DESIGNING ENVIRONMENTAL VOICING TO REMIND PHUBBERS TO LOOK UP: USING LOCATION-AWARENESS MESSAGING SYSTEM AS INTERACTIVE DESIGN FOR SAFETY

ABSTRACT

Phubbing is a new term coined from "phone" and "snub", which describe the emerging phenomenon of the act of snubbing someone in a public setting by staring at your phone instead of paying attention. With the progress of the times, Wi-Fi and smartphones are almost ubiquitously available. With the rapid increasing use of mobile phones in Taiwan, what need noted nowadays is that the smartphone addiction causes both the damage to social life and dangerous to personal health and safety. The accidents are often happen because of phubbers looking at their smartphones ignoring the dangerous environment. To this end, this research aims to design a danger warning environment to help phubbers prevent from accidents by sending messages in time when they get closer to somewhere dangerous, such as crossroads, and their smartphones are still on. We adopt Esri's Geotrigger Service to communicate with smartphones. Geotrigger Service can add location awareness and location-based alerts to apps for iPhone and Android. According to closeness to the dangerous place, Geotrigger Service can provide an invisible area drawn on a map which is set to have an action or message associated with it. When a mobile device crosses into the "trigger zone", the Geotrigger Service sends a location-based message to that device, or even notifies the server for custom events. By doing so, our research contributes to well identify the right distance between phubbers and dangerous sections and how to show messages on the smartphones that can effectively remind phubbers to look up. Using the design thinking method, we ask pedestrians as target users to participate our experiments. We set up three kinds of distances to test, which include 5 meters, 3 meters, and 1 meter. In addition, , we also design three kinds of interfaces to show messages: slide-down banner, pop-up messages and lock-up message. In empathy prototyping of users' experience, we made two short films to provide the simulated real situation scenario and played on the Internet. Following up the experiment, , we collected 64 participants' feedbacks from questionnaire survey. We examined the relationship between the right distance and the right way to show messages, and the results showed that the distance about 3 meters away from the dangerous is the most precise position to get a notification. Meanwhile, the most of participants consider the lock-up messages to be the clearly way to remind phubbers to look up and prevent from accidents. To conclude, this study may be one of the first to provide phubbers with a better understanding of the right behavior when walking. Further research can validate and generalize the usability and usefulness of location-awareness messaging system in different environment situation. The implication of application of our design is discussed.

Keywords: Environment voice, Interaction design, Location-awareness system, Phubber, Smartphone addiction, Location-based system

1. Introduction

According to the research report about the use of mobile phones in Taiwan from Foreseeing Innovative New Digiservices(year?), the number of people using smartphones or tablets are rising more than 69.1%, which means there are approximately fourteen million people getting addicted to using their smartphones. Phubbing is a new term coined from "phone" and "snub", which describe the emerging phenomenon of the act of snubbing someone in a public setting by staring at your phone instead of paying attention. Phubbing sometimes causes inappropriate behavior and becomes a threatening issue surrounding our daily life. The existence of the word "phubbing" reflects the fact that it is a serious phenomenon because people are getting disconnected and losing the art of conversation and real interaction with each other. The reasons of the widespread of Phubbing, are smartphones are universal and the Internet is quite convenient. However, Phubbing would not only cause health problems but also bring accidents to people .Thus, our goal is to notify people to switch their attention from smartphones and put more emphasis on their safety by developing a location-awareness messaging system.

2. Literature Review

2.1 Affordance

We adopt the conception of Affordance proposed by perceptual psychologist J. J. Gibson. Affordance refer to the qualities of the physical world that suggest the possibility of interaction relative to the ability of an actor (person or animal) to interact. We draw on affordance to design a danger warning environment to help phubbers prevent from accidents by sending messages in time when they get closer to somewhere dangerous, such as crossroads, and their smartphones are still on. in particular, we designed following the three distinct kinds of artifacts [2]:

- I. The modification or construction of a surface so as to alter its affordance for human life. Its utility or function. (Manufacture, shaping, crafts reshaping)
- II. The modification of a surface for displaying information about something over and beyond the surface itself. (Sculpting, depicting, graphic symbolizing, writing)
- III. The modification of an existing surface so as to improve or enhance its appearance as a surface, so as to invite inspection of the surface, without changing what it affords or making it specify something else.

2.2 Perceived affordance

Norman (1988) further highlighted that a designer cares more about what actions the user perceives to be possible than what is true and suggested that a designer should highlight

the expected product attributes to make affordances more easier to be perceived. **Design** thinking process

Design thinking is an innovative process for problem-solving, which include five modes , which are empathy, define, ideate, prototype and test. (Shown in Figure 1) First, we have to stand on the users' point of view and empathize the users to understand their needs. And then define an actionable problem statement based on the deep understanding of users and the design space. After that, we have to generate ideas divergently to explore a wide solution space for building the prototypes to test with users. In the phase of prototyping, it's to get your ideas and explorations out of your head and into the physical world. In this phase, it's important to learn from those interactions and observes from the users again, which can help drive deeper empathy, as well as shape successful solutions. And testing is the chance to refine our solutions and make them better. In this study, we adopt the design thinking method to empathy the phubber's user experience then develop the solution of warning devise to enhance environmental awareness.





3. Research Objective

For enhancing phubbers' health condition and safety, our research aimed to design a system to help them realize their addiction to a smartphone by setting time segments to remind themselves to look up. Meanwhile, the system will automatically locate the phubbers' position and lock up the screen when they enter the dangerous area and unlock when leaving, which can help prevent accidents from happening.

4. Method

Our research has gone through the five steps of design thinking process and will introduce each step from empathizing our users to come out with a solution.



Figure 2. Empathy map

All the words indicated two things that (1) they are like druggies addicted to their smartphones; (2) they minimize the real world lives to their screens. Interestingly, none of them feel anxious about missing a phone call when they are home with a telephone but they did with their smartphones. We think it is because they forget no matter texts or feedbacks they got, these are all "people" made. Phubbers just focus on the so-called "interface" too much. They should look up and concern other people and the environment around them.

4.2 Define

According to the empathy map above, our research use Point-of-View Analogy to define an actionable problem statement. We can analogize that smartphone addicts are like drug addicts. It is a serious phenomenon of dependence and will cause the unhealthy effect to them. We divide the effect into three parts to discuss: physical, mental, social effect. In the aspect of the physical effect, phubbers become unhealthy unconsciously because they stared at their smartphones for a long time. In the aspect of the mental effect, phubbers get into the habit of relying on the smartphone to protect themselves from confronting some negative emotions like anxious, depressed, sour and so on. And in the aspect of the social effect, they may have some problems on their ability of language expression. Such as they talk or answer mumbled, unclear and brief. Furthermore, they also do not know how to maintain good interpersonal relations. From these observation above, we come up with an actionable problem statement is that phubbers need to look up to concern everything around them because they can get healthier and do interact with the environment.

4.3 Ideate

In this part, we need to transition from identifying problems into exploring solutions for the users. After brainstorming about how to make phubbers look up, there are plenty of ideas popping out when discussion. Hence, our research uses selection method to categorize the ideas and select the better solutions for build the prototype. We came up with some ideas and pick up the most representative ways to switch their attention from the smartphone: (1) Take-over of smartphones (2) The Message Reminder (3) The Dome of Light (4) The Street Artist (5) The Piano Stair (6) Sending messages and showing on AD (7) Augmented Reality. Through the process of selection, we find that (1) Take-over of smartphones is compulsory to force people stopping using smartphones and could be a long-shot method. But the message reminder could be a lighter way to remind phubbers to look up. For the third one to the fifth, via experiencing and participating dynamic activities, the opportunities of interaction with the environment will increase and this is good for phubbers' health. And for the last two, these are more interesting and can easily draw attention from everyone not just phubbers. Hence, after observation of our selection, we choose environment interaction and reminder application to be the solution and go into prototyping stage.

4.4 Prototype

We narrow down our topic's range. Our point of view puts more focus on "Phubbers' Safety" in the issue of how to switch phubbers' attention to the environment. Our system's features will be divided into two parts: Self-notification and Outer-notification. We design an application called Head Up to help users manage their frequency of using smartphones and prevent accidents from happening based on a location-awareness messaging system. (Shown in Figure 3)

4.4.1 Self-notification model

Head Up provides users with the time segment to choose when to pop out a message to remind users to look up according to their addiction to the smartphone. There will be twelve segments which begin from 5 minutes to 60 minutes. And it also records the time users spent on the smartphone a day so that users can check out their frequency to be their reference for interval time setting and self-notification about phone addiction.

4.4.2 Outer-notification model

Nowadays, car drivers will be fined for NT 3,000 dollars and scooter drivers will be fined for NT 1,000 dollars when they are driving and still using the smartphones. However, pedestrians now are still in process. Hence, our system will focus on pedestrians and design a platform for backend managers to set up the trigger points and its range using Esri's Geotrigger Service. Esri Geotrigger Service can easily add location awareness to users' apps and create an immersive experience with users' app by sending messages to users or other systems when they enter or leave geofenced areas. A geofence can create an invisible button on a map, and when users' phone get within that button - that invisible region - a relevant action will be triggered. And a trigger action can be triggered in three ways: (1) Sending a push notification to a phone. (2) Sending an action to a server. (3) Sending an action to an app. Therefore, our research uses location-awareness messaging system to set up triggers on somewhere dangerous. When users enter the range, the smartphone will get a notification (lock-up message) to remind users to pay attention to the environment.



Location-Awareness Messaging System

Figure 3. Framework of Head Up system

Moreover, we also design three kinds of different interfaces to show the messages when receiving an action and try to figure out which way is better to switch users' attention from their smartphone: (1) slide-down banner (2) pop-up messages and (3) lock-up message. Slide-down banner is the lightest way to remind users to look up. Pop-up message will interrupt users' behavior. And lock-up message will restrict users' behavior till they leave the dangerous area. Consequently, we will test the prototype to choose which one can really help users get notified and raise their head. The prototype of Head Up is shown in Table 4.





Table 4. The prototype of Head Up

4.5 Test

Our research uses "Shooting Video method" to communicate our ideas, insights and stories. We shoot two short films to simulate the situation by standing on user's point of view and put them on the Internet. After watching these two films, we design an online questionnaire to get users' feedbacks. The first film is talking about the real case that phubbers do have car accidents when using their phone without paying attention to the environment. And in this film, we have simulated how Head Up system could help prevent these kinds of accidents from happening. (Shown in Figure 5)



Figure 5. The first film (https://www.youtube.com/watch?v=KQBLoAo793U) Based on the design thinking method, the second film is to show the virtual distances away from the crossroad for users to choose, including 5meters, 3meters and 1 meter. We want to know which distance is the most precise distance to send the instant message based on the pedestrians' safety. To set up the significant settings for prototyping test, we drawing on statistics from Bureau of Transportation, Tainan City Government, 2014 to choose the most dangerous crossroads in Tainan city and set up the triggers on traffic lights or somewhere near the crossroads: the intersection of Beimen Road and Dongfeng Road. Also, there will be three animations for users to choose about how to display messages mentioned above. The result of the testing can help us set up the trigger's range more effective and make sure it can prevent from accidents in time. (Shown in Figure 6)



Figure 6. The second film (https://www.youtube.com/watch?v=rDRrD4e9Vws)

5. Analysis and Results

After testing, we finally have 64 participants to fill out the online questionnaire. The results show that 53 participants themselves have been using a smartphone when walking and 59 participants have seen other people doing this rude behavior. Results of this study also show that the distance roughly about 3 meters away from the crossroads is the most accurate

position to get the message. And the most of the users indicated that lock-up messages can clearly remind phubbers to look up and prevent from accidents. Moreover, Head Up system got 4.03 rating out of 5.00. Most of participants think that Head Up can really help phubbers prevent from accidents. In addition, we had received some useful feedbacks from them. By the "Feedback Capture Grid" method, all of the feedback had been categorized into four different categories including Like, Wishes, Question and Idea spurred. We use the grid because it can help us be systematic about feedback, and more intentional about capturing thoughts in the four different areas.

Conclusion and Discussion

The advantage of Head Up system we designed is to utilize location-awareness messaging service. Drawing on affordance perspective, our system takes an interactive design approach which enable environment to be more active in shaping appropriate behaviors. To this end, we framed the relationship framework among an object, users, behavior and feature as shown in Figure 8. In the past, when users see a warning sign (an object), they will get noticed and pay attention to the environment (a behavior). After behavior generating, the follow-up feature of this behavior (Prevent from accidents) will be differently explained according to the users' experience. However, a warning sign cannot help phubbers switch their attention to the environment because of the phubber's behaviors. Thus, a warning sign has to be reshaped and modified in order to match the current situation. Users can get the instant notification automatically from their smartphone when entering somewhere dangerous and still focusing on their screen rather than the traditional warning sign which needs to raise their head and to get notified. Consequently, the location-awareness messaging system can build a connection between the environment and people. The actual system also achieves high running performance based on Esri's Geotrigger Service. The study contribute to help phubbers awareness of the environment and increase safty condition.



Figure 8. The relationship of an object, users, behavior, affordance and feature

6. Future Research

In current study, we concern about the health condition and safety. Technology brings us the convenience but also builds a wall between us. Future research can extend our research to intently focus on the issue of phubbering and gain different points of views from empathy. in addition, how to facilitate the real social interaction which are serious deprived by phubbering should call for intensive research for better social life.

7. References

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