An iPad Application Prototype to Enhance Memory of Older Adults

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Abstract. The objective of this project is to propose a prototype of an iPad application that will satisfy the demand of old adults, whose interest is a long lasting healthy brain. Developing an application for old adults is reasonable because of rapid increase of their population. This paper focuses on a development of an iPad application within mobile UD (Universal Design) principles for older adults that will lead to further research on user testing.

Keywords: Older adults · Mobile application · iPad application · Application design · Universal design · User centered design

1 Introduction

Recently, as older adult population has rapidly increased globally, it seems relevant for older adults to increase interest of long, lasting, healthy life. According to the data, the elder population aged over 60 is expected to reach 22 % in 2050 (ESA, U.S. Department of Commerce 1995). Therefore, independent living for older adults is the expected primary goal. Such countries as U.S.A. South Korea, Japan, and Europe are in the process to make such programs that serve independent living. Moreover, extended better education allows today's old adults more experience with technology of most interactive devices, such as computers, mobile devices, and related technology (Ana et al. 2013). According to the research data, 53 % of older people in 2012 were using Internet and email and 69 % of them were using mobile phone (Ljilja et al. 2014).

The aim of this project is to make a prototype of an interactive application operable on iPad for older adults who are concerned about their memory loss. As an assistive technology, the iPad is suitable for older people to play games and communicate with their friends and family members.

2 Background

2.1 Older Adults and iPad

The computer is more familiar with older adults, than the tablet. However, many researchers said that the tablet is "more intuitive to use for people with disabilities and for senior citizens who may need graphics represented in nontraditional ways" (Walker

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2011, Tina and Dietmar 2012). As an assistive device, there are not many great functioning applications that are visually supported and attractive for those who want to use it for their activities. Hence, the study focuses on the visual design based on Universal design approach.

2.2 Universal Design

UD (Universal Design) was introduced by Mace in 1988, reducing complex processes, using consistent interface, easy interaction with products, and environments for physical impairment and older adults (Kascak et al. 2014). We conduct research under UD to provide better user centered design. Project direction:

1. Easy to use navigation: Touch based devices are not familiar with old adults, so navigation is important for comfortable feeling. A home screen menu is provided as a safe point of return (Ana et al. 2013).
2. Easy to perceive: Most older adults supplement their eyesight with eyeglasses, but to help declined spatial ability (Nicole et al. 2014) and color perception, over 14pt font is provided. Also, font size can be changed in setting section for flexible usage (Keiko et al. 2001, Nicole et al. 2014).
3. Easy to touch on screen: Touch space, location, size of icons is considered for users.
4. Easy to Interact: To help easy interaction, the top center of the screen has a help icon to explain any page's function. Moreover, for a more convenient environment, recording voice and type writing function both are provided in a community menu.
5. Color set for older adults: In the design, mixing with yellow/white, blue/green, dark blue/black and purple/dark red color were avoided for clear recognition (Keiko et al. 2001).
6. Recognizable icon set: To increase affordance of elements text is provided in icons. Back button is on top of the screen as a safeguard (Ana et al. 2013).
7. Simple interface: Use few steps to the destination and a back button and home screen menu are in solid location.

2.3 Older Adults with Music

Many researchers discuss how music is helpful for older adults. One of the effects of music is reducing agitation (Witzke et al. 2008). Also they report that classical, calming, meditative and soft background music had the best effect, and playing soothing music during mealtime reduces aggressive physical and verbal behavior in older residents with dementia (Lisa et al. 2013, Chang et al. 2010). In the sound intervention, the user can listen to music that already set up in the menu.

2.4 Older Adults and Games

Although there are many challenges due to the lack of experiments for older adults, games are used for training, education, or in rehabilitation to help patients regain or keep specific abilities they may have lost. Their sight, hearing, and spatial problems and cognition impairment are barriers for investigators to develop new programs for them

(Ijsselsteijn et al. 2007, Anna et al. 2014). Simple games may provide daily activity to prevent their loss of abilities. To encourage the game activity, this application offers the function of games with a friend. Each level in a game has different functions. Right now it has only one level that is matching similar sets of pictures. Users can see a hint to learn how to play. Buttons are big enough to press; if someone needs help, they press the help button to see a written or to hear a voice instruction for convenience.

2.5 Older Adults and Communication

As time goes by, older people communicate less frequently with others and easily are isolated from society by retirement and illness. Moreover, there are many chances of distance communication, as many more people live individually than in the past. Long distance communication tools such as email and telephone calls are more common, rather than face-to-face meetings to maintain family communication and relationships. Most old adults prefer to write a letter when communicating with others; however, as people age, they tend to use a telephone than a letter because they need much effort such as spelling and grammar correction (Anna and Robin 2007). Communication section of the iPad application is a place to make one's own electric album and interact with others. Lively communication with others will help keep older adults active and have positive thinking. The community section is operated with individual's stories from their memories, using recorded voice and writing with their photos that would be a method to retain information when they lose their memories. The advantage of this section is that users do not need to go out to interact with others. They can meet each other in augmented community with recorded and written stories. Caregivers can control the community room by answering members' questions.

Figure 1: the Logo (Fig. 1) represents a person's brain. Also, it shows a smiling face with heart shaped mouth. The name of application "Lolli" implies that of a fun application like a candy they can bite. To provide an everyday life activity the name "Lolli" was created.

Fig. 1. Logo

3 Development

3.1 Logo Development

3.2 Information Architecture

The application consists of three different menus: sound intervention, game, and communication. It requires "log in" because of interaction with others in game and

communication menus (Fig. 2). Two menus: Sound intervention and Game, are for one's individual activity; however, communication menu is for interaction with others sharing stories, asking problems, giving suggestions each other. Caregivers or doctors would help to control the communication on the community room, controlling users' behaviors, mediating their conversations, and giving suggestions as a recommendation.

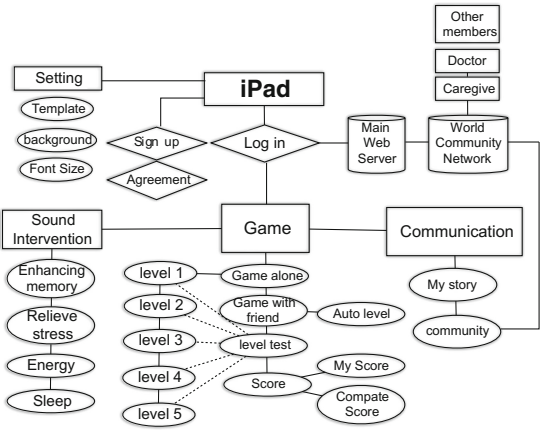

Fig. 2. Information architecture

3.3 Prototype

"Older adults can effectively navigate websites that have simplified selections per screen and flattened navigation structures" (Demiris et al. 2001, Katie et al. 2010). This prototype of application (Fig. 3) aims to provide easy and convenient interface based on UD. To avoid uncomfortable feelings on digital devices, it offers background feeling like reading an old book; a textual image similar to book paper was used for it. To avoid complicated interface, flat and rounded icons were used. Most pages have their own introduction with written and voice explanation about the page on top of the screen, named "help". In the communication menu, to make a story album requires a process of uploading pictures. Voice uploading and type writing method are used to provide various convenient functions for older adults. Home screen menu is always

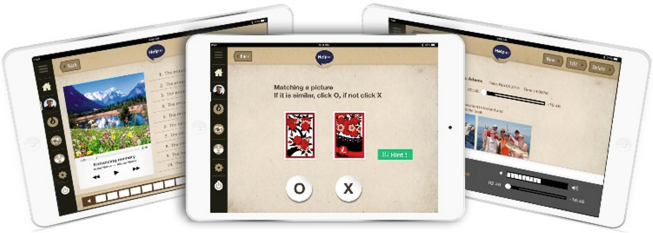

Fig. 3. Prototype application design

located on the left side to help users keep their direction on the application. Back button is located in top of right side and edit menus are in left side; the menus are changed depending on the pages such as a detail page of "my story" that has menus: "new", "edit", "delete" and such as a "make story" page that has a menu of "post".

Brown tone color is used as a base color set to keep away from a complicated interface design. Big size font and icons with names are provided considering of their better concentration while playing application.

4 Conclusion

Many researchers have acknowledged that the industry for older adults will be extended; however, there are not many applications visually satisfying for older adults that understand their conditions and chronic symptoms such as color recognition and spatial problems. Technology has the potential power to enhance visual effects and provides social tools. In this sense, the three menus on the application provides significant part as it could be a portable personal activity tool with many functions. This application will have a role to help older adults as a daily tool that should lead to the next step.

The objective of this research is to make a prototype of an application. As a next step, to verify the usefulness of this application, further research of user testing is expected. In the next step, user test of recording voice function to know how effective it is and usability test to know how comfortable it is.

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