Google Glass and Application for Photographers

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1. Introduction

1.1 User Experience(UX) Guidelines for Google Glass

Glass is fundamentally different than existing mobile platforms in both design and use (Google, 2013). Hence, it is important to think about UX guidelines specific for Glass and where Glass could go wrong, in order to provide best experience.

1. **System design consideration**
    i. **Add information or object to an existing world**
    Augmented experience should add meaningful information or object to users' current situation to improve their experience. Users appreciate the augmented experience that is relevant and practically more useful for them in a given situation.
    ii. **Ask user only when necessary**
    When designing an augmented reality (AR) experience, automate the application as much as possible, however, when user gestures are required, make it smooth. For example, users find it awkward when they control the AR with one hand and controlling the device with another.
    iii. **Save users' time and effort**
    One of the biggest benefits of using Google glass over smartphone or tablet is that it can remove the interaction middleman when necessary. Therefore, Google glass should allow easier information memory and retrieval that would barely possible via other platforms.

2. **Embodied Interaction**
    i. **Allow comfortable and natural gesture, manipulation and movement.**
    During augmented experience, their gesture and postures should be natural and follow the major human movement.

3. **Content Design**
    i. **No heavy flashy animation**

The risk of users developing eyestrain or eye fatigue is much greater than when viewed on a desktop, tablet or smartphone.

ii. **Group the contents logically**

Add only one content to a card display and put the most important things first.

4. **Understand the environment**

   i. **Collect all details of the physical environment to be augmented**

   Since augmented experience can happen in many different environments, it is important to consider as many details as possible, which include:

   1. Different noise level of the environment.
   2. Different reception qualities and its effect on AR.
   3. How augmented experience can be different in indoor and outdoor.
   4. If user moving or not.
   5. The effect of sunlight on AR.

5. **Balancing the reality and virtuality**

   i. **Do not isolate users**

   Allow connectedness and collaboration with people around AR when necessary.

   ii. **Don't try to excel the reality**

   Augmentation should be utilized for things that are not possible in real world but radical virtual reality could interrupt user acceptance (Once users realize that augmented experience is too disconnected from their reality, they are less likely to accept their augmented experience).

   iii. **Clearly differentiate the reality from virtual reality**

   Allow users to easily differentiate the virtual reality from reality. If they are confused, they will keep trying to differentiate virtual reality from reality by wearing off their Glass.

6. **Support appropriate level of user control**

   i. **User initiated information rather than proactive notification**

Except information such as weather alert, nearby events and store promotions (set by users), users prefer to see self-triggered information.

ii. **Minimize user's attention**

Since monocular view removes real world stimulus from users, AR should require minimal attention.

7. **Support security and safety of user**

   i. **Protect the identity of user**

   Collect users information only when authorized by them (including takes pictures/videos of them).

   ii. **Support safety of the user**

   Always allow their experience to be stopped because it shouldn't get in the way of users when they are suddenly placed in a hazardous situation.

1.2 Where Google Glass Could Go Wrong

Glass can cause symptoms such as eyestrain, headache and pain in a neck

- Our brain doesn't like to see one image in front of one eye and nothing in front of the other.
- The problem could arise from Glass are binocular rivalry, visual interference and phoria.

Glass can infringe others' privacy with camera

- People can make a personal decision to check their smartphone but sometimes Glass wearers cannot make decision as to whether they want the Glass to be 'on' or 'not'.
- It is difficult for people to tell when Glass is recording them or not, because Glass always point at other people around.
- In certain situations such as casinos and pubs, the Glass can be illegally used to record videos and take pictures.

Glass wearers' information will be shared online because Glass could record everything

- Not only the data (photos, contact information, etc) are gathered via Glass but also Glass wearer's personal information are saved online, which are available for other Glass applications to share it with others and others to have access to it.

Glass's distinctive looking will draw unnecessary attention from others

- Some people will wonder when they see a person wearing a Glass
- When a Glass wearer talking on the phone in the street using an earphone embedded microphone, people passing by will think that it is awkward, especially depending on the culture/norms of the society.

Glass needs to be hooked up to the Internet constantly for its full functionality; therefore data cost can be a concern for users

- In order for Glass to record everything, upload it to the Internet and share with friends, Glass needs a constant data connection.

Glass can distract users and people around them

- Distracting users while driving could result in an accident.
- During conversation, not only the user but also the conversation partner can be distracted.

Glass wearers are less likely to see the real world around them.

- Living insulated lives away from the natural world could result in higher possibilities of developing mental diseases such as depression, anxiety, attention deficit disorder, and addictions.

Glass provides distinctive interaction method

- In the beginning, most people need to learn and practice how to use it. Unlike smartphone where people see rows of icons, Glass has a unique way of interacting and controlling the system. For example, a user has to swipe down to go up the

hierarchy on level. It could take long to mentally construct a model of Glass' menu hierarchy and map it to the gestures needed to navigate it.

2. About the application

Before get into the features of this application, it is important to understand how fashion photographers work before and while shooting.

2.1 **Context of use**

Central to the notion of this application is helping fashion photographers while they are preparing for the shot as well as taking a shot. In case of outdoor shooting, photographers visit the potential sites before shooting to understand the site's possibilities, limitations and conditions while deciding specific locations of a site to shoot. While scouting the shooting site, photographers take test shots of potential shooting locations, remember the locations and sometimes leave the notes about what comes to their mind at that moment.

After scouting the site, photographers transfer site pictures to their computer. While referring to the site pictures, they start sketching the shots, collecting resources such as other inspirational images from magazine, journal or books. During this stage, photographers get together with others such as make-up artists, hairstylists and fashion stylists exchange ideas and make decisions about shooting. At this stage, a team of artists and photographers make decisions about every single detail for individual shots.

On the day of shooting, a photographer is a creative director that manages the situation and other staffs. Most of the time, all staffs already knows their job, however, it is up to the photographer to final decisions on the site. For instance, when the weather conditions becomes worse unexpectedly, photographer should adjust the shooting schedule or in case any staffs suddenly come up with idea for shooting, photographer should decide whether to take that idea or not. To sum up, the decisions made for fashion photography project is made by a group of specialists, and it is up to the photographer that make all ideas happen in reality.

2.2 Key Features

This application allows a photographer to take pictures of potential sites, remember the locations and record notes via their voice. Some of the examples of notes that photographer would record along with site pictures are direction of the light and time of the shooting day that they want to shoot.

After site scouting, photographer can upload shot sketches, notes, and other inspirational images to the application. At this point, photographer has everything he needs on the application. The resources are categorized into 3 sections – shots, resources, and locations. And each section includes bundle of cards, which are:

1. Shots
   - List of shots
   - Shot sketches and notes
2. Resources
   - Any notes photographers have about the shot
   - Inspirational images
3. Locations
   - Shooting schedule
   - Background shots
   - Live cards that shows shooting locations (Augmented Reality)

This application allows photographer refer to these information as naturally as possible without hindering the flow of shooting.

2.3 Benefits

The most critical elements of shooting are the flow of shooting and time management. Once a photographer and models are on the flow that they both like, that shooting goes very well most of the time. In terms of time management, If the shooting is scheduled for 2 hours, a photographer actually left with about 15 – 20 minutes to take photos after models receive makeup and put the clothes on. Hence it is necessary for some photographers to set the timer for each shot, so that they can take different shots they need within limited amount of time.

In this situation, this application allows photographers to refer to their resources without hindering the flow of shooting. Waking up the Glass and ask for specific information or images can happen in no time with a few gestures or voice invocations. On top of that, it could give them a light notification about their shooting schedule.
When a photographer uses this application as guidance for shooting and time management tool, directing the models, and other staffs becomes less of a concern. In the end, a photographer can take shots according to what he had planned while using limited time more efficiently.

2.4 Where the Idea Came From

Thinking of ideas for Glass application, I thought of my experience when I had to struggle a lot while shooting for school projects. When the shooting lasts longer, I lost the track of following my shooting plans, and just took whatever I thought was good at that time not willing to grab the notes from the backpack and remind myself. Since then I have talked to my friend who recently finished his college degree in photography and asked his workflow from the very beginning. He have worked on many different type of photography projects and when he talked about how he prepares for the fashion photography shooting, I thought that there are so many works involved and the role of photographers are much more demanding than I could have possibly imagined before. Since then I have done researches about how photographers prepare for, and shoot the fashion photography from YouTube videos, articles and blogs. Finally I also had a chance to talk about my idea to a professional photographer, who recently worked for Lexus cars' TV and editorial advertisement. Looking at the slides his team prepared for the shot, I could validate (though a little) my ideas because they actually create sketches for every single shot they want to take along with detailed plans for make-up, hairstyles and clothing styles. So far, this application has a potential to be well adopted by both professional and junior fashion photographers.

3. UX Guidelines for the Application

3.1 Application Compared to UX Guidelines

System consideration

- When photographers are visiting the location before the shot, they could look up the history, culture, and other special things about that location.
- Since this application will be used while their hands are carrying camera and they could be climbing the ladder or crouching low, it should require as little movement as possible (voice recognition and switching the cards with hands).
- This is where Glass can be most handy. This application would allow photographers to retrieve their sketches, idea notes, and mood board easier. In addition, it could potentially be used to communicate photographer's ideas about expression, mood and backdrops.

Embodied interaction

- Most of the interaction should happen via voice or blinking for the virtue of photographers' efficient workflow. However, for photographer who usually does not wear eyeglasses, it could be uncomfortable for them to wear Glass.

Content design

- Most of the contents are images and notes. Hence it is important categorize images (sketches, idea notes, mood board) so that photographer can access quickly without being confused with other images.

Understand the environment

- This environment will be quite noisy. Photographers keep talking loud to models while shooting such as "Great!" "Love the expression!", in order to make them feel confident and comfortable.
- The sound from shutter will be loud.
- The model could mistakenly understand that photographers are talking to them when they are actually talking to the Glass.

- The photographers will use it both inside and outside. Especially when they are in outside, they will be moving a lot when they are preparing for the shot.

Balancing the reality and virtuality

- In order not to isolate photographers, the transition from interacting with Glass to talking to their staff should be natural.

Support appropriate level of user control

- The application shouldn't distract photographers while they are taking shots. Only photographer should trigger the information.
- During shot, they are looking at the lens most of the time, Glass should be comfortable for them to wear while their eyes are close to the camera.

Support security and safety of user

- A lot of times, photographers are looking at the model, which means that Glass's camera will be looking at the model as well. The identity of model should be protected and the photographer's sketches and notes should be protected securely.

3.2 Application Compared to "Where Glass could go wrong"

Glass can cause symptoms such as eyestrain, headache and pain in a neck

If the use of this Glass application is limited to when photographers are preparing for the shot and during the shot, I wouldn't worry too much about the potential development of mental diseases or eye-strain because it's use cases is limited and photographers are mostly grown-up.

Glass can infringe others' privacy with camera

Models who are in front of photographer wearing Glass could possibly feel less comfortable.

Glass wearer's information will be shared online

Since photographer's notes, sketches, ideas and other inspirational images exist online, they is a risk of being infringed by others.

Glass's distinctive looking will draw unnecessary attention from others

Photographers will be around people who are in favor of new technology. Therefore the acceptance level of Glass for photographers and people around them would be quite high.

Glass can distract users and people around them

The model could mistakenly understand that photographer is talking to them when he is actually talking to the Glass.

Glass provides distinctive interaction method

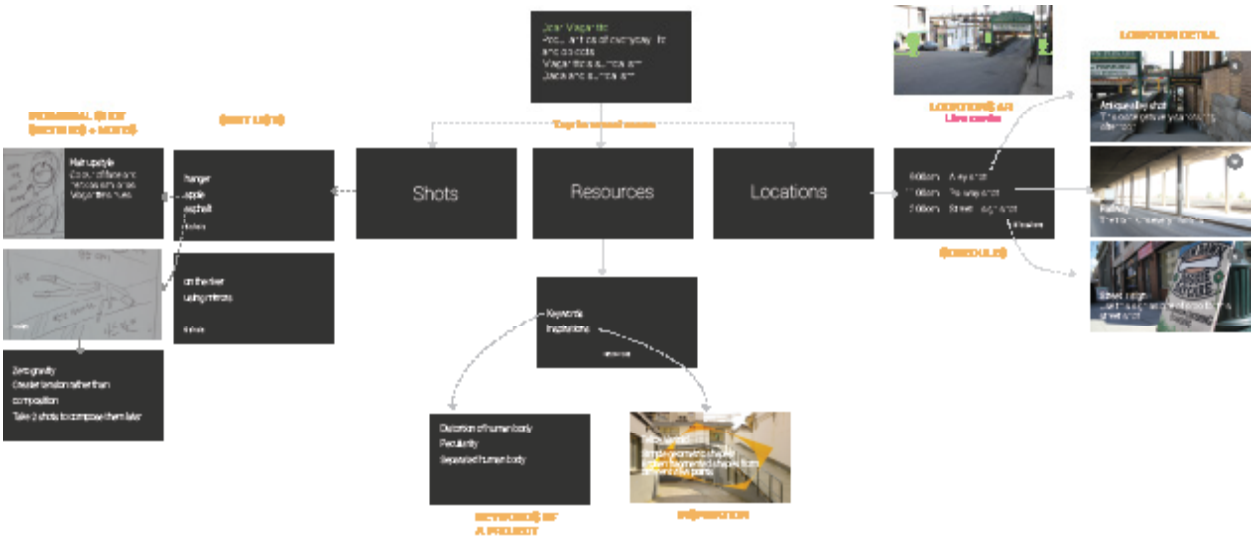
Photographers tend to be good at learning how to use new technology. The camera technology is changing very fast and they regularly upgrade their equipment, there fore they could learn how to use Glass relatively easily.

4. Storyboard

4.1 Outdoor shooting

4.2 Indoor shooting

5. Application Timeline



6. Pilot Testing

6.1 Testing Timeline

TIME	PONG	WE	NOTES
9:00am	Be familiar with Glass	Introduction to Glass & application	A
9:15am	Pre-test questionnaire	Pre-test questionnaire	
9:25am	Start walking around the campus to take pictures of potential site for shooting	Take pictures of Pong using Glass	
9:50am	- Think about the potential sites for shooting. - Start think about inspirations with her spreadsheets(little inspiration pics Pong normally use)	Move the photos from Glass to laptop	
10:00am	Flip through the photos and choose one site for shooting		
10:10am	Find inspirations for shooting	Upload a picture of shooting site to Glass	
10:15am	Sketch the shots & leave notes		B
10:25am	Prepare the equipments(-camera) for shooting	Upload sketches (&key-words) to Glass	
10:30am	Move to the site and start shooting	Take picture of Pong shooting	
10:50am		Post-test questionnaire	

Note - A

How to use Glass

1) Tap the touchpad to activate Glass.
2) Swipe forward to move right on your timeline, swipe backwards to move left through items on timeline.
3) Swipe rapidly to navigate quickly through timeline but you wouldn't probably need to use it.
4) Tap the touchpad to select a card or expand a bundle of cards.
5) Swipe down from the Home screen to turn the display off. Swiping down acts as your back button.
6) Head wake up functionality...Tilting your head will turn the display on for a few seconds. You can also turn the display off by quickly nodding your head up again.

About study

1) Suppose you were asked to shoot for fashion magazine. The setting is on our campus and you will walk around the campus to find potential site for shooting. You can freely take pictures with Glass of your potential site. Once you take pictures of the potential sites, we will transfer pictures to our computer, so that you can flip through the pictures and choose one site.
While we are transferring the pictures, you can start to think about your inspirations for shooting using your spreadsheets. Once we finish transferring file to the laptop, you can flip through the pictures you've taken and choose one site for shooting. Feel free to chat with your friends!. Once you choose one site for shooting and your inspirations for shooting, you can create some sketches for your shooting, as you would normally do. Once you are done, we will upload your sketches to the Glass and you can start shooting.

Note - B

Have her to look at the photos she has taken while sketching. She can choose to look at it from the Glass or laptop.

6.2 Pre-Test Questionnaire

1. What comes to your mind after you heard about this application?

"It has so much potential to be something. How it looks and how it feels should be adjusted more to be actually integrated in real life. The screen make it hard to focus on both so it is hard to multi-task."

2. Can you talk about a time when you prepare for shooting...? How do you go about preparing for shooting?

"It always start with concept. Find images on the Internet or do some sketches all out of my head. And go find a model that fit the concept, contact to stylists and do same thing for location."

   a. How long do you prepare for a shooting?

   "Depends on the project, I can do it in a day or it can take even a month."

   b. (If any)How do you usually work with make-up/hair stylist, models and stylist?

   "At first, it was just me and talking to a lot of people that really don't know. But now I have a team that work together. We pull ideas from each other and sometimes make props. We usually gather at the coffee shop."

3. What kind of devices do you use before/during (outdoor) shooting?

   a. Why do you use that device?

   "Laptop for image collecting and IPad for sketching. It is also useful, in case the model is not experienced. I can show the pose and vibe using IPad. Also I can send out sketches to people easily."

4. Can you talk about a time when you are shooting? Can you describe how you would direct other staffs? models? How do you communicate with them?

"Yeah. Photographer is a creative director. I usually talk to them before so they all some to the site knowing what they have to do. When you really need to direct people is when something goes wrong. Or someone comes up with an idea, I need to decide whether to take that idea or not. Sometimes people show up late or not show

up at all. In case the model is not experienced enough; I need to warm up the model. I have them try out variety of poses and expressions though I am obviously not going to use that images."

5. Do you have any question before start testing?

"No."

6.3 Post-Test Questionnaire

1. How does it feel to wear Glass in general?

"I cannot put the camera to my eyes. It is a really huge problem. It will be more helpful for people who focuses with left their eye but that's not common either."

2. How does it feel to use this application before and during a shot?

"It worked as I expected. It provided me enough information and images that I can scroll through quickly while doing something else. It takes a bit to get used to. But as I am running around today, I am starting to get it."

3. Where there features of the application that you found useful? If so, why?

4. How likely would you like to use this application if you have an access to Glass?

"There are a lot of possibilities in film. It actually could be very helpful in painting, because you can have images on the Glass interface that you can keep refer to easily."

   a. Can you describe more how you would use it in film setting?

   "Film is very team based. There are at least one or two cameraperson and there is a director. Directors access the scene and provide references for cameramen so that they can construct the scene. If the camera could be synced to the Glass, director can even direct the cameraman at home."

5. Is there anything you wish this application would allow you to do that it doesn't right now?

"Camera needs to be suitable."

"In the photography, we usually crop a lot of things out and most of the time we want to focus on one thing but Glass takes a very quick snap shot of everything (almost panoramic), so you don't know why you took certain picture (was it ceiling or wall or floor that I liked?). So I have to walk up to the object to take picture of what I really want."

6. Given the opportunity, are there any ways you would look to improve this application?

7. Do you have any comments or questions about the application?
   "Fashion photography is so old, and there hasn't been any revolution in this field. We are still using the same equipment as long time ago. There are upgrades in the same equipment but no evolution. It would be so cool if there is a evolution."

6.4 Review of Pilot Testing

Recruiting participant was daunting in the beginning. I started asking to people and could finally find someone who knows a freelance fashion photographer. The participant perfectly fit to the user group I was considering- a fashion photographer who is not very experienced but worked on several real-world projects.

While setting up a schedule for testing with participant via email, I introduced him about myself and the background for this testing so that he feel relaxed and comfortable with visiting the campus for testing. When participant asked if he could bring his friends, I thought it would not be very necessary but I could not say "no" to that. Starbucks gift card was prepared for compensation.

While planning the pilot testing, the book *Interviewing for research* by Andrew Travers allowed me to reorient my knowledge for user testing, which I haven't done for a while. One of many other helpful tips from the book that I wanted to remind myself but which I failed to follow perfectly during test is:

- Be neutral and naïve as much as possible – Throughout the interview, I sometimes said "Okay, that is cool" and "That is interesting" to the participant's answer. It could have drawn interviewee into saying what they think I want to hear.

What I have done well during interview were:

- Avoiding leading or closed questions.
- Pause for a while after an interviewee has replied.
- Reframing what an interviewee has just said.

Some of the issues that I have found while following participant trying Glass were:

- The participants' friends were talking about their ideas throughout the testing, which could have biased the participant.
- The actual time for testing was delayed while participant and their friends taking pictures of themselves wearing Glass. It could have hindered the normal workflow of the participant.
- We were trying to test 2 interfaces but the second image was not showing up on the Glass, however, at least the first images was shown up properly.
- The participant could not put the camera on this right eye wearing Glass, which he uses for focusing.
- The Glass camera quickly captured a very wide angle of the scene so the participant had to actually walk close to the object of interest, because he is usually interested in one specific object of the scene not the overall scene.

Though there were some issues with study, the information gathered and what I have realized from study were very helpful for this project.

- The process of quickly referring to the application interface while shooting was natural enough so that it did not distract the photographer's usual workflow.
- The participant got used to using Glass quickly and used the application as I expected – quickly flip through the cards to see the image on interface.
- The participant also mentioned that the application worked as he expected, which is quickly flipping through images of cards that are giving him helpful information.
- The participant felt distracting to have Glass interface turned on while shooting. However, after turning off the Glass interface, he could focus on shooting and wake up the Glass when he wanted.

7. Reflection

7.1 What worked and What Didn't Work

I worked with Glass starter project written in PHP, which allows developers to quickly test the major functionalities of the Google Mirror API. I could send code for card layouts to Glass and display cards on the Glass interface via localhost. All the cards that I have developed are static cards and the types of cards are:

- Displaying shot sketches with notes
- Displaying site pictures with notes
- Displaying inspirational images with notes
- Displaying shot lists
- Displaying shooting schedules

The cards were categorized into 3 bundles, which are "shots", "resources" and "locations".

Though I could display all images and texts on the Glass interface, they were all static card and the functionalities that I missed are:

- Allowing users to upload information by themselves.
- Having Glass to remember locations of the sites and allowing users to scan the site with Glass.
- Allowing users to record notes via their voice.
- Freely navigate the cards using menu items.
- Allowing users to schedule shooting and setting up notifications.

7.2 Review of UX Guidelines

In section 3, the application was compared to the UX guidelines for Google Glass. In this section, the application will be compared to UX guidelines based on the findings from the pilot testing.

System consideration

Glass application allowed a photographer to quickly look up the site pictures, notes and sketches. Interacting with Glass was natural and fast enough so that it did not hinder the usual workflow of shooting. The task of looking up resources from Glass interface is

much faster than current way of referring to resources, which is stop the shooting, put the camera down and grab other devices or their notes.

Embodied Interaction

Most of the time, a photographer took pictures via voice command and when looking up the card, he used touch pad. A photographer wore Glass for about an hour and during that time, he did not complain about controlling Glass with touchpad. Hence, it could be assumed that the gestures related to controlling Glass were natural enough. However, controlling Glass could be even more natural if the angle and sensitivity the photographer can turn on/off the Glass by nodding is customized to him.

Content Design

The interface only included the information needed for photographer. The information is categorized into 3 bundles, which are shots, resources and location. The effectiveness of this categorization could not be proved from the study since we only allowed him to look at the site picture.

Understand the environment

Since a model already knew that photographer would be talking to Glass, the model did not mistakenly understand that the photographer is talking to her. The ambient noise did not really have impact on the use of Glass for photographer. It is very much possible that Glass be activated by the voice from others, however, during testing no one stood close to photographer and no one said specific voice command that Glass can understand.

Balancing the reality and virtuality

While testing, the situation where the photographer is being isolated from others could not be found.

Support appropriate level of user control

It was a huge problem because the photographer could not put the camera close to their right eye because of Glass. And in the beginning of shooting, the photographer struggled

a bit trying to turn the display off while shooting but he soon became familiar with turning on and off the Glass while shooting, as he wanted.

Support security and safety of user

The security concern, which is protecting the photographer's resources could not be proved by the single study. The only thing that could be proved from this study was the fact that the model did not feel uncomfortable with the Glass lens being keep pointing at her.

7.3 Review of where Glass could go wrong

Due to limited resources and amount of time, not all lists could be proved from this study. Some of the lists that could not be proved but I could found out are:

Glass can infringe others' privacy with camera

While the participant was walking around the campus, Glass's camera pointed at a lot of people on campus. None seemed to be concerned about their privacy, however, it could be because the environment is on campus where students will safe most of the time.

Glass's distinctive looking will draw unnecessary attention from others

A participant drew attention from people while walking around the campus wearing Glass. However, the attention was just at the level of being curious and glancing at the participant. Even when the participant was talking to Glass such as "Okay Glass, take a picture", people passing by the participant did not seem to care that much.

Glass provides distinctive interaction method

A participant struggled with manipulating the Glass in the beginning. Even after getting introduced about how to use it, the participant made a lot of errors such as not being able to turn off the display when he wanted. However, after running a test for about 2 hours, the participant felt quite comfortable with using Glass.

7.4 Reflection on the study

I found this directed study very informative and interesting. Although my initial goal for the directed study was developing a web service in order to improve my web programming skills, there are many other aspects that I have learned and practiced, as a result of this study.

This study first introduced me into the field of wearable technology and especially Google Glass. It was a totally new platform that I have never worked with and the domain of wearable technology was not very familiar to me even though I came across the term “wearable technology” from online media. Coming up with UX guidelines for Glass and where Glass could go wrong was very helpful practice. When Andrew first asked me to come up with a list, I was unsure of what needed to done and how or where I should start just because It was my first time coming up with some sort of guidelines for a specific device, however, I soon realized the importance of this practice while researching about the wearable technology and Glass. UX guidelines are considered to be the best resource that designers and developer can use to ensure that the applications they produce are usable (Mlfsud, 2011). It was especially more important for the wearable technology since the device is physically attached to the human body. Hence my research had to look beyond the screen and consider the relationship between digital interface and physical interaction. For example, guidelines such as “Allow comfortable and natural gesture, manipulation and movement”, “Do not isolate users”, and “Clearly differentiate the reality from virtual reality” will allow other designers and developers to consider how the physical interaction and space will affect the experience of using wearable technology.

Working on UX guidelines for wearable technology and Glass also allowed me to look at the credibility of the information. The guidelines are for designers and developers who create applications for users and it had to give the creators of application insight into designs that will work and will not work.

After creating storyboards and scenarios, I started programming in PHP using Glassware starter project. Though I understand the limited access to Glass, programming for Glassware was something that could have been better for me. I usually just write code first though I am not sure how the code will actually turn out, and fix the code as I debug frequently. However, since I could not debug by myself, I had to guess how the code would look like on the interface. In the end, I was not able to explore the programming side of this project as much as I expected.

Lastly, pilot testing was very informative for me. Though I have done several user-testings this semester, none of them were as formal and well structured as this one. Reading a book Interviewing for research by Andrew Travers reoriented my knowledge about user testing, which helped me a lot when preparing for a study.

After testing I have realized that my preparation for user testing will have to be more specific. Though I still need more interviewing experience, the interview environment where there are 5 other people listening to my questions was a bit daunting to me and I feel like I could have better lead the interview especially when I had to deviate the order of questions depending on the answer of the participant. However, I do know that my next interview will definitely be better based on this experience.

In conclusion, this study introduced me into the research, design and develop for new domain and the entire process of this study will better prepare me in my future project especially when I get to work on the domain that I am not familiar with. I have learned and practiced how I should go about working on the new domain of design project. In my future project, I will be able to relatively easily figure out what to consider in researching about the project, and the process to follow to come up with better end result.

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