the market? I believe the reason is that “the object doesn’t realize the behavior which the user did.” In other words, a human-centered design object may not realize the relationship between the user and the user’s activity, but, no doubt, it can realize the relation between the user and a machine.

In the past, there have been numerous examples of a successful object coming from a good design strategy with human-centered design. Users really need a friendly-learning tool, including the software interface, to operate successfully. Even though the use of a tool may be easy to learn, its multi-function capabilities can often create additional problems.

Why do people feel uncomfortable working with new tools? It is because most people feel uncomfortable working with a tool that is too complex or unlike an old tool they are familiar with. For example, a simple tool would be a screwdriver or a typewriter, even a word processing program. Most people do not feel uncomfortable learning to use a typewriter because its function is simple. A more complex

## Human behavior design

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tool might be Microsoft Word. When the function is not too complex, the user will not feel any difficulty operating it if they already learned it well.

In fact, with growing technology today, it is impossible for a device, or a tool, to have only one target. I use “target” instead of “function” here, because a typewriter has one function—to type—and one target—to finish—whereas a word processing program has numerous functions for typing, drawing, layout and so on, and one target—to finish—. When users need more functions with the tool, they will feel “it doesn’t fit me”, if the functions are more powerful than the user need. In other words, the device only comes with a well-designed human-centered design strategy, sometimes it shows well-designed and powerful interface but not simple and suitable options. Hence, how to design an object that really fit the user are more important than just being easy to learn it. For example, if Microsoft Word was designed using a human-behavior model, it might be learned more quickly as well as being user-friendly.

## Human behavior design

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How an object likes that be designed? The first step is to understand the behavior of the user. As the interface is a connection, or language, between a tool and its user, behavior is a connection between the user's goal and the user. For this reason, I believe human-behavior design is more important than human-centered design.

### **What's the difference between human-behavior design and human-centered design?**

Human-behavior design is very similar to human-centered design. What's the difference between them? I believe that there is only one difference: the Activity.

A basic rule of human-centered design is to listen to users, to analyze their problems, to understand the human factors involved, and develop a solution. Indeed, in human-behavior design, though listening to users is an important factor, the most important factor is to observe the users, to analyze the environment, and to record all the types of activities they did. Through this method, the tool's function reveals what the needs of the user are and responds the activities of the

user. If an interface developed with this method, the user can learn how to use this interface not only naturally, but also through their experience.

How is it that the user can operate a human-behavior designed tool by their experience? It is because human behavior results from their knowledge, life style and experience. If we build a tool by observing the users, analyzing the environment, and recording and researching their activities, the users wouldn't feel uncomfortable using it. We can say the learning process has a type of activity-centered nature.

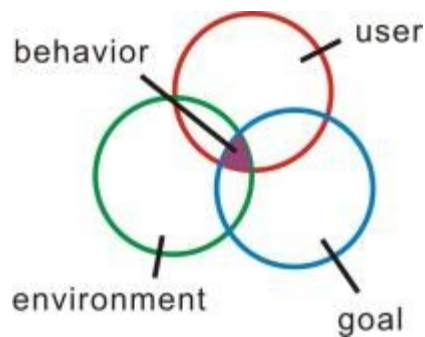


Figure 1 the relationship of behavior

## Research

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### **Visitors in the museum.**

In order to understand a user's activities in the museum, the first step is to observe what the visitor's target in the museum is.

### **Why do people visit museums?**

"The overwhelming reason given for visiting museums is for some type of learning experience, usually described as 'education', 'getting information', 'expanding knowledge', doing something 'worthwhile', and even directly as 'learning', which is often linked to higher-order fulfilment of personal needs and enhancing self esteem." (Lynda Kelly, Head, Australian Museum Audience Research Centre, April 2001, DEVELOPING A MODEL OF MUSEUM VISITING)

Describe it simply, visitors to a museum have four kinds of psychological experiences.

"To learn", "to experience", "to feel", and "others".

## Research

---

### **Visitors who want to learn something.**

This kind of visitor visits the museum with a clear target, and knows what they will find in the museum; especially if they studied some related information before starting their tour. They expect or plan a specific goal. For these visitors, their major activity is searching and learning, and a significantly different activity is asking for help. They like to learn information not only from a tour guide book but also from a docent.

### **Visitors who want to experience it.**

This group is very like the visitors who want to learn something, but their most important factor is to participate. If the “learning” visitors want to acquire knowledge, the “experience” visitors’ goal is to become more familiar with content with which they are unfamiliar. Satisfying their curiosity is their main objective.

## Research

---

### **Visitors who want to feel it.**

The modern museum is unlike a traditional museum.

The modern museum not only provides knowledge but sometimes provides the surrounding feeling to the visitor. What is the surrounding feeling meant for? In other word, it is atmosphere. The atmosphere can help the visitors enjoy the museum. This group likes to experience the museum as a life style. Hence, the most activity they do is enjoying the space in the museum, relaxing in the space, and places his mind in that atmosphere.

### **Visitors as others**

These visitors may or may not have a specific purpose for visiting. They may visit as part of a family activity, or at the invitation of a friend.



## Research

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### **Space in the museum**

There are some typical functional spaces in museums.

#### **Entrance**

All museums have an entrance; some of them have a bulletin board showing information about the current show in the museum.

#### **Information desk**

A visitor can get all kinds of help here.

#### **Lobby**

A major space after the entrance, it connects each space and floor.

#### **Atrium & passage**

We don't find this space in an old-style museum, because it was not necessary. In modern museum design theory, this space is important, and seen as a "breathing" space. Because the museum has become multi-functional and numerous contents are placed in a limited space in the museum, the visitor may feel exhausted from being subjected to so much knowledge and information.

## Research

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### **Theatre, gallery, interactive showroom**

They are different kinds of show room. Theatre showroom holds the show about movies or Theater performances; gallery showroom holds the show of painting, sculpture, and so on. Interactive showroom usually keeps a big empty space for artist needing. They can do anything in that space to create a relation between the visitor and works of art.

### **Store**

Visitor can buy a lot of kinds of scholarly publications, printed pictures, and three-dimensional reproductions of art objects here.

# Design development

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## Visitor's behavior in the museum.

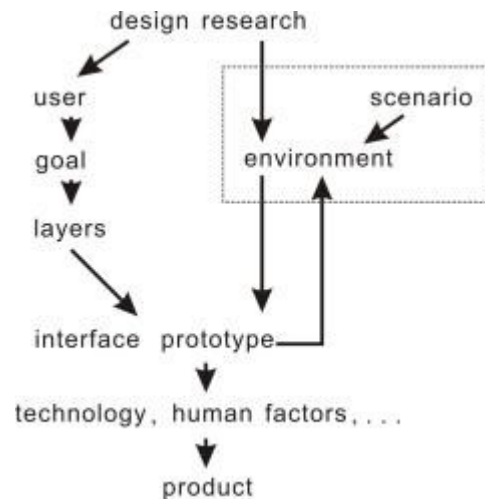


Figure 2 a chart of a human behavior design process

Defining the “activity” is the first task.

After the basic design research, such as the image recognition system, indoor position system, etc., I analyzed the user’s goal in different layers (museum space). At the same time, I developed some operating methods (control types of the hardware design) by processing a scenario design in a specific environment. Then, the design prototype developed with all the human behavior research, and the hardware design procedure. After the prototype being born, the Designer tests the prototype by different scenario to see how it work and correct it.

## Design development

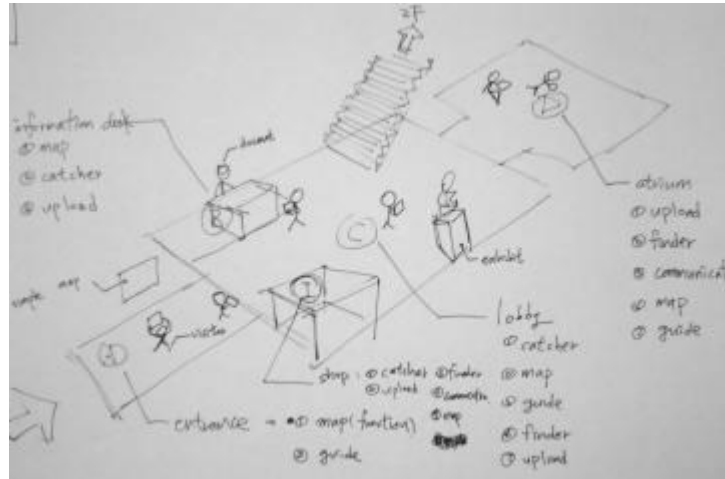


Figure 3

There are some museum spaces illustrated in figure 3, including the entrance, information desk, lobby, gift shop, atrium, and an exhibit.

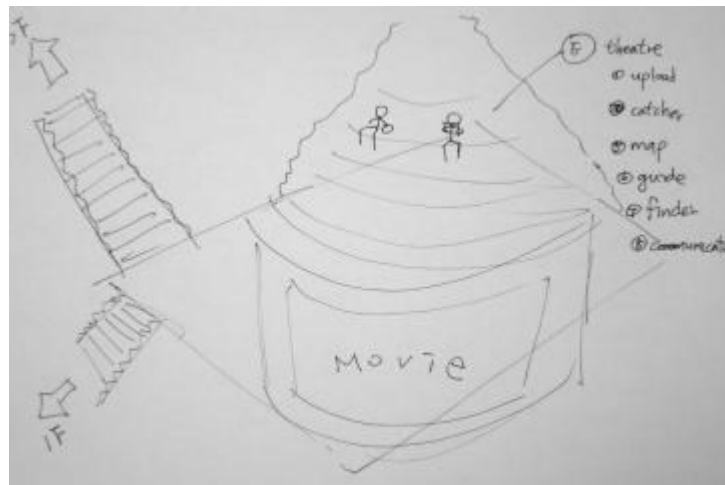


Figure 4

Spaces illustrated in figure 4 include a theatre and an interactive show room.

## Design development

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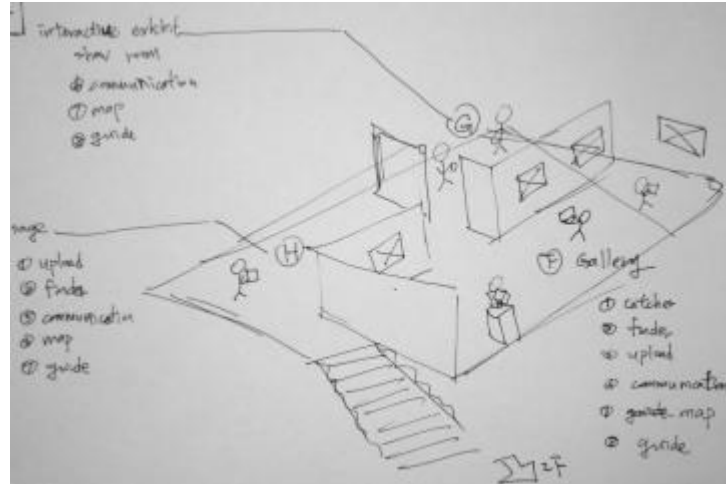


Figure 5

Spaces in figure 5 include a gallery interactive show room, and a passage.

## Design development

---

According to the four types of psychological experiences of the user in these spaces, I recorded and analyzed all kinds of information-seeking activities here. Then, those activities are systemized and listed below.

- a. Map (layout of the museum)
- b. Position (where I am within the map)
- c. Guide (where my objective is)
- d. Exhibition (what it is)
- e. Information (what it is)
- f. Direction (how to get there)

The most important is that each behavior acts in different space; we need to make each behavior more clear and independent to other behaviors. How to make them more clear and independent? First, make sure what the object is. Even the same behavior, they still have different object. Like finding a restroom is different from finding a gallery. In this case, the result of these two actions should show in different user interface, and content. It also means different spaces will have different interface and content in this museum guide system.

These activities can be organized into two groups.

- a. Search (information, exhibition)
- b. Find (map, guide, position, direction)

## Design development

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### **How do behaviors effect the operation?**

In a museum, all behaviors come from “searching” and “finding.” I attempted to design a reasonable interface from the behaviors. I proposed some representative activities which included “searching” and “finding” metaphors. After analyzing these data and brainstorming, I believe that the “turning page“ and “using a magnifying glass“ should be intuitive behaviors to represent the two actions of “searching” and “finding.”



## Design development

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Figure 6 collecting behaviors

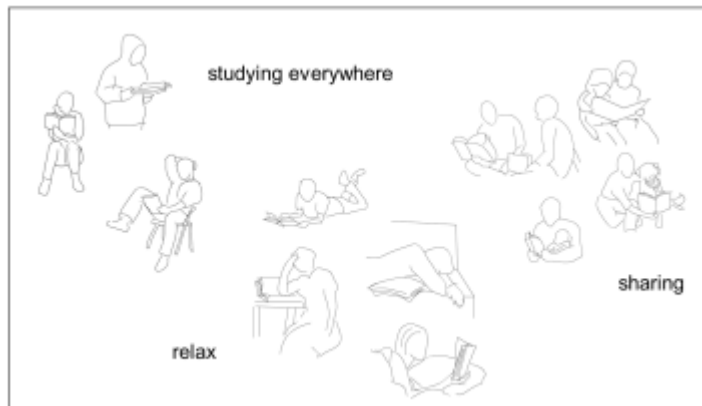


Figure 7 collecting behaviors

## Design development

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### Interface design

#### [Frame]

How do people use a magnifying glass to read? It is a kind of “framing”-like action. Using a magnifying glass to “frame” the information is a behavior, or interface, for seeking information, and turning pages, or scrolling, is a behavior to read additional information.

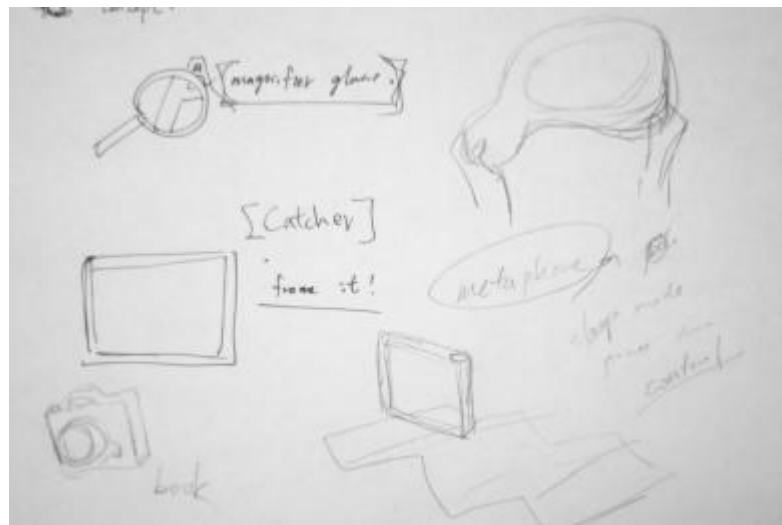


Figure 8 magnifying glass concept sketches

## Design development

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### **[Scroll]**

A user can scroll up and down, or left and right, to get more information or change the function in each space. Because different spaces have different functions or behaviors, it is impossible for the user to scroll all functions in one space.

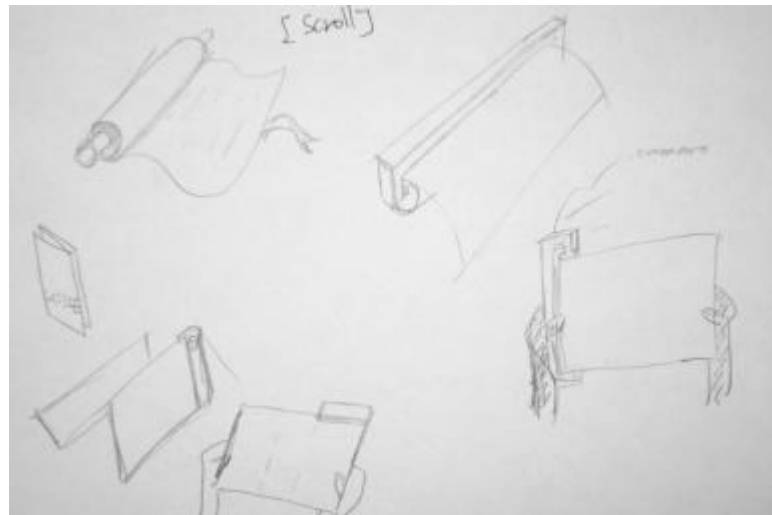


Figure 9 scroll style concept sketch

### **How it works**

The device is used like a magnifying glass to see, or “frame,” the exhibits or other items in the museum to gain more knowledge and extra information. Based on the space or items appearing in the frame, different information or functions are shown on the screen.

## Design development

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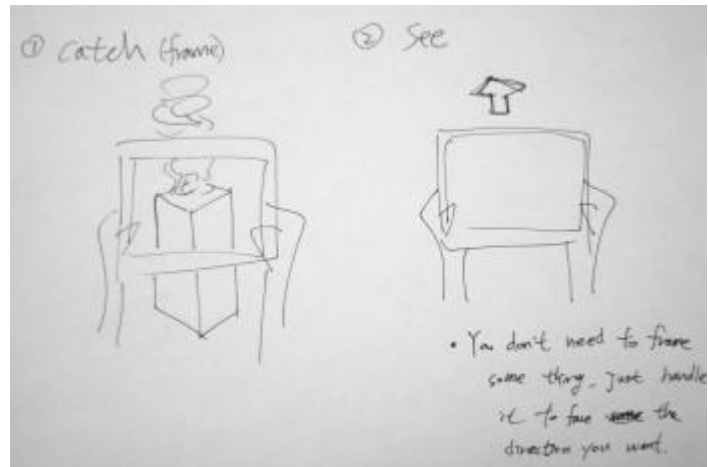


Figure 10 how it works

When the device is used to view the map, the information shown on the screen, and the content, depend on which area the user frames on the map. For example, if the user frames “room A” on the map, the device will show that exhibition’s detailed information on the screen; if the user frames “room B” on the map, the device will show extra information about the exhibition in room B.

If the device is used to frame the passage’s direction, it will show the direction guide information on the screen, for example, what exhibition is in that direction?

## Design development

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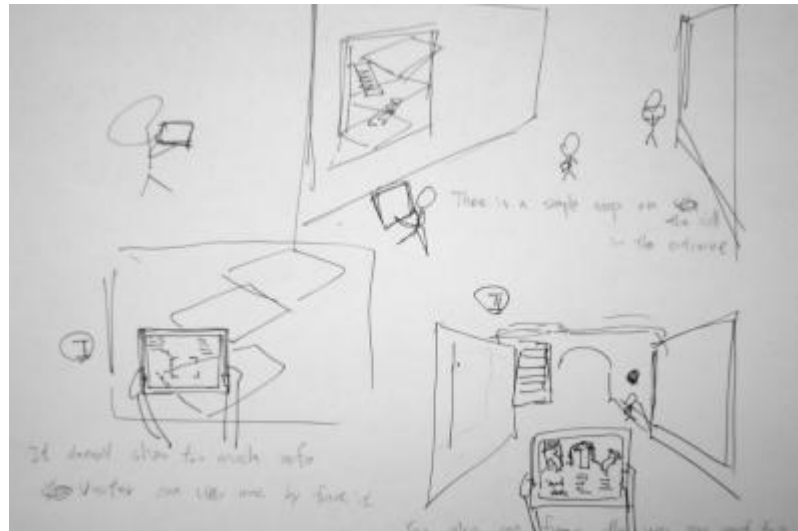


Figure 11 scenario sketch

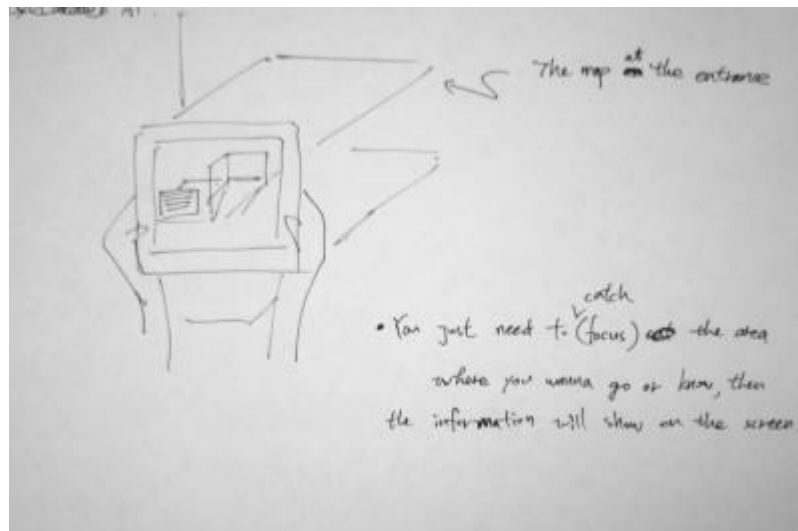


Figure 12 scenario sketch

## Design development

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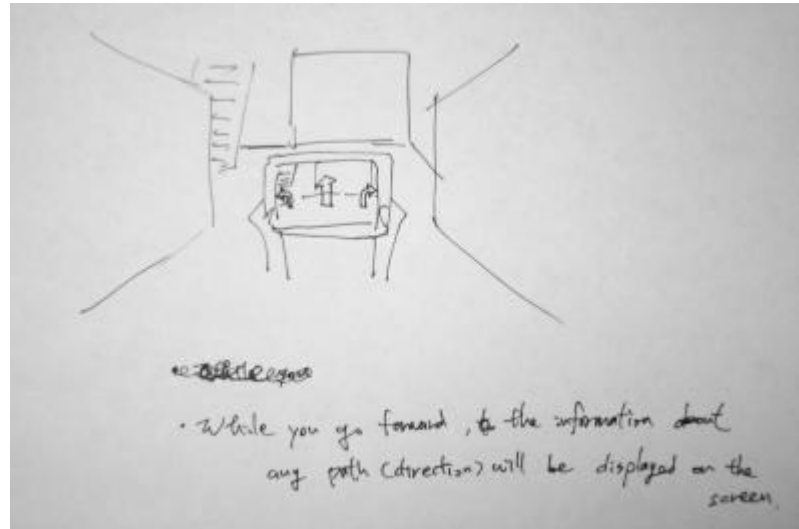


Figure 13 scenario sketch

When user goes into a showroom, the information on the screen will change to the exhibition's guide itself.

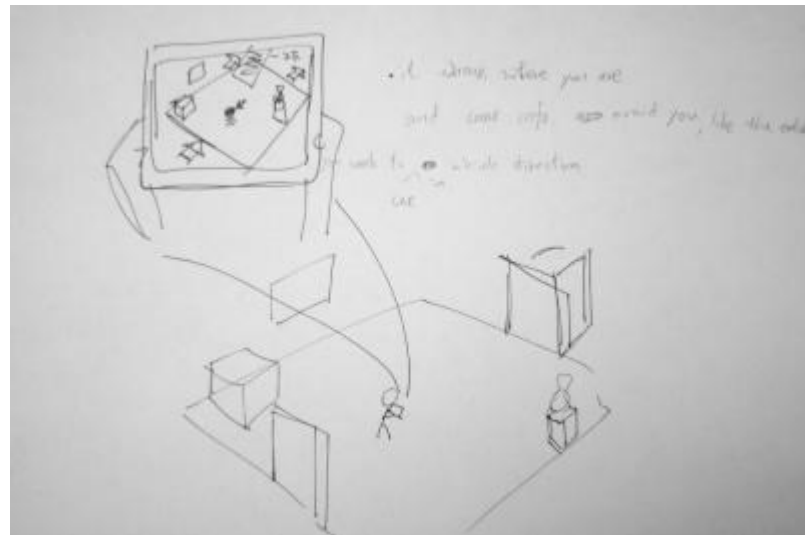


Figure 14 scenario sketch

## Design development

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User can get additional information about the exhibit by framing it.

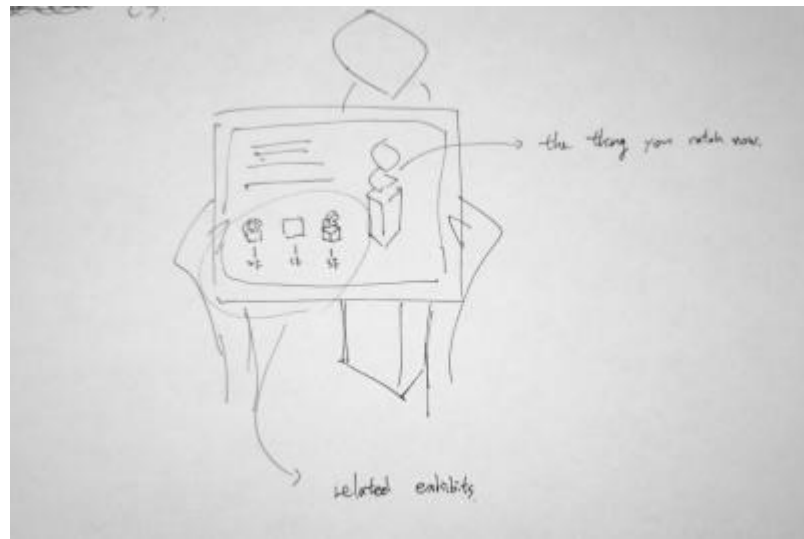


Figure 15 scenario sketch:

After framing it, the information of the exhibit display on the screen.

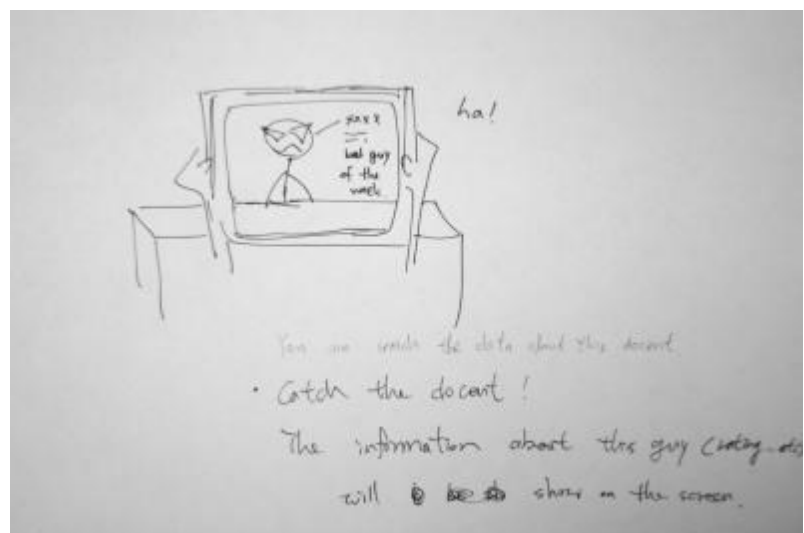


Figure 16 scenario sketch

## Design development

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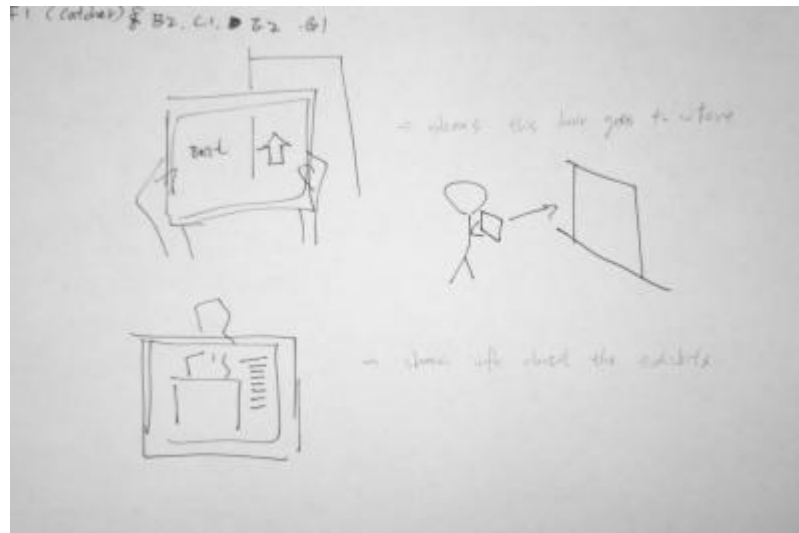


Figure 17 scenario sketch

Not only the information of the exhibit display on the screen, but also the information of the space can be showed on the screen. All the visitor has to do is “framing” anything they want to know.



## Design development

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At the outset of the project, I thought about what kind of input type would be suitable for this device. But I eventually changed my thinking, because, if I designed a device through human-behavior thinking, the best input type should be “behavior” itself. I’m now certain the appropriate input type is “frame it.”

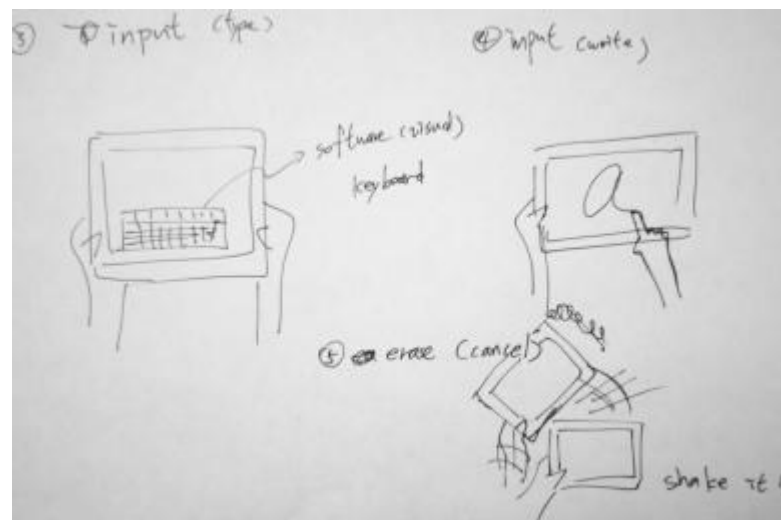


Figure 18 scenario sketch

In the beginning, I put too much enthusiasm on typing the text to search the information. At this time, this behavior is to type a word, but not to search information in the space.

# Design development

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## Hardware design

[Development sketch]

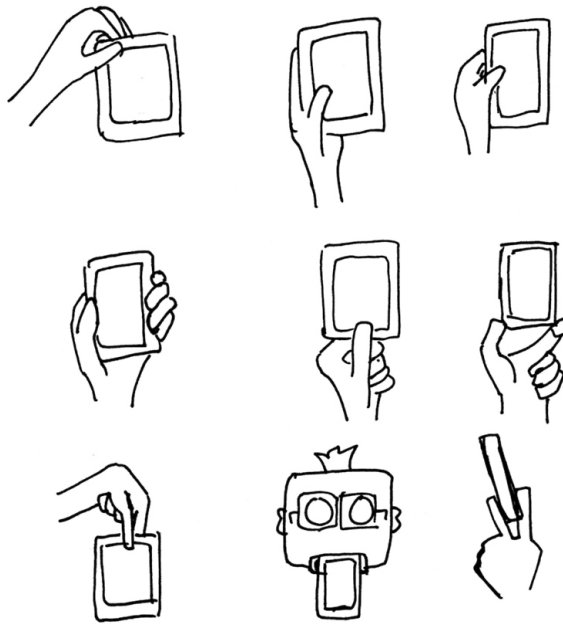


Figure 19 concept sketch

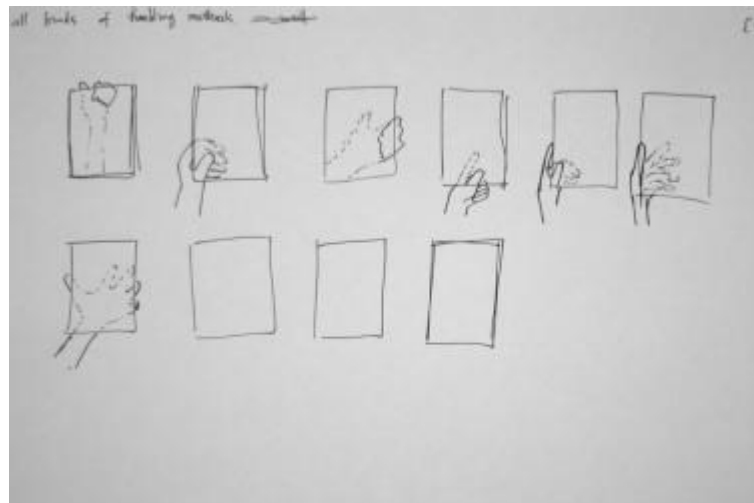


Figure 20 concept sketch

## Design development

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Combining the “magnifying glass” and “scroll.”

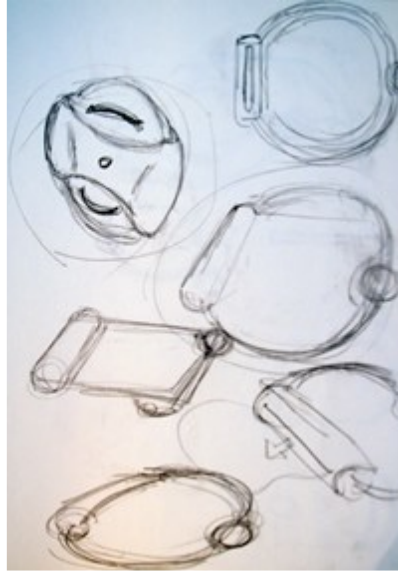


Figure 21 concept sketch

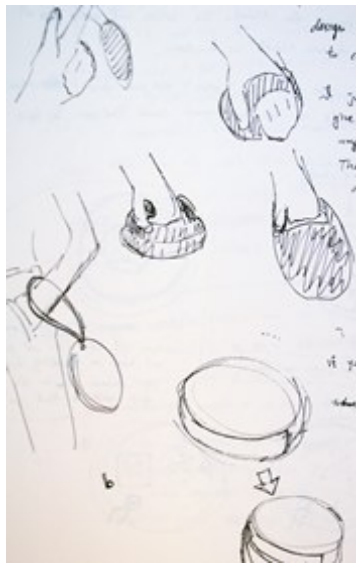


Figure 22 concept sketch

# Design development

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[Different handle style]

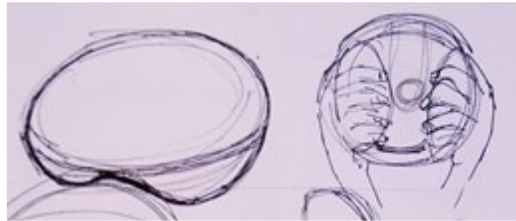


Figure 23 concept sketch



Figure 24 concept sketch

## Design development

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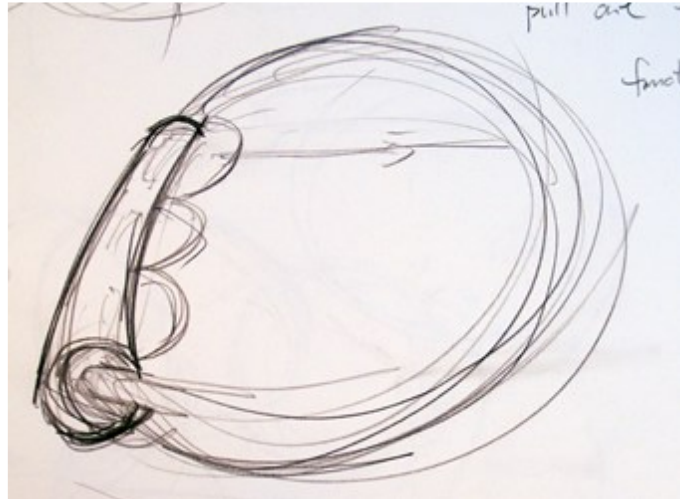


Figure 25 concept sketch

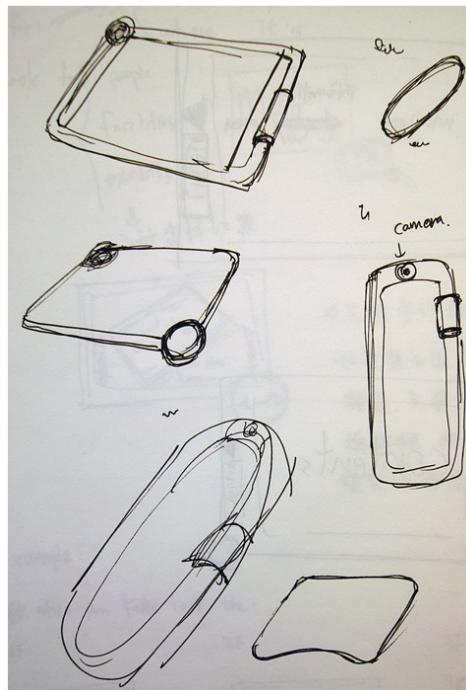


Figure 26 concept sketch

# Design development

---

[Mockup]

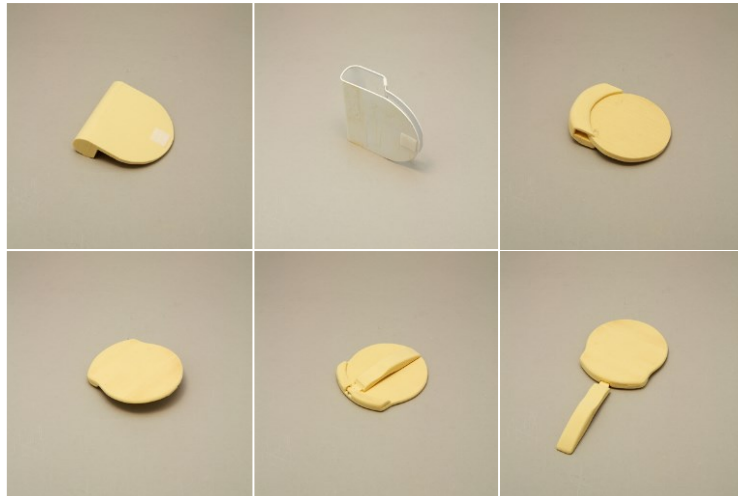


Figure 27 mockup

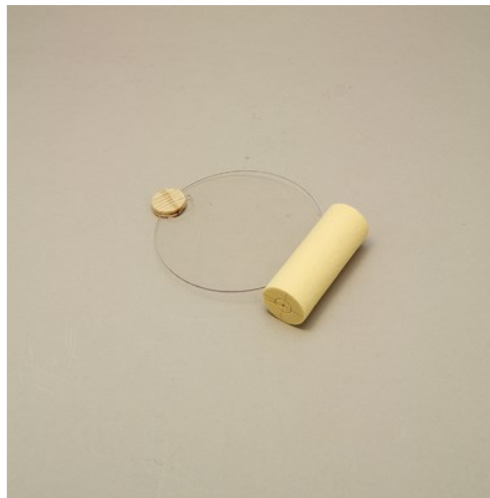


Figure 28 mockup

## Design development

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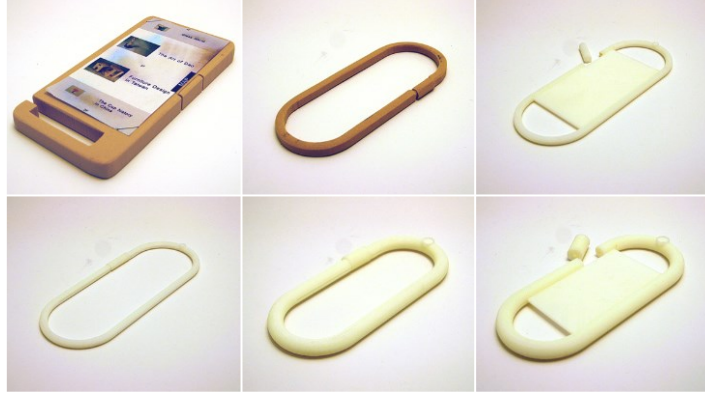


Figure 29 mockup



Figure 30 mockup

## Design development

---



Figure 31 mockup



Figure 32 mockup



# Final design

---

## Hardware

This shape implies both a magnifying glass and a scroll. The user handles its ring-type body, and frames any items to get more information using the ring-type body. If there are more functions in that specific space, or the contents are too much to read, the user can scroll the black wheel button to change the function or see more content.



Figure 33 3D rendering

## Final design

---

On the back side, there is a camera which is an image recognition system. It not only can scan barcodes, but also can recognize the image, environment, and others items in the museum.



Figure 34 3D rendering



Figure 35

## Final design

---



Figure 36



Figure 37

## Final design

---



Figure 38

### Interface

#### [Start]

The Start page tells the user that they can frame a specific tag to get additional information in the museum, and the user will find this tag on anything than can lead to additional information.

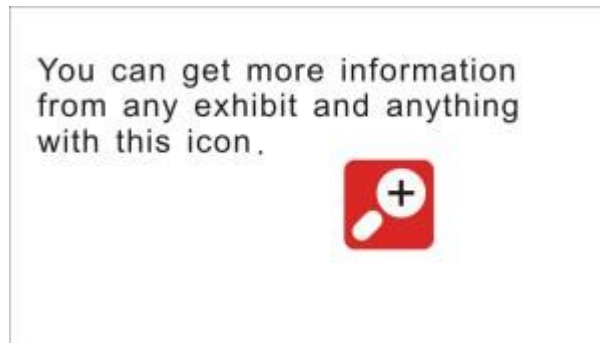


Figure 39

The start page shows the hint about how to get the information in the museum.

## Final design

---

### [Entrance, lobby, and passage]

Visitor can scroll up and down to see an exhibition's guide or another floor's map.

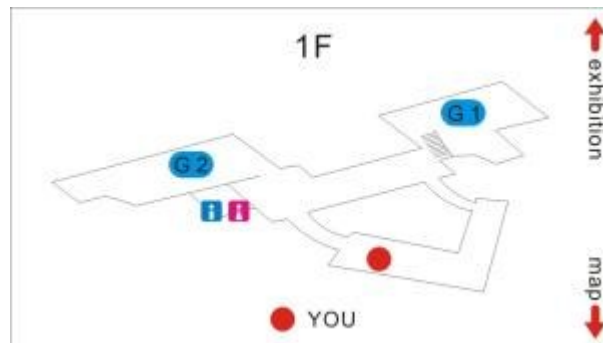


Figure 40

The red point indicates where you are by the indoor position system.

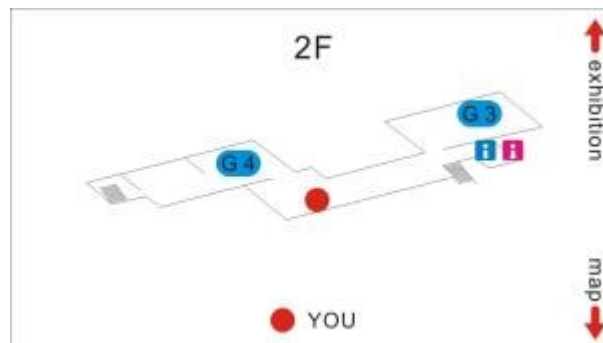


Figure 41

The red point indicates where you are by the indoor position system.

## Final design

---

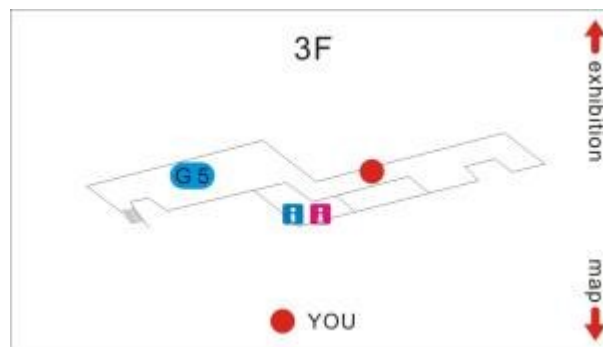


Figure 42

The red point indicates where you are by the indoor position system.

### [Show room, any exhibition space]

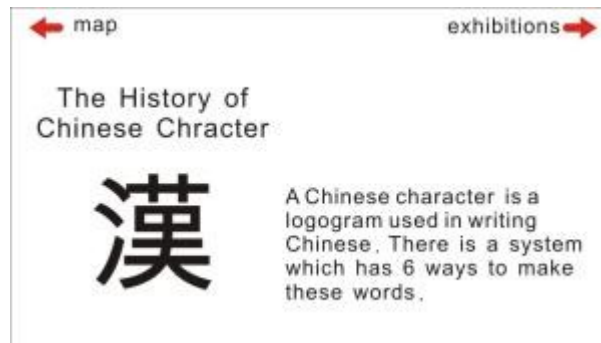


Figure 43

While the visitor goes into a showroom, the information display on the screen.

## Final design

---

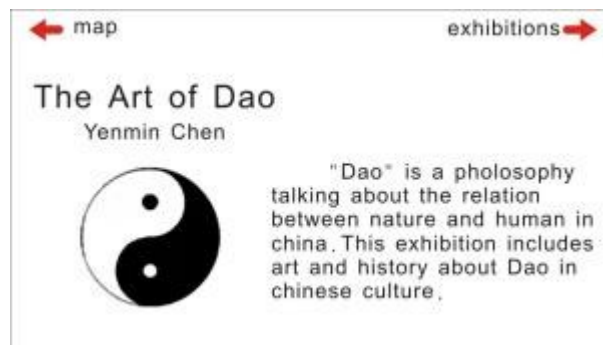


Figure 44

While the visitor goes into a showroom, the information display on the screen.



Figure 45

While the visitor goes into a showroom, the information display on the screen.



## Final design

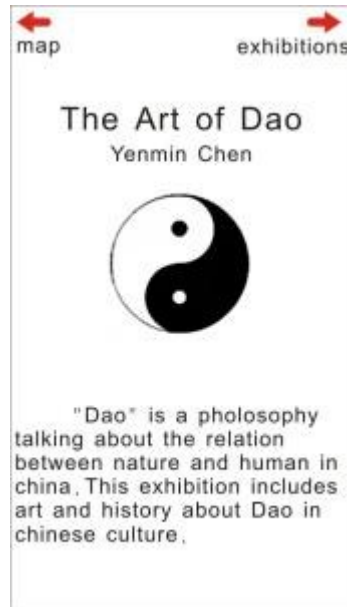


Figure46

While the visitor goes into a showroom, the information display on the screen.

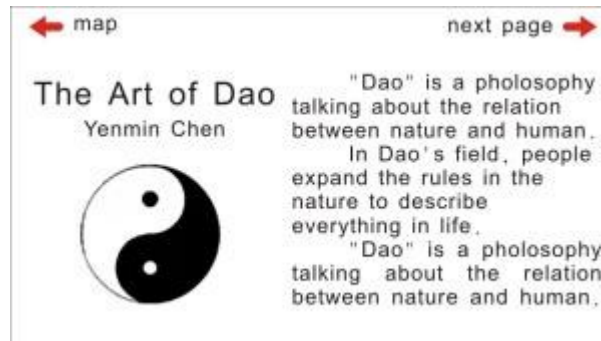


Figure 47

After the information display on the screen, the right arrow indicates that there are more contents in the next page. Then visitor can scroll right the wheel button and see the next page.

# Final design

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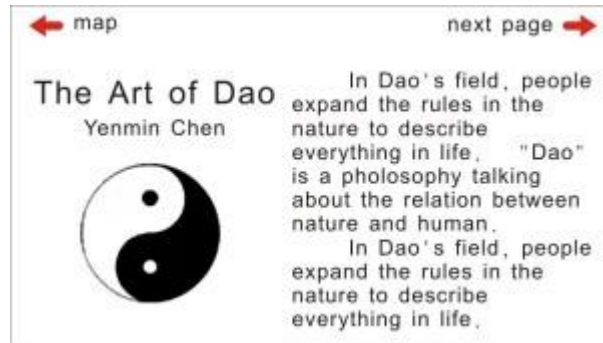


Figure 48

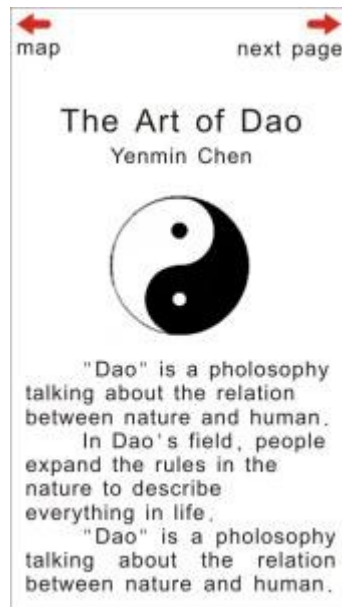


Figure 49

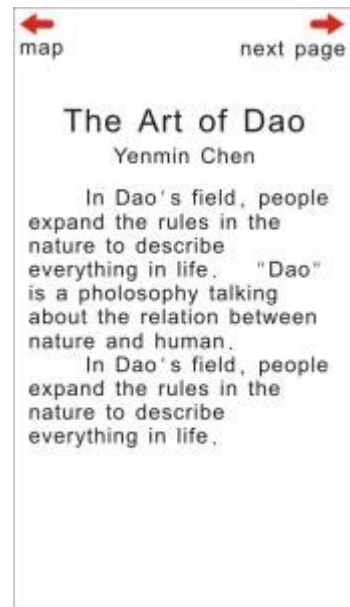


Figure 50

## Final design

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### [Exhibits]

While the device is being used to frame an exhibit, detailed information is displayed on the screen.



Figure 51



Figure 52

After the information display on the screen, the right arrow indicates that there are more contents in the next page. Then visitor can scroll right the wheel button and see the next page.

## Final design

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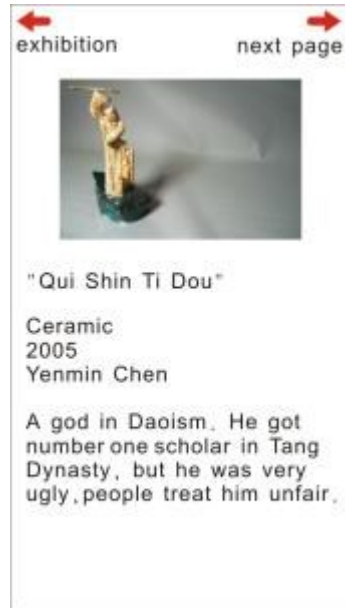


Figure 53

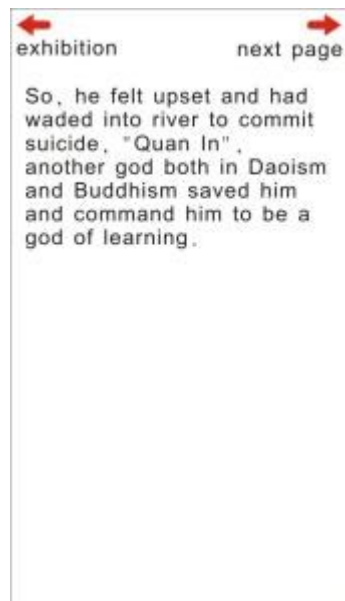


Figure 54

## Conclusion

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Some museums already use a PDA, tablet or other devices, such as a large tape player, as their electronic guide device. If you have experienced them, you may have the same complaint I do: a complex interface, a large size, non-intuitive operation, etc. Why can't we consider visiting a museum to be like reading a book or exploring a new world? No matter how much information there is, there is only one action needed: searching. No matter how difficult or complex the content is, there is only one action to do – finding. Visiting a museum becomes easier and more interesting, would it not? Visiting a museum should be like reading a book; Let everything go back to a simple life style. Human-centered design does a good job in developing a good product. It can avoid some obvious failures in the beginning; moreover, it can create an easy learning product, too. But, does an easy learning product give the user a simple tool? In this case, I have replaced a boring touch pad with a magnifying glass concept device, and I replace a clicking action with a searching behavior. Be simple, be intuitive. Simply say, the behavior of walking in the showroom is instead of click the button "the information of this

showroom” on the screen. The behavior of framing the exhibit is instead of typing the number of the exhibit by your keypad to get the information of the exhibit.

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