PHOTO TURNTABLE

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Demonstration Project Report
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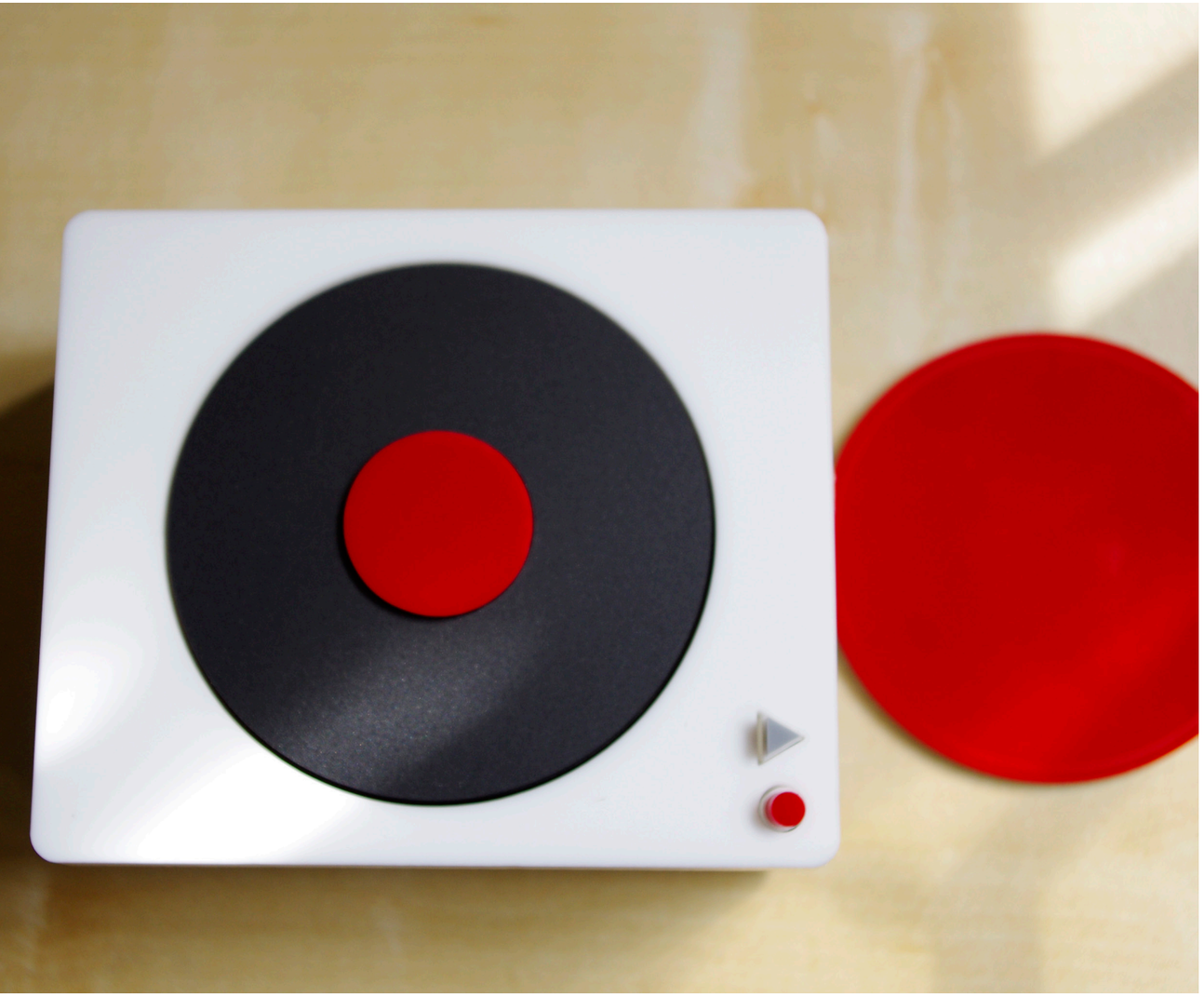

Executive Summary

Nowadays, taking photos is easy for people, not only because digital photography has rapidly supplanted film photography, but also smartphones are used as daily photo taking devices. However, as the size of digital photo collection increases, most people have trouble finding their digital pictures because digital pictures are cheap and ephemeral. In home environment, people rarely view their digital photos. The problem is that there are fewer opportunities for people viewing and sharing digital photos within home environment. Digital photos are messy, hard to access and lack the physical affordances that make reviewing and sharing easy and opportunistic.

According to research findings and problem definition, three design criteria are proposed in this report. First, by this system, it is easier for people to organize their digital photos. Second, the system provides a tangible interaction for peoples' photo organizing, viewing and sharing. Third, people easily share their digital photos within or outside home environment.

A concept named Photo Turntable is proposed in this report. It is a system that provides a tangible way to organize, view and share digital photos. The system includes the software and the product. The software starts to pre-organize. Then people create albums by putting a physical disk on the turntable. People choose photos they like to put into the album, and choose a cover and add text description for that album before printing from the turntable. Physical albums and cover remind people about photos inside so that photo viewing is easier for people. By putting the disk on the turntable, photos play on any screen devices or the projector in it. People control photo viewing manually by hand or by clicking a bottom. Sharing is easier when things become physical. It is a good way to share great albums with family and friends by giving as gifts or viewing photos together.

In order to verify the provided solution, evaluation is used to test the three criteria. For each criteria, the method for evaluation is prototyping. Two types of prototyping are used, including behavior prototyping and appearance prototyping. The software and photo turntable product will be evaluated. The results indicate that by using photo turntable, people easily organize photos into albums, view and share digital photos triggering by a tangible interaction.

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Volume I

1 Problem Definition

There are fewer opportunities for people viewing and sharing digital photos within home environment.

1.1 Problem Scope

Photo is an excellent example that evolved from physical to digital in a short amount of time. Nowadays, people take photos everywhere, when they are travelling, working or even when they are eating. People take photos by every method, not only by cameras but also by cellphones and tablets. Taking pictures is easy for people, because digital photography has rapidly supplanted film photography, but also smartphones are used as daily photo taking devices.

However, digital photos are not as tangible as physical photos before. As the size of their digital photo collection increases, most people have trouble finding their digital pictures because digital pictures are cheap and ephemeral. Although people share photos easy over distance by Flickr, Facebook, Instagram etc., in home environment, people rarely view their digital photos that are stored in their computers. The problem is, compared with distance photo sharing, there are fewer opportunities for people viewing and sharing digital photos within home environment. Digital photos are messy, hard to access and lack the physical affordances that make reviewing and sharing easy and opportunistic.

1.2 Research Review

The main research includes three parts: academic work, user research and existing technology. Academic work provides detail about why the problem is significant and how it has been solved in the past. User research indicates user needs and findings through interviews, task walkthrough and artifact analysis. Existing technology shows the existing products and technologies which are used to solve the problem.

1.2.1 Academic Work

The photo is an excellent example of a common domestic artifact that has evolved from a primarily physical to now mostly digital media in a very short amount of time. Photos have many properties that are interesting to domestic research [1]: home inhabitants take many of them; some spend a considerable amount of time sorting them into collections for display (e.g., photo albums); people personalize their homes with photos (e.g., framed photos); photos often become the focus of social activity (e.g., storytelling); and people often gift photos to one another. [2] Yet digital photos inhibit some of these activities: the technology of digital picture transmission, printing, file sharing, and display are sufficiently complex and time-consuming as to prevent many people from saving, retrieving, and sharing the pictures they cherish [3].

To promote in-home photo sharing, a system [4] that lets people link digital photo sets to physical memorabilia. These mementos trigger memories and serve as social instruments; a person can enrich their story-telling by moving the physical memento close to their large-format television screen, and the associated photos are immediately displayed.

Early studies of digital photography practices in the home showed that families are no more organized in managing digital photos than analog ones. For example, in a home visit survey of 11 families in northern California, Frohlich [5] found that digital photographs were archived on the family computer in disorganized collections of virtual folders similar to packs of printed photographs. However, in contrast to printed photos, digital photos were not usually put into photo albums. This meant that most printed images were shared loose, out of the packet, in various forms of “photo talk”.

In contrast to these findings, Whittaker [6] found that family members often struggled to locate digital photographs from family events which took place more than a year ago. It showed that nearly 40 % of digital

Academic Work

photographs in a family collection could not be found in the collection when cued by the naming of a memorable event mentioned by family members. Eighteen UK participants could only find 61 % of such photographs which were an average of 3.1 years old. This surprised participants themselves who were recruited for their role in digital photo archiving and thought they knew where they had stored many of the target photos. Reasons for failure to find photos included a high volume of photos to search, distributed storage across folders, directories, devices and discs, minimal hierarchical organisation, and minimal revision and maintenance of the photo collection.

The exponential growth of digital photo collections, combined with the legacy of printed photographs, is leading families to experience difficulties in remembering and finding photographs. Paradoxically this creates new opportunities for the rediscovery of forgotten images. A new study in this area, based on interviews and creative activities with ten families in the south-east of England found that many triggers for photo reuse were either speculative or accidental and led people to reinterpret the meaning of photographs in the light of subsequent experience and social discussion. [7]

The value of a photograph seemed to increase with time, because of the way it connected to other photographs, memories and events since the original was taken.The diamond framework for domestic photography [8] shows that half the activities involve different kinds of solitary reflections on the photograph by the various human participants. The other half involve different kinds of three way interactions between participants around the photograph. In this view, memory is something which happens individually on review of a photograph, but also socially and collaboratively in interaction.

1.2.2

User Research

In order to understand how people organize, view and share their digital photos, the user research consists of several methods, including interviews, observation, task walkthrough and artifact analysis. Nine interviewees from different backgrounds including advertising, chemistry, design, maths, engineering etc. were interviewed in depth. They were asked questions about how they took, organized, viewed and shared digital photos.

From interviews, the problem that people didn't like to review digital photos was found. Interviewees talked about the reasons why they rarely review digital photos and the motivations of photo reviewing. It is found that most of motivations of photo reviewing were quite accidental rather than speculative. However, once they started to view digital photos in their computer in the way of task walkthrough, they would spend more time viewing and sharing their photo memories, and they found more surprise and recalled more memory by looking at related photo folders.

In-depth interviews aimed to trigger interviewees' experience sharing although there were some settled questions. Interviewees shared their experiences regarding photo organizing and sharing. Also, they mentioned about the differences between digital photos and physical photos. Most of them prefer to review the physical photo albums at home rather than digital photos in their computer. They talked about the relationship between memory and photos and also between the memory and physical objects.

The reasons why people don't like to review digital photos.

TOO MESSY many and cheap

HARD TO ACCESS many steps

TIME-CONSUMING organize and share

From Interview, the reasons why people don't like to review their digital photos are summarized. The first main reason is that people think digital photos are too messy and cheap. People just take photos and put them all in the computer without organize so that digital photos are hard to locate. Second, digital photos are hard to access. When people want to view digital photos in the computer, there are too many steps to open a specific photo. Third, it is time-consuming to organize and share digital photos after a certain time. Some people want to edit photos after taking them. But after a certain time, organizing and sharing digital photos are not easy for people.

Motivations of Digital Photos Review

From interviews, most of the motivations to review digital photos are quite accidental. The motivations include visit of family and friends and serendipitous discovery of photos. Some people view photos triggered by music or movies. Some reasons are reminiscing about a event such as ceremony or birthday or because of missing family and friends.

A few motivations are speculative. People view digital photos because special photo projects, such as wedding, birthday gift or doing portfolio. Some review photos due to others' asking. Few people will review digital photos when they are really bored.

ACCIDENTAL

Visit of Family and Friends
Serendipitous Discovery
Trigger by Music and Movies
Reminiscing about an event
Miss Family and Friends

SPECULATIVE

Special Photo Projects
Someone Asks
Really Bored

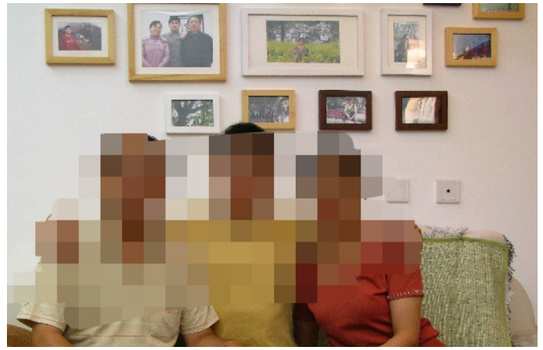
User Research

Preserve digital photos into albums

Stick photos to personalize home

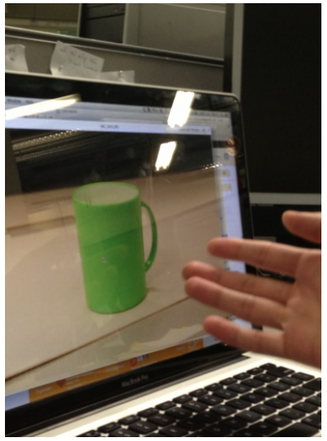
Personalize home by photo frames

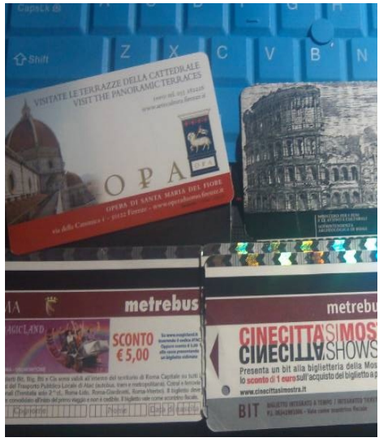
Print photos to make postcards as gifts



Most interviewees mentioned about viewing old physical photo albums at home. They preferred to review the physical photo albums at home rather than digital photos in the computer. They would spend time sitting and looking at the albums which collected in the time of film camera. But they seldom opened their computer and viewed their digital photos when they had time.

Even though photos were almost digital in the home of interviewees, they still liked to print digital photos for different purposes. They printed digital photos to put into frames or just hang photos on the wall to personalize home. Some people printed meaningful digital photos every certain time and preserve them into photo albums to cherish that period of memory. Some one would like to print out photos into album to give friends as a gift, but they were lazy to do that because of the messy and large number of digital photos after a certain time. Most people mentioned that photo was for sharing. Some people would print out beautiful digital photos every year as postcards to send to friends.





User Research

- Travel mementos from Yunnan as gifts
- Travel mementos from Italy as gifts
- Bottle collected in fight to Europe
- Cup got during travel to Taiwan
- Travel tickets

Not only by photos, interviewees also shared their experience and memory by physical objects. People would buy mementos for friends as gifts from travelling, also they would receive gifts from friends. In addition, the ordinary objects will recall people's memory such as travelling. For example, a bottle in the flight to Europe, a cup collected in Taiwan or train tickets would reminded people of lots of memories. People preserved these mementos and ordinary objects to cherish and share their memory. Also this was a good way to trigger the story telling of one's experience.

2 Design Criteria

ORGANIZE easier to create albums

TANGIBLE physically trigger viewing

SHARE within home environment

From research findings and problem definition, three design criteria are proposed. First, by this design, it is easier for people to organize their digital photos. The system helps people pre-organize photos and provides a platform that people can easily tag and organize their photos by themselves. It is easier for people to create photo albums.

Second, the system provides a tangible platform for people's photo organizing, viewing and sharing. Tangible User Interface facilitates user interaction with digital world by providing a mean for integrating physical and digital world. [9] Tangible interaction helps people organize their digital photos and triggers photo viewing and sharing.

Third, people easily share their digital photos within or outside home environment. Sharing is an important aspect of photos. Here puts sharing as a criteria is because most people mentioned about photo is for sharing. Once people have access to photos, they are willing to share their photos and stories. But digital photos barrier the face-to-face sharing situation.

The goal is to provide a system that helps digital photo organizing and triggers photo viewing and sharing by integrating physical and digital platform.

2.2

Vision Statement

Photo Turntable wants people to easily organize, view and share their digital photos by a tangible interaction.

3

Design Description

3.1

Summary of the Design

Photo Turntable

Photo Turntable is a system that provides a tangible way to organize, view and share digital photos. The system includes two parts, the software and the product. By using photo turntable, people easily organize photos into albums, view and share digital photos triggering by a tangible interaction.

The software starts to import photos in the computer and pre-organize them by creating albums by dates. The interface marks when and where people take photos. People easily reorganize and tag the photos in the interface. It is easy for people to create albums by physical disks. An album is created when a photo disk is put on the turntable, through connection to the software. Then people choose photos they like to put into the album. People choose a cover and add text description for that album before printing from the turntable. Physical photo disks are easy to store or hang on the wall so that people will see the cover as photo album collections. Physical albums and cover remind people about photos inside. Viewing is easier for people by putting the disk on the turntable. Photos can be played from any screen devices or the projector in it. People control photo viewing manually by hand or by clicking a bottom so that viewing is a special interaction. Sharing is easier when things become physical. It is a good way to share great albums with family and friends by giving as gifts or viewing photos together. Viewing together using the projector make the experience even more special.

3.2 Concept Development

Why Turntable ?

In order to design the tangible platform, some pattens are researched. It starts from the idea of physical album. Compared with photo albums, there are other albums which are also involved from physical to digital in a short amount of time. Music album is one good example of these. Nowadays, it is rare to see physical music albums such as vinyl records. However, there are still people who really like vinyls and turntable. There must be something special about vinyl for who like them. So I researched about the reasons why vinyl lovers like vinyls.

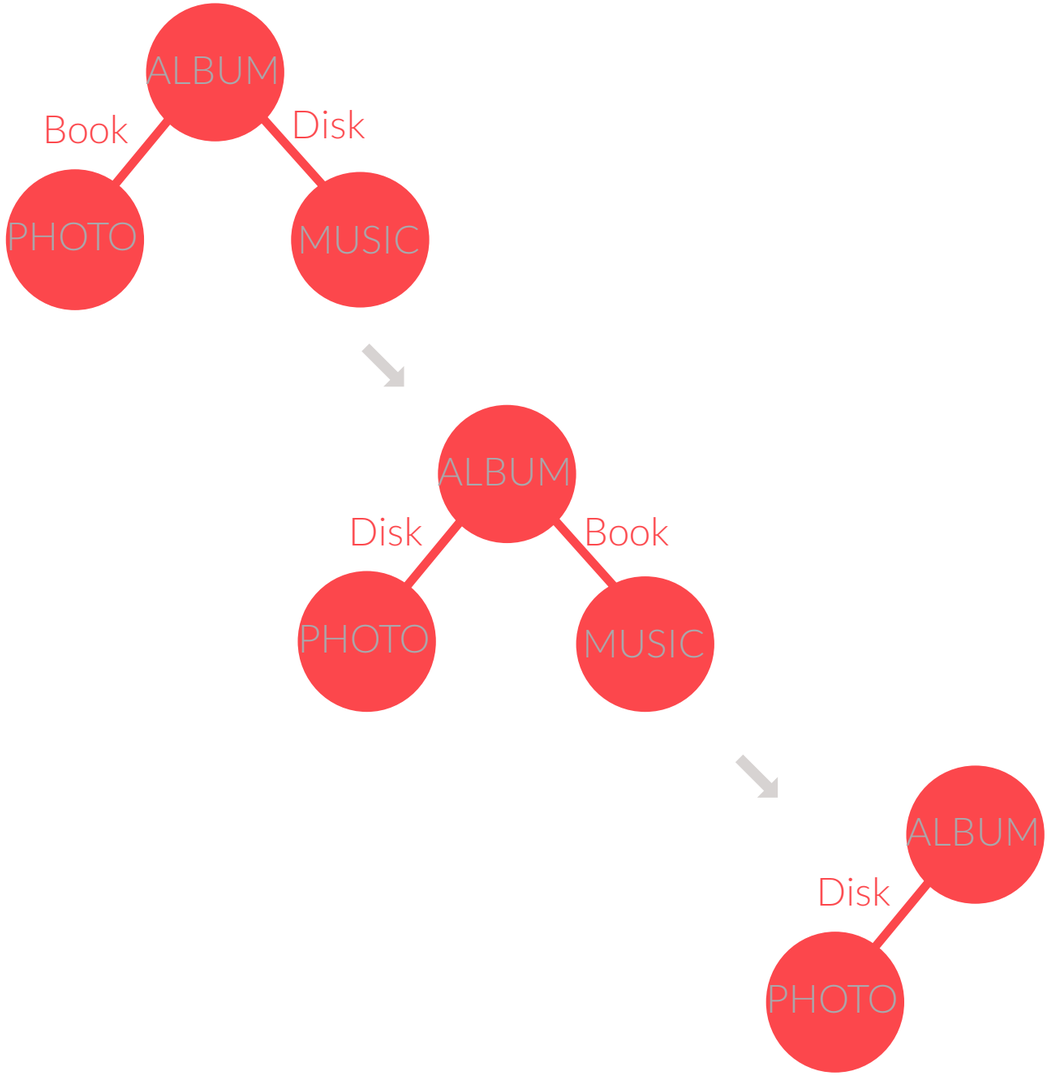
From interviews of vinyl lovers, he reasons are mainly three parts. First, the album itself is a complete concept. A music album is not only a set of music and songs but also a solid story or concept behind it. Second, using turntable to listen to music is exploratory. The uncertainty and exploring music makes the listening process more special. Listening to music becomes a concentrate behavior rather than background music when doing other things. Third, vinyl lovers love the cover of albums. Designed album cover contain beautiful pictures and information so that collecting cover become a separate experience. People hang album cover on the wall to decorate and personalize homes and they will spend lots of time just viewing the cover information in their spare time.

By comparing photo albums with music albums, the insight is to design a photo turntable. Combined the idea of photo disk, album cover and the idea of turntable, the design provides a tangible user interface for people. The digital photo disk helps photo organizing and triggers photo viewing and sharing. People could use their hand to control the tangible turntable manually to experience a tangible interaction.

A Vinyl album is a concept

Using turntalbe to explore music

Vinyl covers and beautiful content



Concept Development

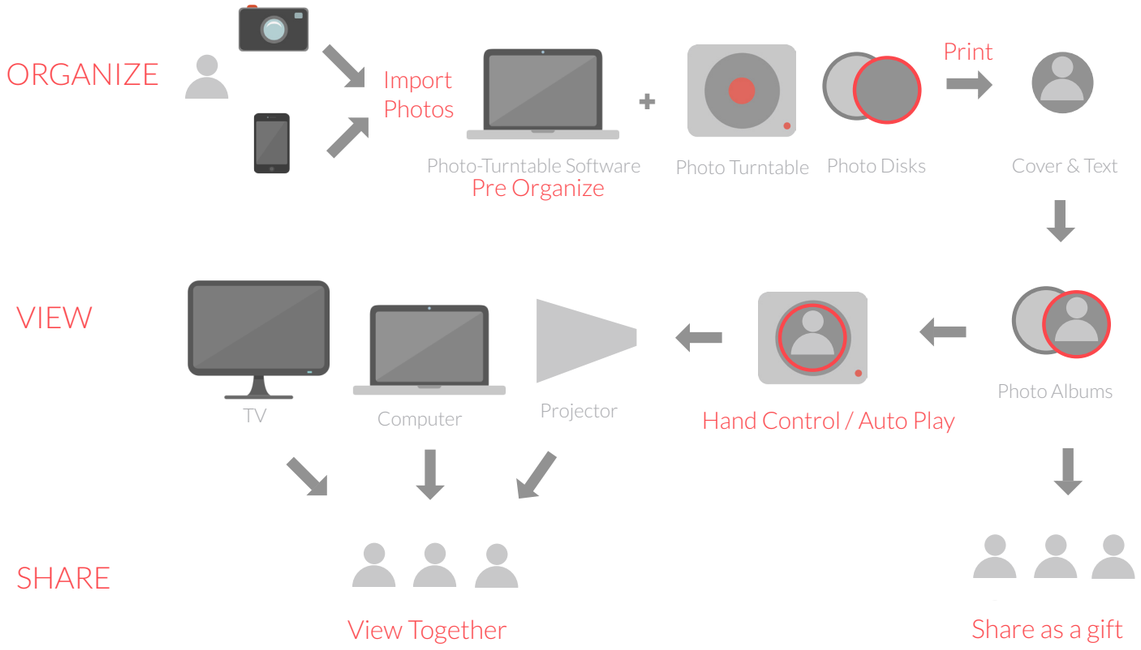
Why Projector ?

Digital photos limit people's environment of viewing photos. People need the screen to view digital photos which leads to less sharing opportunities. The aim of projector is to provide a way in which digital photo viewing and sharing are without screen. The inspiration came from Carousel Slide Projectors. The creation of the projector resulted in the "slideshow"-a popular fixture for professionals as well as home parties. By using projector, photo viewing becomes a special experience when people view digital photos or share with family and friends.

History of Technology - Vintage Electronics at WomansDay.com - Woman's Day, under education fair use, <http://www.womansday.com/life/8-revolutionary-technologiesnow-forgotten-113265>accessed@ Jul.5,2013

3.3 Concept System

How it works



The main function of Photo Turntable are organizing, viewing and sharing digital photos. It provides a tangible way to solve the problem that people don't like to review digital photos nowadays. The system includes the software and the product. The software starts to import photos from digital camera and cellphone to computer . It pre-organize photos by creating albums by dates. The interface marks when and where people take photos. People easily reorganize and tag the photos in the interface.

Integrating software and physical photo turntable, It is easy for people to create albums by physical disks. An album is created when a photo disk is put on the turntable. Then people choose photos they like to put into the album. People choose a cover and add text description for that album before printing from the turntable. Then with the click, album cover is printed from photo turntable, and it is easily sticked to the photo disk. Physical photo disks are easy to store or hang on the wall so that people will see the cover as photo album collections. Physical albums and cover remind people about photos inside. People just pick up the photo disk when they want to view the photo of that album.

Viewing is easier for people by putting the disk on the turntable. Photos can be played from any screen devices or the projector in it. People control photo viewing naturally and manually by finger to navigate the play speed and back or forth. Clicking a bottom is auto photo play. By natural gesture, viewing photos for people is a special interaction just like viewing physical photo books. Sharing is easier when things become physical. It is a good way to share great albums with family and friends by giving as gifts or viewing photos together. The projector releases people from any screen interface and makes the sharing experience even more special.

3.4 Functional Description

Photo Import & Pre-Organize

The software imports photos stored in computer . It pre-organizes photos by creating albums by dates. The interface marks when and where people take photos. It is easy to reorganize and tag the photos in the interface.

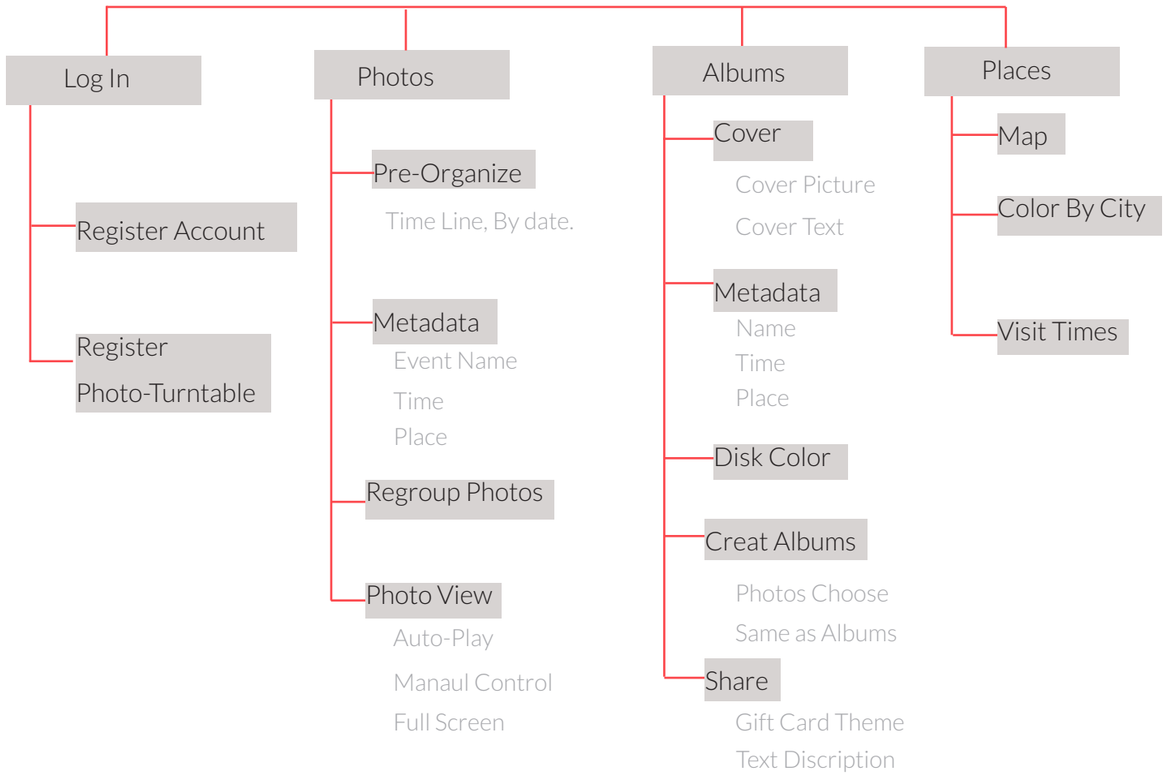
Create Albums

By creating a new album, people choose photos into the album and then choose a cover and add text description. With the click, album cover is printed from photo turntable, and it is easily sticked to the photo disk.

Review Albums

People review all the albums they have created in the interface and edit them. Color is responding to the color of photo disks. When people put a physical disk on the Photo Turntable, photos show out in the interface of the full screen mode.

Software Information Architecture

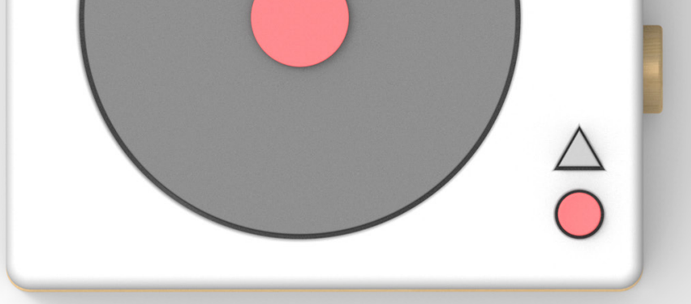


Functional Description

Photo Turntable is the main device in the concept system. It contains a photo turntable and a set of photo disks. The photo turntable connects with computer Photo-Turntable software by wifi.

Each photo turntable has a serial number, and people register the number in the software before they use it. The photo turntable include three parts, the turntable, mini printer and mini projector. The turntable is used for photo disk recognition and play control. The black circle area in the middle is for putting the photo disk. And the black area recognizes a new disk or the created photo albums. The red circle in the area is a jog wheel by which people control the photo play by hand. Outside the black area, the two buttons are on-off button and auto play button. The red circle one is for on-off switch, and the grey triangle one is for auto playing photos. Under the turntable are mini printer and mini projector. The mini printer is used for printing album cover. People put a set of circle paper in it by open the turntable before they will print. By using the software, the photo turntable prints out the cover. The cover is easily sticked on the photo disks. The mini projector is used for viewing photos without any screen devices. There is a wood switch on the projector. After turn on, the projector could project photos on any surface.

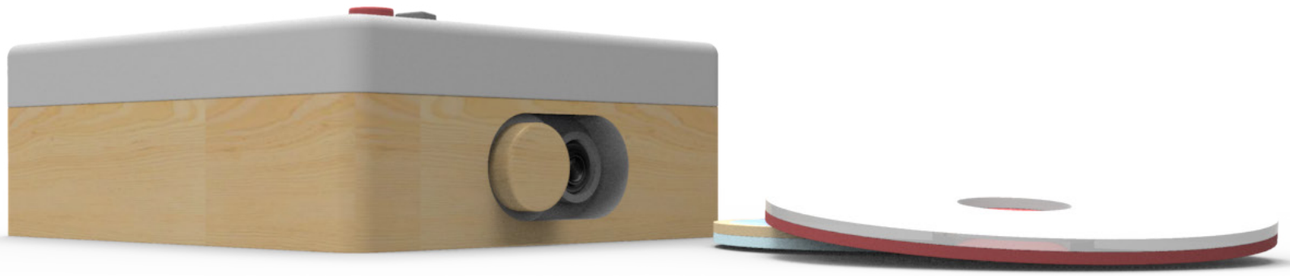
The photo disks are a set of colorful disks for photo storing. Each disk has a unique serial number so that the photo turntable can recognize it. Each disk has a certain capacity so that photos can be stored into the disks. Meanwhile, the photo disk can be just index when the photos are stored in computer or in Cloud in case the capacity of the disk is not enough for storage. Cloud technology is used here in oder to view and share photos in different devices. The disk can be recognized on other photo turntables and view the photos inside if the photos are stored in the disk, which make sharing easier. And people can get the photo out of the photo disk to store in computer. People can set the level of privacy in the software interface to indicate whether the photo disk can be read, edit or not.



Areas and buttons for disk recognition, play and control

Mini printer used for printing covers

Mini projector used for photo viewing and photo disks



Technology

3.5

Mini Printer

Polaroid mini mobil Yazici Printer, under education fair use, <http://images.gittigidiyor.com/5030/Polaroid-MINI-MOBIL-YAZICI-PRINTER__50302601_0.jpg>accessed @ Jul.10,2013

Mini Projector

Princeton Mini Projector PPR-QT1, under education fair use, <http://www.sunrainet.com/princeton-mini-projector-ppr-qt1.html>accessed @ Jul.10,2013

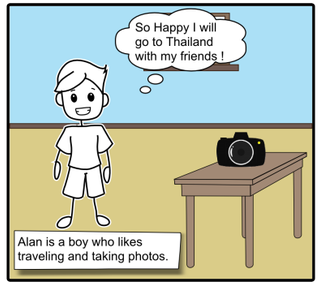
Jog Wheel

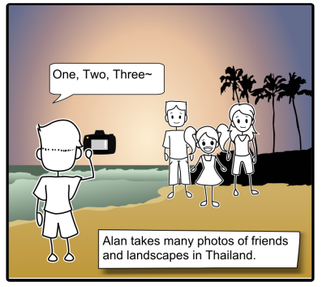
Cylo's 3style jog wheel, under education fair use, <http://www.engadget.com/2007/02/20/cylos-3style-jog-wheel-mouse-spins-it-up/>accessed @ Jul.10,2013

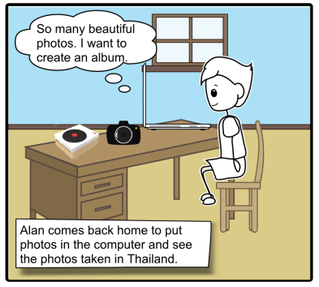
3.6

Scenario

The scenario shows the user experience of using Photo Turntable and how the system works in a certain context of use. Alan is a boy who likes travelling and taking photos. Once he went to travel in Thailand with his friends. He took many photos of his friends and landscapes using camera. After he came back, he view the beautiful photos in the computer.

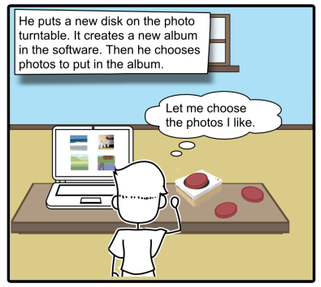


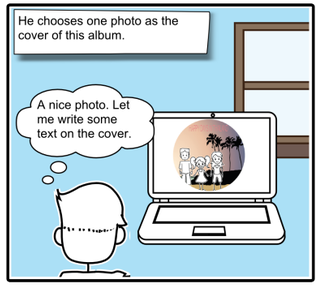


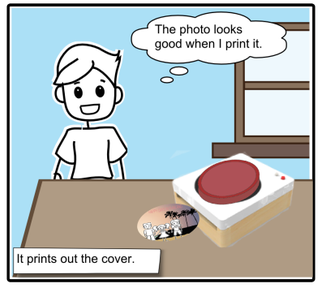


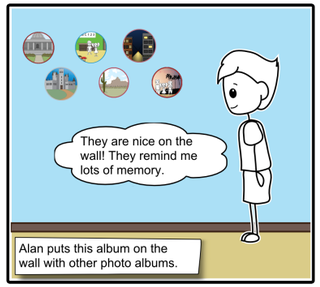
Scenario

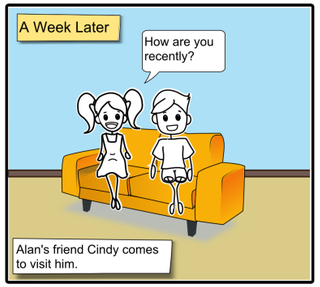
He wanted to create a new album using photo turntable. So he put a new disk on the photo turntable. It created a new album in the software. Then he chose photos to put in the album. After choosing photos, he chose the photo he like the best as cover of the album and the photo turntable printed it. After alan created the new Thailand album, he put his album on the wall with other albums.





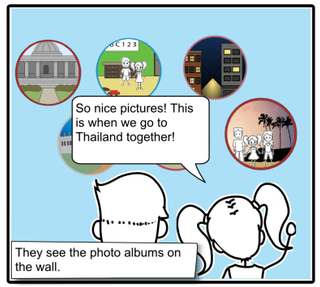


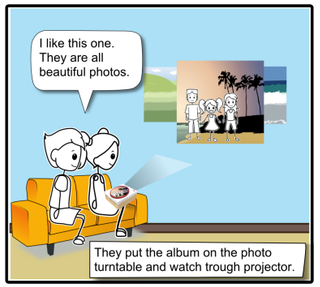


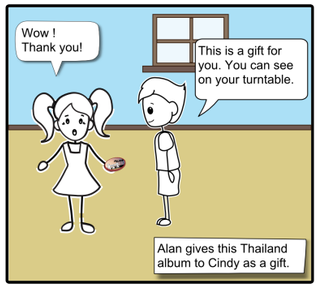


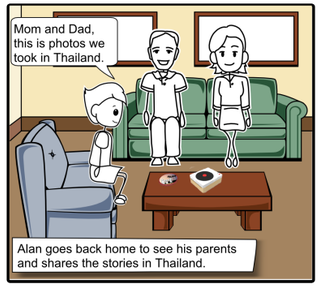
A week later, Alan's friends Cindy comes to visit him. While they are chatting, they saw the photo albums on the wall. They picked up the Thailand album it and put it on the turntable. They viewed the photos together by projecting them on the wall, and they talked about the happy experience they were together in Thailand. When Cindy is leaving, Alan gave this album as gift to her.

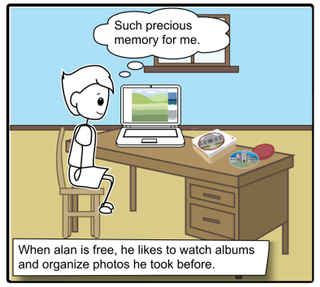
Some days later, Alan went back home to visit his parents and shared the travel to Thailand with them. They put the album on the photo turntable and see the photos on TV. They happily discussed about next time their family travel to go to Thailand. Alan felt photo turntable was really good for sharing photos with parents and friends. And he liked to organized photos taken long time ago to create photo albums using photo turntable.











4

Evaluation

4.1

Evaluation Plan

In order to verify the provided solution, the evaluation is proposed in this section. Looping back to the design criteria established in the second section, each criteria needs to be test. The three design criteria are as follows. First, the system helps people organize their digital photos. Second, the system provides a tangible interaction for people's photo viewing. Third, people easily share their digital photos within or outside home environment.

For each criteria, the method for evaluation is prototyping. Verifying the first criteria is mostly by the software interface prototypes. Two types of prototyping are used here, including behavior prototyping and appearance prototyping. The aim of behavior prototyping is to test the content and structure of the software and to test users' interaction with the interface. Using mockups as the tool of behavior prototyping let users interact with the clickable wireframes. While user testing, users are asked to think aloud to indicate the feeling of detail interactions. And after user test, a survey is filled by the user about the overall experience of this software. After design iteration, the appearance prototyping is aimed to let people know how the software looks like and test the appearance experience of the software.

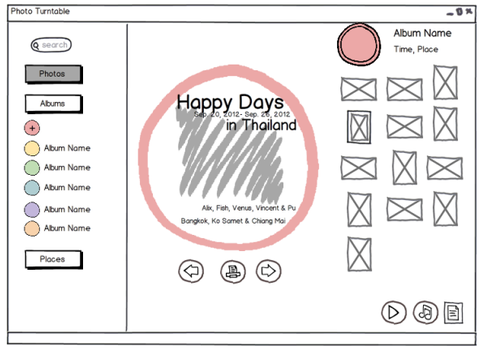
For the second and third criteria, verifying is mostly by using the photo turntable device prototypes. Behavior prototyping and appearance prototyping are used here. Behavior prototyping leaves the interaction possibilities open and lets users actively brainstorm about the design details by a workshop of providing lots of crafts. But before user testing, some questions need to be prepared and the initial concept should be shaped into a behavior prototype. While user testing, users are asked to think aloud. And after test, a interview is aimed to narrow down the design. After design iteration, the appearance prototyping tests the overall appearance experience by giving a specific task.

In order to verify the overall experience of the solution and the three criteria together, a user test of the software and product is conducted. Users are asked to use the software and the photo turntable together by giving different tasks, including photo organizing, viewing and sharing. The evaluation results are proposed in the following sections.

4.2

Evaluation Results

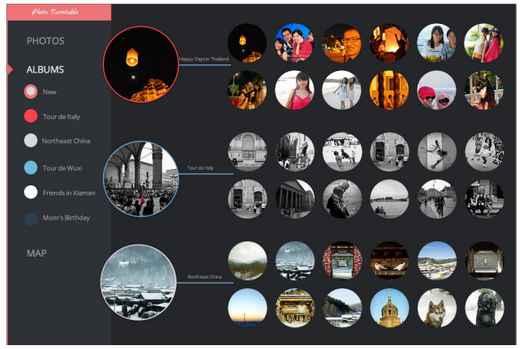
Behavior Prototype - Software



5 users with different backgrounds were tested by behavior prototyping. The aim was to test the content and structure of the software and to test users' interaction with the interface. Mockups was the tool to let users interact with the clickable wireframes. While user testing, users were asked to think aloud to indicate the feeling of detail interactions. And after user test, a survey was filled by the user about the overall experience of this software. The evaluation results indicated that by using this software, it helped people organize their digital photos and create their photo albums.

Evaluation Results

Appearance Prototype - Software



Another 5 users were tested with appearance prototyping. After design iteration, the appearance prototyping was aimed to let people know how the software looks like and test the appearance experience of the software. The appearance prototype was refined from behavior prototype such as some people suggested different shapes of the photos display. The results showed that the interface was easy to understand and had the appealing layout. And the pre-organized function helped people easier organize their digital photos.

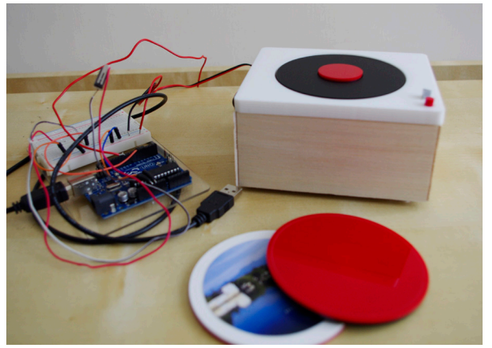
Evaluation Results

Behavior Prototype - Photo Turntable

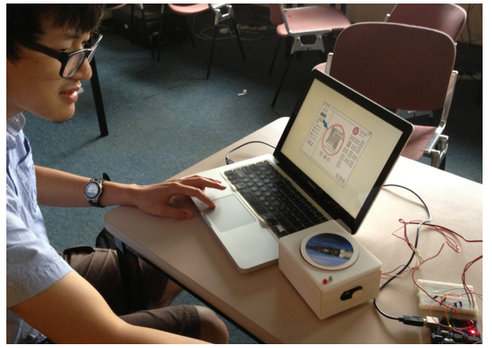
9 users were tested with behavior prototyping. By a workshop of providing paper model and lots of crafts, behavior prototyping left the interaction possibilities open and let users actively brainstorm about the design details. Some questions were prepared before testing. And after test, a interview is aimed to narrow down the interaction details. The evaluation results indicated that the tangible interaction triggered people photo viewing and sharing and provided a new experience to organize and view their photos by physical albums.

Evaluation Results

Appearance Prototype - Photo Turntable



Another 5 users was tested with the appearance prototyping after design iteration. Using Arduino prototyping, people knew about how the devices worked and how it looked like. Also, the users were asked to use the software and the photo turntable together by giving different tasks and walk flow, including photo organizing, viewing and sharing. The evaluation results indicated that by combining software and tangible devices, organizing and viewing photo was an appealing experience for people. And tangible photo disks made the sharing easier among friends and family.



4.3 Discussion

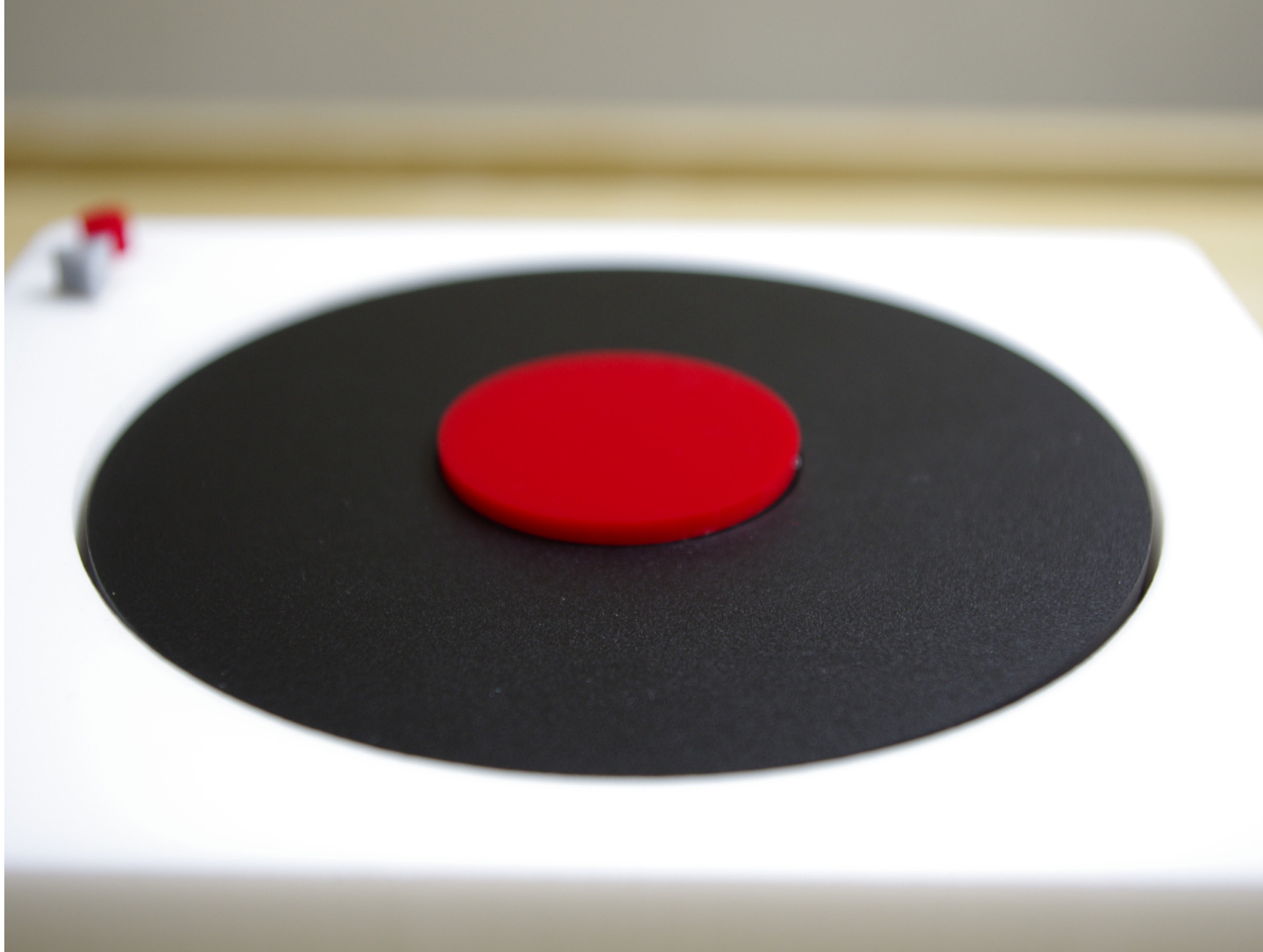
Strengths and weaknesses

In this section, the strengths and weaknesses of Photo Turntable are discussed. The strengths are as follows. First, Photo Turntable is a system involved in the whole process after taking photos, including photo organizing, viewing and sharing. It covers main user needs in such a period of time. The system concept provides people a complete experience regarding digital photos. Second, the tangible user interface helps people easily organize their digital photos into albums. People edit and print their own album cover to create personalized and special photo albums. By integrating physical and digital, Photo Turntable facilitates people's experience with digital world. Third, the tangible albums easier trigger the photo viewing and sharing. It solves the problem that people nowadays seldom review digital photos. The cover and text remind people and physical albums is easy to access. Sharing within home environment is easier than before. In addition, the interaction when photo viewing provides a new experience. People use hand gestures to control the photo play like turning the physical album books in the past. What's more, it avoid the limitation of photo viewing environment. By using projector, people view and share photos anywhere they like.

Photo Turntable have some weaknesses need to be strengthened. First, although the system provide a tangible way of photo organization, the software needs to be more complete to better organize. The software provides a basic pre-organization, but people might need the software to organize in a more personally and meaningful way as the size of photos and tag needs of people increase. Second, Photo Turntable is a home based device, but people might want it suitable for taking out. Sharing is one of the most important aspects regarding photos, now people easily gift photo disks for sharing. But sharing will be even easier when the device could be used outside. What's more, the triggering of photo viewing could be more opportunistic. Using Photo Turntable, people are triggered to view photos when they see the physical disks, but it will be more surprising if the triggering is more opportunistic and intelligent.

Next Steps

Photo Turntable is a system that helps people organize, view and sharing digital photo by a tangible interaction. There are some work need to do in the future. First, from interaction design, the concept is almost complete but some unusual situations need to be considered, such as the need of printing pictures while viewing or other accidental needs. Some need is easy to add but some is better to be eliminated considering the overall experience. Second, from technology point of view, complimenting the related technology and combining them into the device need a lot of work. The implement includes the size of the pattens and how each pattens connect to each other. Also, the development of the software needs to be considered whether a certain interface interaction is achievable. Third, from product design point of view, each pattens' textures, size and other pattens design details need to be design more. Although an appearance prototype was made, the final product is definitely not the same as the prototype. What's more, the market research and strategy plan will provide a market solution for this design.



References

1. Balabanovic, M., Chu. L, and Wolff, G. (2000) Storytelling with Digital Photographs, Proc ACM CHI'00, 564-571.

2. Crabtree, A., Rodden, T., and Mariani, J. (2004) Collaborating around Collections: Informing the Continued Development of Photoware, Proc ACM CHI'04.

3. Norman, D. Emotional Design: Why We Love (or Hate) Everyday Things. Basic Books, 2003.

4. Michael Nunes, Saul Greenberg, and Carman Neustaedter. 2008. Sharing digital photographs in the home through physical mementos, souvenirs, and keepsakes. In Proceedings of the 7th ACM conference on Designing interactive systems (DIS '08). ACM, New York, NY, USA, 250-260.

5. Frohlich D, Kuchinsky A, Pering C, Don A, Ariss S (2002) Requirements for photoware. In: Proceedings of CSCW'02. ACM Press, New York, pp 166–175

6 Whittaker S, Bergman O, Clough P (2010) Easy on that trigger dad: a study of long term family photo retrieval. Pers Ubiquit Comput 14(1):31–43

7 David M. Frohlich, Steven Wall, and Graham Kiddle. 2013. Rediscovery of forgotten images in domestic photo collections. Personal Ubiquitous Comput. 17, 4 (April 2013), 729-740.

8 Frohlich DM (2004) Audiophotography: bringing photos to life with sounds. Kluwer, Dordrecht

9. Elena Mugellini, Elisa Rubegni, Sandro Gerardi, and Omar Abou Khaled. 2007. Using personal objects as tangible interfaces for memory recollection and sharing. In Proceedings of the 1st international conference on Tangible and embedded interaction (TEI '07). ACM, New York, NY, USA, 231-238.

Volume II

1

Problem Definition
Supporting Documents

Interviews

1. Where do you put the digital photos?

2. How often will you view and reuse digital photos?

3. Why review, the motivation to review or reuse?

4. What kind of photos you like to review?

5. Will you print digital photos and keep into album?

6. What objects will remind you about memory?

7. Except taking photos, will you buy any objects when you are traveling?

People Profile 1

Name: CHEN Li
Age: 23
Background: design student

Take photos:
-To record life
-Share with others
-Use mobile app to record foot print such as Four Square

Organize photos:
-By events, key words, folder in folder

Review photos:
-By chance
-Too many other entertainment now when open the computer rather than reviewing photos

Digital photos:
-Too many to organize
-Photoshop really take time

Memory of photos:
-Want to print some photos to make an album, but lazy to organize and photoshop them

People Profile 2

Name: LIN Yunhan
Age: 24
Background: architecture student, prefer DSLR

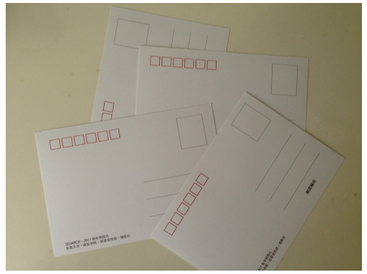
Take photos:
-As his hobby
-Self expression

Organize photos:
-By time, place and theme
-Keep all the originals, Photoshop some

Review photos:
-When listen a song, recall the same song when traveling
-When watch a movie, contrast the same place that he traveled
-Need a photo for expression

Digital photos:
-Timely but cheap

Memory of photos:
-Make postcards by himself every year
-Parents usually review photos in computer



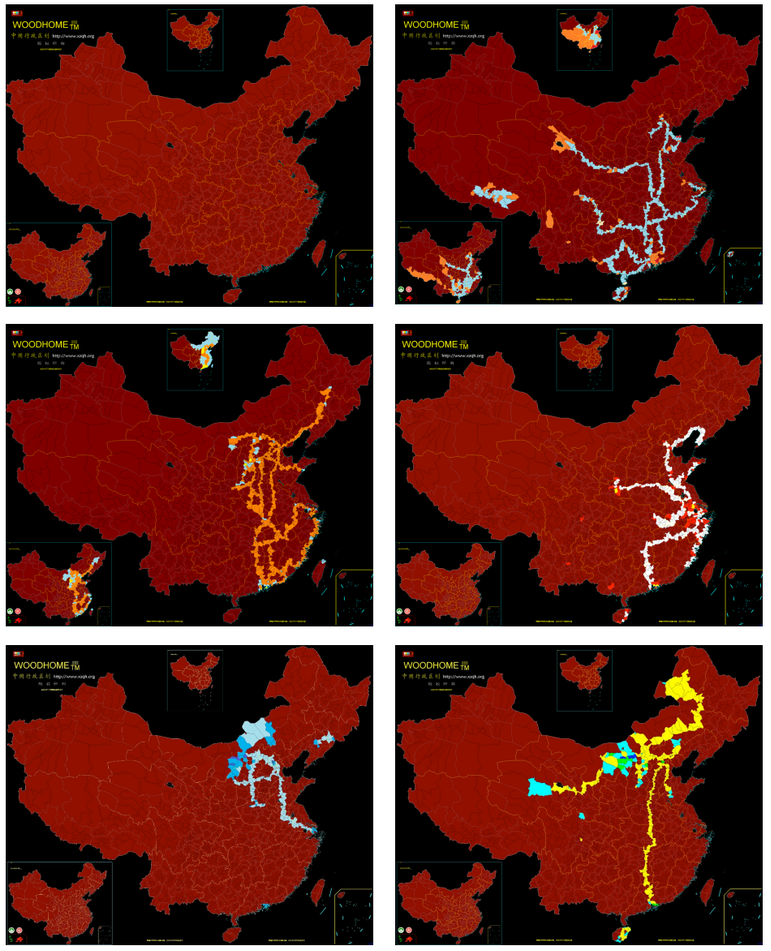
People Profile 3

Name: XU Zhanyu
Age: 24
Background: advertising student

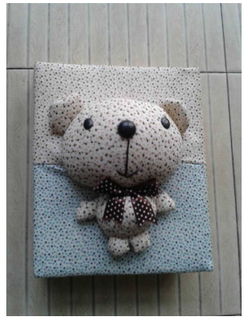
Take photos:
-Record life by photos
-GPS
-Social network, follow others foot prints
-Searching for food, record food

Review photos:
-Using Lightroom, by location map

Memory of photos:
-Draw all the location he has been to by different colors on the map: places he live for long time, places he lived, places he passed by



People Profile 4



Name: CHU Yuhui
Age: 23
Background: design student

1. where: in computer, in social network, organize by time and events

2. How often: not usual, by chance

3. Why: Motivation to review photos
-Special purpose: changing profile pictures
-Home gathering, for family events, festivals
-Miss friends, remind some memory time, such as high school special dormitory photos, by theme
long time not review so that none of them can find the photos
-with parents, see in social network, lazy to find from computer

4. What: photos with people

5. Physical: will print all the important photos of events every time, and put into album

6. Like to organize and see the photos at the moment when finishing photo. but after a certain time, lazy to organize and review

7. artifacts:
-will buy some artifacts
-friends will give artifacts for gifts when traveling

People Profile 5

Name: Jason
Age: 24
Background: design student

1. Where: computer, drive, disk, organize by time and events. seldom organize photo taken long time ago, if the computer is full, just find another drive

2. How often: once or twice for month. not usual, seldom review some time before

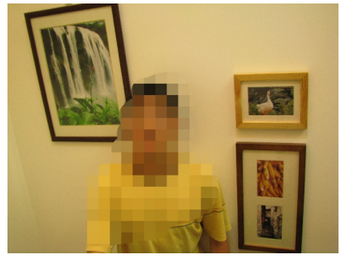
3. Why: Motivation to review photos
-Share to others
-miss friends, parents, grandparents

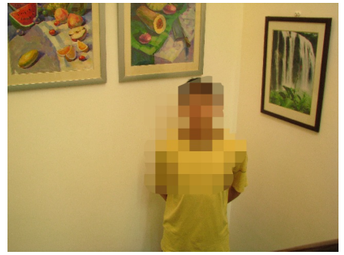
4. What kind of photos: Animals, people,

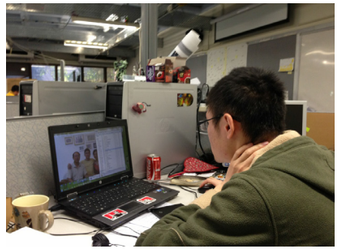
5. Physical: frames at home, selective print

6. Objects: cups, frames

7. Travel: buy some artifacts. masks, to share as a gift



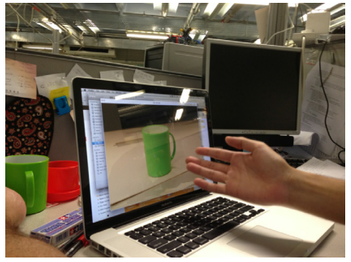




People Profile 6

Name: Diego
Age: 26
Background: design student

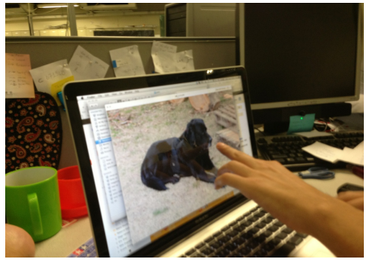
1. Where: computer, camera disk
2. How often: seldom review
3. Why: Motivation to review photos
-when he is really bored
-waiting, reviewing in the camera
-share to others
-by chance
4. What kind of photos: people, landscape
5. Physical: prefer physical album at home
6. Travel: seldom buy artifacts, as gift

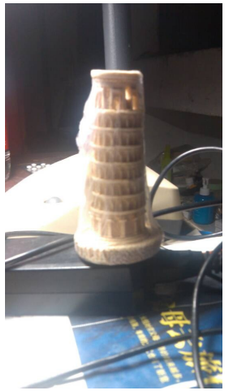


People Profile 7

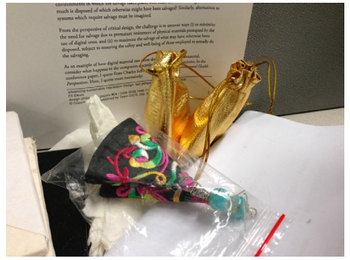
Name: Vincenzo
Age: 26
Background: design student

1. Where: computer, camera disk
2. How often: nearly once every 3 months
3. Why: Motivation to review photos
-by chance, no plan
-share to others
-when start, when spend more time
4. What kind of photos: people, landscape
5. Physical: artifact remind him of travel experience but not mementos



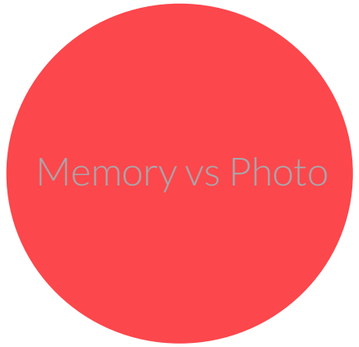


People share the travel memory by the mementos getting from travel. They give other people as gifts. Also, ordinary artifacts such as a bottle in the airplane, the tickets will recall much memories.



People like to put physical objects in their daily life and once been asked, they will automatically remind the memory related to that particular physical objects. People view the physical personal objects are comforting.

Literature Review

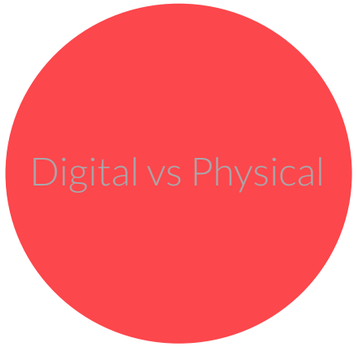


1. Frohlich DM (2004) Audiophotography: bringing photos to life with sounds. Kluwer, Dordrecht

2. David Frohlich and Jacqueline Fennell. 2007. Sound, paper and memorabilia: resources for a simpler digital photography. Personal Ubiquitous Comput. 11, 2 (January 2007), 107-116.

3. Morgan Ames, Dean Eckles, Mor Naaman, Mirjana Spasojevic, and Nancy House. 2010. Requirements for mobile photoware. Personal Ubiquitous Comput. 14, 2 (February 2010), 95-109.

4. David M. Frohlich, Steven Wall, and Graham Kiddle. 2013. Rediscovery of forgotten images in domestic photo collections. Personal Ubiquitous Comput. 17, 4 (April 2013), 729-740.

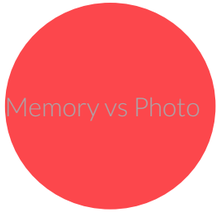


5. Blevis, E., Lim, Y., Ozakca, M., and Aneja, S. 2005. Designing interactivity for the specific context of designerly collaborations. In CHI '05 Extended Abstracts on Human Factors in Computing Systems (Portland, OR, USA, April 02 - 07, 2005). CHI '05. ACM, New York, NY, 1216-1219.

6. Elena Mugellini, Elisa Rubegni, Sandro Gerardi, and Omar Abou Khaled. 2007. Using personal objects as tangible interfaces for memory recollection and sharing. In Proceedings of the 1st international conference on Tangible and embedded interaction (TEI '07). ACM, New York, NY, USA, 231-238.

7. David Kirk, Abigail Sellen, Stuart Taylor, Nicolas Villar, and Shahram Izadi. 2009. Putting the physical into the digital: issues in designing hybrid interactive surfaces. In Proceedings of the 23rd British HCI Group Annual Conference on People and Computers: Celebrating People and Technology (BCS-HCI '09). British Computer Society, Swinton, UK, UK, 35-44.

8. Connie Golsteijn, Elise van den Hoven, David Frohlich, and Abigail Sellen. 2012. Towards a more cherishable digital object. In Proceedings of the Designing Interactive Systems Conference (DIS '12). ACM, New York, NY, USA, 655-664.



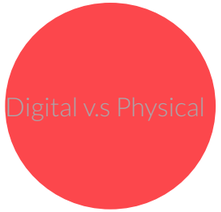
“Memory is something which happens individually on review of a photograph, but also socially and collaboratively in interaction.” [1]

“Despite the advantages offered by screen-based photographs and multimedia variants, consumers are reticent to give up the beauty and simplicity of tangible prints. These provide a reliable method of accessing and managing images, and lead to highly interactive modes of sharing them.”[2]

“Family members often struggled to locate digital photographs from family events which took place more than a year ago.”
“The study found that many triggers for photo reuse were either speculative or accidental and led people to reinterpret the meaning of photographs in the light of subsequent experience and social discussion.”

“The value of a photograph seemed to increase with time, because of the way it connected to other photographs, memories and events since the original was taken.”[4]

“Personal photography is one of the most successful mobile technologies of the last century. Not only has digital photography has rapidly supplanted film photography, but ever-present cameraphones may be poised to replace stand- alone digital cameras in many of their roles.”[3]



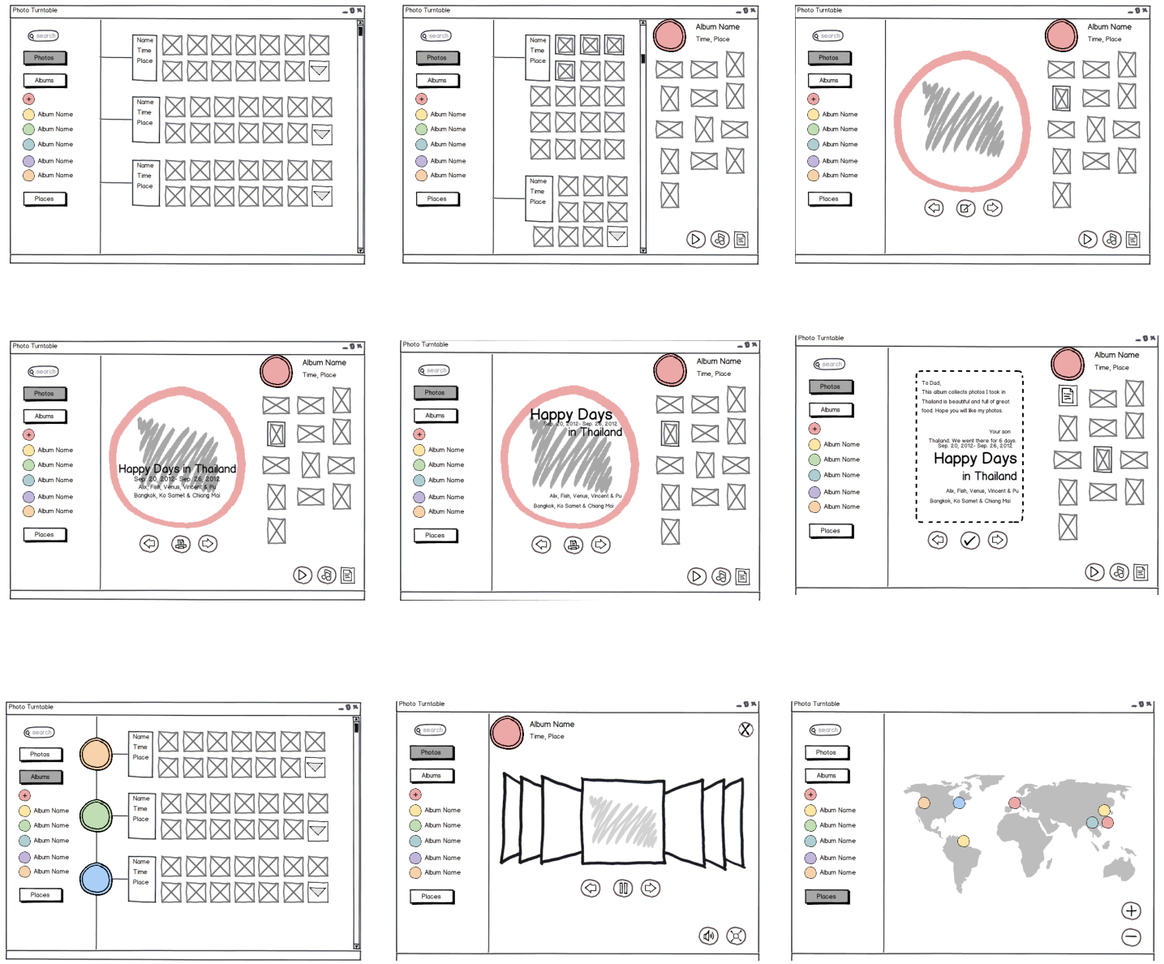
"TUIs are emerging as a new paradigm for facilitating user interaction with digital world by providing a mean for integrating physical and digital world. This term, has been first introduced by Ullmer and Ishii, which defines
Tangible User Interfaces as follows: “TUIs couple physical representations (e.g. spatially manipulable physical objects) with digital representations (e.g. graphics or audio), yielding user interfaces that are computationally mediated
but not generally identifiable as “computers” perse”.

Recently it has been demonstrated that personal objects and souvenirs can be used as tangible interfaces and ambient intelligent objects. Users have a mental model of the links between their personal physical objects (souvenirs) and the related digital information, as a consequence those objects can be used as TUIs instead of developing new ones that have to be learned by the users. In other worlds personal objects can act as stimulus connected to the events helping people to evoke certain circumstances and supporting the reconstruction of memory. In this case the stimulus is a tangible cue which enables the retrieval of information from the memory. "[6]

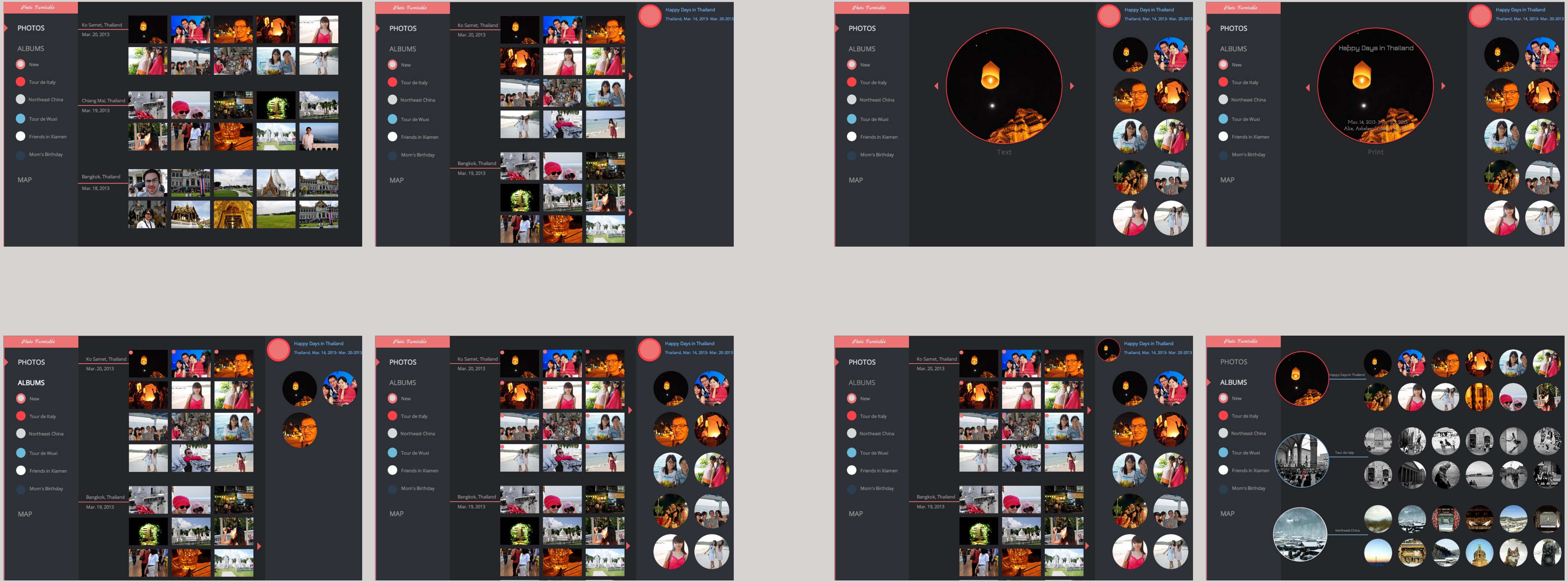
2

Evaluation
Supporting Documents

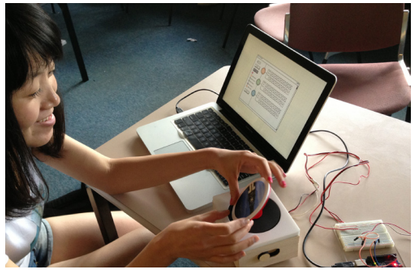
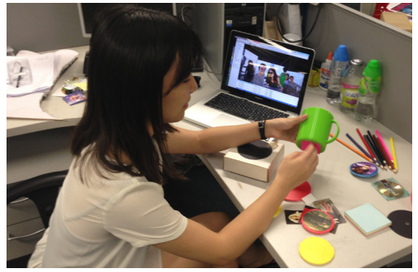
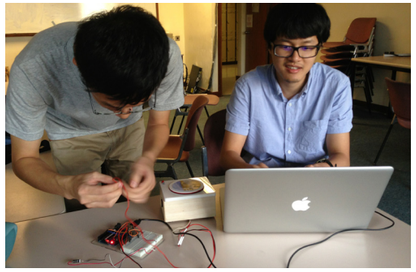
Behavior Prototype - Software



Appearance Prototype - Software

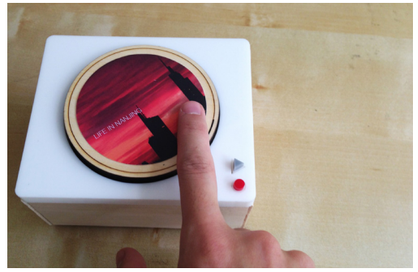


Behavior Prototype - Photo Turntable

Appearance Prototype - Photo Turntable





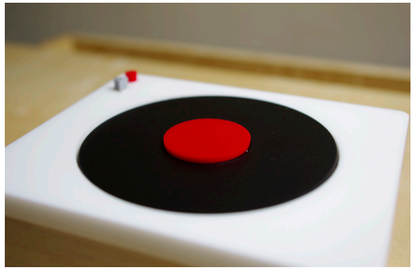


PHOTO TURNTABLE

By YANG Pu

Demonstration Project Report
Advisors: Eli Blevis & Huaxin Wei

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Jul. 17, 2013