

## **"Enhancing Visually Impaired People's Travelling Experience through Mobile Applications"**

**Ms. Lusha Huang, Hong Kong Polytechnic University**

**International Disability Rights Affirmation Conference 2018**

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[2018/10/05 06:59] Elektra Panthar: Hello everyone.

Today's presentation is being transcribed so those without audio or who require text only can participate in real time.

Some speakers may use a teleprompter. Transcription will support the speaker and Q&A sessions.

A little explanation about this service.

Voice-to-text transcriptionists provide a translation of the key ideas discussed, NOT a word for word transcription.

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Transcription is provided by Virtual Ability, Inc.

The transcriptionists are:

Elektra Panthar

LoriVonne Lustre

The following initials in the transcription record will identify the speaker:

LH = Lusha Huang

[2018/10/05 07:00] Gentle Heron: Good morning and welcome everyone.

I'm Gentle Heron, a volunteer in the Virtual Ability community here in Second Life and president of the Virtual Ability, Inc. nonprofit corporation that supports our work here. I have multiple sclerosis.

I want to welcome everyone to our 2018 International Disability Rights Affirmation Conference. Our conference theme is "Taking Care of Us."

This can mean many things, of course.

Whether these people are called caregivers, assistants, carers, support partners, attendants ... it doesn't matter. They help those of us with disabilities in many ways. Probably first what comes to mind is providing physical care, assisting people who can't perform their activities of daily living.

For instance, I can't drive, which means I can't shop for groceries, go to the library, get to doctor appointments,

or meet with my Girl Scout troop unless I have someone to transport me.  
But we need lots of other kinds of care too.  
We need scholars and researchers who find out about how we live as persons with disabilities.  
We need people who use research findings to make and carry out supportive policies, at international, national, and local levels.  
We need specially trained teachers who prepare us appropriately to take our place in society.  
We need journalists and spiritual leaders to educate the non-disabled public about disability issues.  
We need advocates and we need people with disabilities who are willing to talk about their lives.  
And we need inventors to create new and improved assistive technology.  
Welcome to IDRAC where we will explore all these kinds of caring, and more.  
Now on to our first session.

[2018/10/05 07:03] Maria: Hello, and welcome to Virtual Ability's 2018 International Disability Rights Affirmation Conference, IDRAC!  
I am Gaia Maria Caeca, and I have very low vision.  
Because I have a little usable vision, I can function in Firestorm, but I also use an alt in Radegast, a modified text viewer that allows text to speech (TTS).  
So I can hear and respond in chats and IMS, and any number of other things, including, at the moment, handling the podium.  
I've been in SL since 2014, and I love it!  
Today it is my pleasure to introduce Ms. Lusha Huang, who is a graduate student at Hong Kong Polytechnic University.  
She will be speaking about enhancing visually impaired people's travelling experience through mobile applications.  
Please hold questions and comments until our speaker has finished her presentation, thanks.  
Again, welcome, Ms Huang! You have the floor, and I admit to being especially excited to learn about what you are doing!

[2018/10/05 07:05] Lushahuang Resident: My name is Lusha Huang and I am a third year PhD student major in design from Hong Kong Polytechnic University.  
This morning I am going to talk about my PhD project which is A Study of Using Gamification in Smartphone Travel Applications for Visually Impaired People.

2.

I'd like to organize my presentation into six parts.  
First, I'll introduce the background, research questions, scope of the study and the significance of the study. Then I'll move on to Related Research and Applications, In the third part of my presentation, I will describe the methodology I used in research project.  
Fourth I will present my preliminary research. After that, I will talk about the gamification app experiments. Last, I will discuss the future plan.

3.

I'd like to start with the background.

The World Health Organization states that in 2014, 285 million people were visually impaired worldwide.

There are 174,800 visually impaired people in Hong Kong, 2.4 percent of the total.

4.

My main research question is:

How could the digital product experience of visually impaired people be enhanced using empathic design and sensory ethnography?

5.

The main research question will be supplemented with the following four sub-questions:

- 1) What is the current situation of visually impaired people using assistive products in general and travel apps in particular in Hong Kong?
- 2) How can researchers successfully implement empathic design and sensory ethnography methodology to better understand the needs of visually impaired people when designing a digitally enhanced travel experience?
- 3) How do visually impaired people use their non-visual senses to engage with the world particularly when travelling?
- 4) What is the best way to add the gamification element to digital products in order to enhance the travel experience of visually impaired people?

6.

The scope of my study is:

- 1) Different levels of visual impairment will all be considered in this research project.
- 2) Visually impaired people aged between 18 and 55 in Hong Kong
- 3) I will focus on Apple's IOS platform.
- 4) For the range of digital experiences within the scope of my investigation, I will focus on the facilitation of traveling for visually impaired people. In this study, regarding travel, it focuses on the on-site travelling experiences in particular.

7.

The Significance of Research are:

This research will help to fill the research gap about visually impaired people in the field of digital technologies and in travel-supporting applications specifically.

This new knowledge can contribute to enhancing design research about visually impaired people in both game design and app design.

This research will also benefit the visually-impaired community in the economic aspect making digital products more affordable.

This research will give more information to the government, social enterprises, and organizations serving visually impaired people.

8.

The term "gamification" involves a motivational and emotional system which entails understanding a host of psychology and experience design.

Therefore the focus is on identifying and interpreting the related terminologies for this project, which branch out into nine areas:

experience, experience design, emotion, motivation, gamification, audio description, assistive technology, assistive technology for visually impaired people, and existing mobile applications.

Due to the time limitation, I am going to focus on three key areas: Gamification, Assistive technology for visually impaired people, and Existing mobile applications.

9.

Pelling (2002) first introduced the term “gamification” as he discussed making electronic transactions both fast and enjoyable by applying game-like user interface design.

Gamification is a way to encourage motivation, engagement and enjoyment (Seaborn and Fels, 2015).

10.

Balata, Franc, Mikovec, and Slavik (2016) propose the concept of gamification as the process of integrating game components and game development methods to devise solutions to serious issues, including business problems and social or healthcare challenges.

More specifically, they (2016) also suggest that visually impaired people can navigate collaboratively by adopting game elements.

11.

The existing applications mainly use two features to help visually impaired people: One is text-to-speech (speaking items on the screen), in iOS it called is voiceover, and “talkback” in android.

The other is camera recognition, used a mobile’s camera to describe your object, colors and people around you.

These kind of products only meet the basic needs, so I want to dig deeper and discover the potential needs with them.

12.

The mobile application developed specifically for visually impaired people can be categorized by three main areas: navigation assistance, object recognition and others including entertainment and education.

In this vein, the categories of navigation assistance and objects recognition are the most developed application in Apple store.

However, there is not any travelling application specific design for visually impaired users.

13.

In the category of Navigation Assistance, for example, OverTHERE (2016) is an app that helps blind people explore and interact with the surrounding environment by using virtual audible signs.

By selecting a sign from the list, the user can access details about a location such as its address, phone number, or website.

14.

In the category of Object Recognition, for example there is DuLight (2016), developed by Baidu.

It captures the user's surroundings via a camera and then sends that data to the user's smartphone.

15.

The Eclipse Soundscapes app (2017) is an interactive "rumble map" app that lets visually impaired users use touch to visualize the solar eclipse.

When users touch the photo, the app vibrates the phone with a strength based on the brightness of the section.

16.

A Blind Legend (2015) is the first mobile action game without video or any interface, as it uses audio only.

The players are guided only by 3D sound, similar to "surround sound" in movie theaters.

However, this game does not provide a Chinese language version.

17.

In order to answer my main research question which is, "How could the digital product experience of visually impaired people be enhanced using empathic design and sensory ethnography",

I designed the research methodology which consists of three main elements, namely secondary research, field studies, and app design.

This figure shows the Secondary research section which includes the background studies in which I conducted interviews and observations at the Ebenezer School in Hong Kong.

Later, I conducted several field studies by applying methods from sensory ethnography.

The first study mainly applied the methods such as interviews, observations, and directed storytelling.

The second study mainly applied the methods such as multisensory participant observation and directed storytelling.

Last, I conducted the agile development approach in the app design process.

18.

The primary conventional ethnographic methods are participant observation and ethnographic interview. These usual ethnography methods would be impractical and inappropriate for researchers to conduct.

Therefore, I draw on Pink's (2015) postulations of both participant observation and the interview. Since Sensory ethnography is the latest revision of ethnography, I will emphasise the sensory ethnography.

Sara Pink suggests that Sensory ethnography is not simple ethnographic research about the senses.

Sensory ethnography is the re-thinking of ethnographic methods with focus on sensory perceptions and experiences.

Sensory ethnography, based on social anthropology, primarily concentrates on how knowing and experiencing are integral, in sensory ways, of the lives of individuals in the research and how the ethnographer proceeds with their craft.

19.

There are two principles of sensory ethnography, which are embodiment and emplacement, in order to create a correspondence between researcher and participant.

Embodiment is "the relationships between bodies, minds and the materiality and sensorially of the environment".

Emplacement is "the ways in which we align our bodies and sensing with those of the research participants so as to make places that are similar to theirs".

20.

There are two methods of this methodology: multisensory observation: the ethnographer as sensory apprentice. eating together, walking together and the interview, not only just sitting and talking but also eating and walking together.

21.

In order to discover how visually impaired people can be educated to learn how to live independently,

I conducted a background research in February, 2017 at the Ebenezer School, the only school for visually impaired people in Hong Kong.

22.

There are some key insights to address.

Polly, a social worker at the Ebenezer School, commented that the students' lives are quite meaningful and enjoyable due to smartphones.

She also emphasised that, 'What you can do, they can also do'.

Visually impaired people are familiar with their everyday life. Accordingly, enriching visually impaired people's life experience is a key objective.

However, going to unfamiliar places and trying new things often concerns visually impaired people and their families.

The focus will be on enhancing visually impaired people's digital experience to enrich their quality of life by adding encouraging elements through gamification.

23.

The principal at Ebenezer School said that, "Visually impaired students rely on assisting technology in learning, both hardware and software (such as: turning text to speech)."

"Visually impaired students have lost their sight but their other senses are trained to be greater."

24.

I conducted two studies with four visually impaired people in Hong Kong and five visually impaired people in Guangzhou. They are all iPhone users.

The field studies were conducted by using the methods from sensory ethnography. The first study was using interview observation and directed storytelling in Guangzhou and Hong Kong.

25.

The second study was using multisensory participant observation and directed storytelling methods, which was conducted at a restaurant in both Guangzhou and Hong Kong.

26.

The interviews were conducted in Cantonese, and later translated into English. After organizing and analyzing the answers, they were organised into themes that emerged from within several categories.

Quotations from the raw text illustrated the meaning of the category.

The themes are the travel experience, sensory compensation, different accessibility in different regions, meaningfulness of travel, different senses experience, using other senses,

love travelling, orientation and mobility training, love sharing, using white cane on purpose, detail description, independent demand, disadvantages of navigation app, the other senses of visually impaired are not stronger than normal people, navigation method.

Significant insights were generated from the interview that can be used for the final app design.

The preliminary study helped in defining the research scope and focus of the main study.

27.

Under the theme Travel experience, there are four sub-themes. For each of quotes there is a sub-theme associated.

Due to the time limitation, I will briefly discuss main themes and their associated quotes that related to my research matter.

- detail missing. quotation is “I can only see the big outline of mountain or architecture.

I cannot see the details, such as carving, but what I can perceive is whether it is low enough that I can touch and feel it. I need my friends to describe the details for me.”

- a reason to visit the place. “They sometimes told me the places I must visit, and then I would visit the place specifically.”

- interact with and • “watch” and experience the life of the local people, “I love talking to the locals to learn about their culture.

Travelling can broaden my horizon and I can learn more and I am able to distract myself from focus the issue of my eyes. I encountered different experiences when I travelled.”

28.

The quotation in Sensory compensation is:

“In my travel diary, I describe the whole environment. I describe the whole atmosphere I experience.

For example, the time I travelled to Tibet, we arrived very early. I can feel the golden sunlight from the sunrise. I can hear the sound of the river, and the sound of birds.

It’s quiet there, with no cars. I can smell the aroma from the flowers and fresh air. All the sound and the atmosphere blend together”.

29.

The quotation in Meaningful of travel is:

“When I go travelling, it broadens my horizons and I become more open-minded. I won’t focus on the condition of my eyes too much.

The world is big with beautiful scenes. I can “see” the scene by experiencing the atmosphere.”

30.

The quotation in the theme Detail of description is:

“When I travel to the suburbs, my friend only told me there is a forest, waterfall and river in front of me. I am fine with it.

However, when I travel to historical sites, I want to know more information about them.

I would search for details about the places on the internet in advance, but I can't associate the information to the site.”

31.

The quotation in the theme Independent demand is:

“I would love to try to travel abroad by myself. No matter how difficult or what the result is. I would like to have this experience at least once.”

32.

All nine interviewees love travelling and socializing with other people. They all want to play games on their iPhone. They are using their other senses like sensory compensation very well.

All insights and findings can assist the researcher to design a better travelling app for visually impaired people.

33.

Based on the data generated from the preliminary research, I attempt to propose the features in the travelling app for visually impaired people.

In order to better design the app, we conducted an in-depth interview and participatory design with three visually impaired people in Hong Kong Blind Union in December, 2017.

34.

This app can be considered as a mobile-based, location-aware collection game app. This app can turn the travelling experience into an emotion-laden and commemorative experience. It includes the following features:

1) This app is a free audio-based app using GPS on the user's phone. It allows greater independence to the visually impaired when they are traveling.

2) This app can encourage visually impaired people to explore the interesting locations when they are traveling.

3) After checking the specific locations, visually impaired people will receive a piece of music as a reward. In order to get a whole music, they should try to check all the spots in the area.

4) Visually impaired people can leave a message such as: a hint or their feelings to other visually impaired people.

35.

These are the basic interfaces for the app. The high-fidelity prototype in the final stage of development.

I called this app “Gamified Traveling”. Let me go through the user journey. When users pass by a new spot within an attraction, let's say PolyU as an example, the app suggests five must-visit spots at PolyU.



When users arrive of the new spot, the app will automatically give them a reward. The reward can be a part of a song or points leading towards a coupon. Visually impaired people's other senses are often more acute, and they have subtle feelings when they get to know the world. To take advantage of this, they can also leave a message before they leave such as a hint, or their feelings, or their experiences on the app, for other users. The message can be liked by other users with the top five most-liked messages showing in the leaderboard. Each attraction, for example PolyU, will have its own leaderboard, so users can discover the best experiences with helpful and meaningful tips from their peers who they can trust. With a growing community, users can create detailed databases of localized information. The information grows with the community, creating a completely crowd-sourced traveling map of the world.

36.

In long-term, this app can be used for attractions in Hong Kong. We have piloted in the Hong Kong Polytechnic University as an attraction to check how the app works with visually impaired people. We picked five essential spots for the Visually impaired users: the entrance to the university, Pao Yue-Kong Library, campus grassland near lawn café, Shaw Amenities Building, and Jockey Club Innovation Tower. All of the participants are satisfied with the accessibility of this app, and they all agreed that it is an app that is easily manageable for visually impaired people. The following are the suggestions about how this app could be enhanced:

- 1) Add vibration or sound to indicate that their recording is to begin or finish.
- 2) Add an "important amenities recommendation" regarding where users can find the restroom or water dispenser.
- 3) Add audio guidance to the braille information board in the app.

37.

I finished the first prototype of this app, and I am planning to hold a design workshop which will invite visually impaired people to co-design with me. We will have a discussion on how to design a better traveling experience app based on the first prototype for visually impaired people. However, I really want to know how I can hold a design workshop with people who cannot see since visual prototyping techniques are not appropriate for blind users. I would like to seek help from you, the audience.

38.

Thank you all for listening. If you have any questions, I'd be delighted to answer them.

[2018/10/05 07:35] Gentle Heron: Thank you Lusha. This is a really great idea. QUESTION: Are you yourself visually impaired? If not, how did you get interested in this issue?

[2018/10/05 07:35] Elektra Panthar: LH: I'm not visually impaired  
My motivation is I was raised by my grandparents, teachers of ophthalmology  
I saw the change in people after they were cured from illnesses affecting their sight

I studied in the USA and studied in Las Vegas, noticing how, despite the effort that was put into developing apps, not many were actually usable by visually impaired people

So I decided to go back to Hong Kong and study a way to develop apps for visually impaired people

At the end of my PhD I'll put the app in the App store

[2018/10/05 07:37] LV (lorivonne.lustre): What is the name of your app?

[2018/10/05 07:38] Lushahuang: gamified travelling

[2018/10/05 07:38] LV (lorivonne.lustre): TY

[2018/10/05 07:38] Gentle Heron: [07:35] Gloriejoy (joycie.string): are you familiar with braille embossers

[2018/10/05 07:39] Elektra Panthar: LH: I'm not familiar with them unfortunately

[2018/10/05 07:39] LV (lorivonne.lustre): GH: Joycie? Could you tell us more about braille embossers?

[2018/10/05 07:39] Gloriejoy (joycie.string): yes!--it is a machine where you create braille---it is loud and has all the punctuations and other needs like a keyboard has

It is like a jackhammer

[2018/10/05 07:40] Elektra Panthar: LH: I saw a lot of people use that and they showed me how it's used

[2018/10/05 07:39] Gloriejoy (joycie.string): yes!

great

thank you!

[2018/10/05 07:40] Gentle Heron: [07:35] ChuChu Ricardo: You are so young and you hold 5 patents already !! WOW Can you tell us more, you think while sleeping?

[2018/10/05 07:41] Elektra Panthar: LH: Hehe. I'm a person who always see problems and since when I was an undergraduate I decided to solve the problems I notice

[2018/10/05 07:41] Gentle Heron: [07:35] Shyla the Super Gecko (krijon): Is it available internationally? And how is it funded, how does it pay for itself?

[2018/10/05 07:41] Elektra Panthar: LH: I never stop thinking and creating

I take a lot of notes in my phone

I'll try to find funding for Hong Kong for now, but I hope I can make it available internationally

I have to think about business plans

A few organizations have approached me about it, I have to decide which path to take

[2018/10/05 07:42] Shyla the Super Gecko (krijon): Government funding sounds like a good way to go.

[2018/10/05 07:42] Gentle Heron: You may want to know about AXSLab

[2018/10/05 07:43] LV (lorivonne.lustre): GH: Jason DaSilva is one of the speakers coming up. They are crowd sourcing funding for their applications

[2018/10/05 07:43] Shyla the Super Gecko (krijon): Dyslexie Font also crowd source funds successfully

No, it is for people with dyslexia

They crowd source so they can provide the font for free

[2018/10/05 07:43] LV (lorivonne.lustre): GH: You may want to contact him Lusha. Sounds a like a good colleague for you. Conferences are so great for making connections?

[2018/10/05 07:45] Elektra Panthar: LH: Are there other questions?

[2018/10/05 07:45] Lushahuang: [lusha.huang@connect.polyu.hk](mailto:lusha.huang@connect.polyu.hk)

[2018/10/05 07:45] Elektra Panthar: LH: If you have other questions, this is my e-mail, you can reach me there

[2018/10/05 07:45] LV (lorivonne.lustre): GH: If there are no more questions, please thank Lusha. We look forward to hearing more about this app

[2018/10/05 07:46] Gentle Heron: I want to remind the audience that during the set up breaks between sessions you can go over to Healthinfo Island and see slideset displays and exhibits about various topics related to our conference.

[2018/10/05 07:46] LV (lorivonne.lustre): <<transcription ends>>