SMART PHONE MENU LAYOUT FOR ELDERLY USERS

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ABSTRACT. Nowadays, smart phone have become prevalent across the world. Many functions and services offered in the smart phone are important but current smart phone more convenient and user friendly to younger generation. In addition, the current technologies do not adequately capture the smart phone pattern of the elderly and make them hurdles to adopting a smart phone. This study used OldGen Framework to obtain the suitable arrangement icons for smart phone main screen. The objectives of this study are to identify usability issues that elderly faced due to smart phone and to recommend interface design for elderly smart phone. This study used two methods which are user testing and drawing method. As a result, usability issues can be identified and recommendations of user interface design for elderly smart phone main screen.

Keywords: smart phone, elderly, user requirements, interface design, user testing, drawing

INTRODUCTION

Nowadays due to rising of elderly population, technology should be beneficial to older people but a digital divide remains. Smart phone is crucial technology for elderly as it can communicate with family and friends while it also make them more independent and secure (Olwal et al., 2011). They realize that they must adapt and learn the new technology as a modern life (Weilenmann, 2010).

Older adults always make use of new technologies, but unfortunately always encounter trouble than younger adults (Czaja et al., 2006). Graf et al., (2005) states in his study older adults did not begin any tasks without guidance while younger adults did not request any help when learning new smart phone. The author also explains that older adults more likely to be concerned with "doing things right" and afraid of failing something new. Olwal et al., (2011) mentions there are several aging symptoms that make smart phone difficult to use due to vision impairment, motor difficulties, poor hearing and bad perception about smart phone.

Weilenmann (2010) mentioned there are two reason elderly refuse to use the advanced mobile phone. First, elderly have different purpose towards the mobile phone such as calling and texting with their family and close friends. Second reason is impairment of cognitive capabilities and poor physical movement to grip the variety design of mobile phone. There are many studies on technology design for older adults, but much of work has focused on indoor and stationary application such as desktop computers (Lee, 2007). They have poor eye vision to see the small text in the mobile phone and did not hear well unless they used the ear device equipment.

Hassan and Nasir (2008), mentions the purposes of mobile phone in elderly daily life such as cheaper, friend's relationship, confident level, useful when they are lost or trouble, alone and for fun. They use the mobile phone for calling or text in emergency situation. Researcher also mentioned that older user only use simple function like calling or texting messages (Been et al., 2010). According to Renaud and Billjon (2008), the elderly group more prefer 'easy menus' on the mobile phone followed by large screen. They also mentioned wants large buttons because of the cognitive limitation of elderly user effect from aging such as poor hearing, vision and movements.

There are misconception about elderly where elderly is not interested to learn new technology. There is absolutely no proof which elderly deny technologies however they acknowledge as well as follow technologies once the second option satisfies their demands as well as anticipation (Conci et al,. 2009).

RELATED WORK

Smart Phone User Interface for Elderly

The popular frameworks such as RoADMap Framework, OldGen Framework and FlexInterface Framework. The OldGen framework is being used where it have four type of user interface which are list layout (icons + text), grid layout (customizable cells), dock layout (preview in center) and list layout (icons only & zoomed). For this study, it focuses on grid layout to find the best arrangement for elderly smart phone.

According to Olwal et al., (2011), OldGen is a framework where an original concept allows accessibility features on common mobile phone by decoupling the software user interface from the physical form of mobile phone. The specific leads to better customization in features and behaviours, user friendly interface and make the achievable to be able to modify that for certain requires of each and every personal rather than other frameworks.

OldGen makes the graphical user interface convenient, so that it can be shifted in between diverse telephone components, irrespective of design and also company. Primary correction and also reviews together with older consumers suggest that principle can deal with personal graphical user interface relevant convenience concerns in general-purpose products. Figure 2 shows the four types as prototype user interfaces and layout generated using OldGen framework.

Figure 2. Four Types as Prototype User Interfaces and Layout Generated Using Oldgen Framework (Olwal et al., 2011)

Olwal et al., (2011) states that the appliance prototype framework seems promising in its capability to help addressing the usability difficulties in today mobile phones by:

- Presenting versatile personalization associated with mobile UIs which might be focused on particular specific requirements.

- Decoupling software program UI through the phone's actual physical contact form, permitting customers to needing to understand one mobile UI, because a conveyable UI might be relocated among cell phone equipment, no matter product as well as brand name.
- Via personalization, presenting ease of access functions upon general gadgets, in a way that elderly may not be restricted to particular "elderly phones".

METHODOLOGY

The method used in this study is by using user testing and drawing method. The purpose of user testing method is to identify usability issues that elderly faced due to smart phone. The second approach is by using drawing to get the collection of best arrangement icons for elderly smart phone at the main screen based on their priority of use. The studies have three phases and instruments for each phase as table below:

Table 1. Phases Included in Study

Phases	Objectives	Instruments	Description
Pre-Test	To identify usability issues that elderly faced due to smart phone	Set of interview questions	To acquire participants demographic detail
Test	To identify usability issues that elderly faced due to smart phone	Set of tasks	To identify usability issues for each task in user testing
Post-Test	To recommend interface design for elderly smart phone.	Set of interview questions and drawing if user interface	To acquire participant's opinion regarding user interface on the smart phone main screen

For the post-test phase, set of interview question are given to obtain participants demographic details. Seven tasks were be given and time is recorded to identify duration of participants can accomplish those tasks.

1) Task 1: Dial a number 019-340 1397
2) Task 2: Receive a call
3) Task 3: Search a contact
4) Task 4: Type a text message "How are you today?"
5) Task 5: Set an alarm clock
6) Task 6: View the picture
7) Task 7: Google browser & type keyword 'Healthy foods'

In the post test phase, elderly need to determine several icons in the main screen where may consist of power button, camera, call icon, message, contact, calendar, camera and clock based on their priority of used. The drawing approach is used to identify the icons arrangement at the smart phone main screen.

RESULT & ANALYSIS

The details below show the results of data collection by the study. The findings were obtained from the data collected through observations on participants while doing several tasks with smart phone and in-depth interview conducted with the participants.

Table 2. Demographic Data of Participants

Participant	Age	Gender	Duration of Smart Phone Use
P1	64	Female	2 years
P2	67	Female	1 years
P3	75	Female	6 month
P4	81	Male	8 month
P5	66	Female	3 month
P6	63	Female	1 years
P7	64	Male	3 years
P8	65	Female	2 years

The study was being done in MARA University of Technology, Shah Alam, Malaysia. The older people from Elderly Citizen Complex, Shah Alam, Malaysia were invited to participate in interview. Table 3 below show the time completion by doing seven tasks for eight participants.

Table 3. Completion Each Task for Each Participants

Participant/ Completion Task in seconds	P1	P2	P3	P4	P5	P6	P7	P8
Task 1	14	16	25	38	12	23	34	21
Task 2	1	2	1	3	2	4	1	2
Task 3	8	4	8	6	6	5	7	3
Task 4	42	20	48	72	68	24	32	10
Task 5	32	30	37	48	38	27	13	15
Task 6	4	6	10	17	11	6	7	5
Task 7	40	32	33	41	17	22	6	32

DISCUSSION

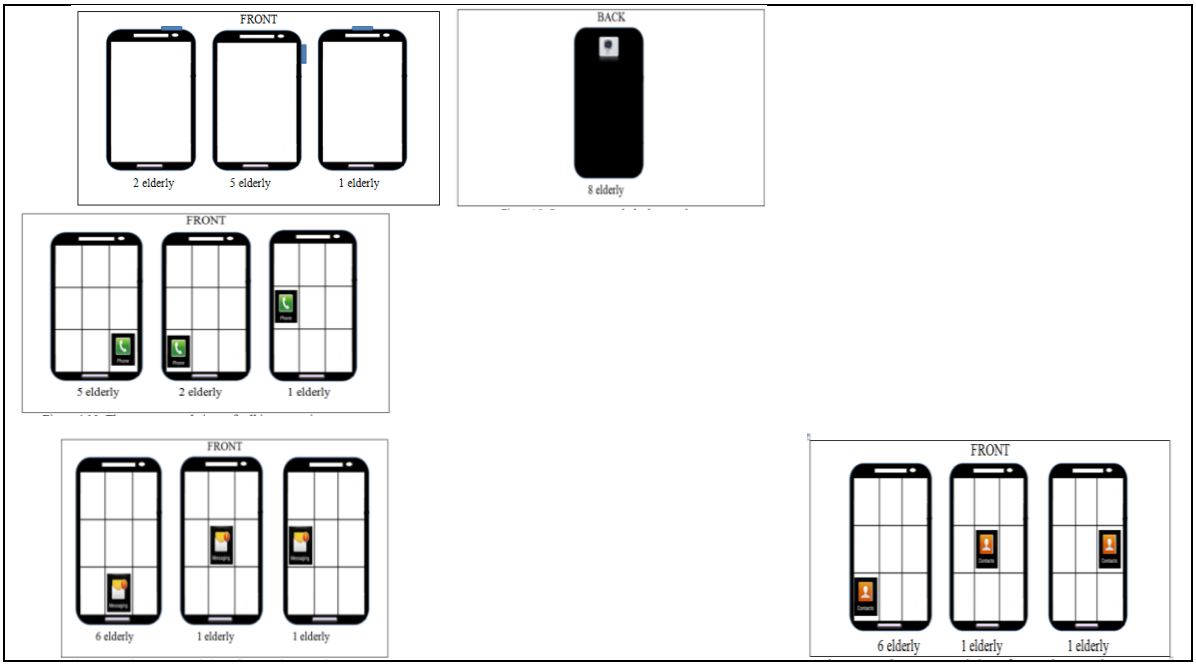
a) User Testing Discussions

For task 1 dial a number, P4 is the slowest participants where it takes 38 seconds to accomplish the task because factor of ageing and use somewhat frequent to use call features in daily life. Olwal et al., (2011) states that the button size is too small at the dial screen and less sensitive for elderly fingers. It also a normal problem due to aging when participant have short term memory loss symptoms and lack of mental flexibility (Sabatino, 2005).

For task 2 receive a call, P6 takes 4 seconds to accomplish the task which the slower participants than others. She mentions to prefer for press button for receiving a call rather than swipe the icon. Olwal et al., (2011) also says that many of current features may confusing and irrelevant to elderly people. For task 3 search a contact, both P1 and P3 takes 8 seconds to accomplish the task which the slowest participants because they rarely used of contact features and only used it in emergency time and support by Hassan and Nasir (2008). It is because of difficult to navigate the contact number. For task 4 type a text message, P4 takes 72 seconds to accomplish the task which the slower participants than others. It is because of participants ageing and the QWERTY keyboard is small. It also support from Hamano and Nishiuchi (2013) where they mentions "QWERTY" has a problem in that its key size is too small to depress and less sensitive for elderly fingers. Other than that, the software centric approach such as text enlargement no longer exists in the current elderly smart phone (Olwal et al., 2011). For task 5 set an alarm clock, P4 takes 48 seconds to accomplish the task which the slower participants because participant rarely used the alarm clock features and avoids getting confused with the interface design due to memory problems. There are many features also confusing the elderly people which may affect the elderly perception to use the smart phone (Olwal et al., 2011). For task 6 view the picture, P4 takes 17 seconds to accomplish the task which the slower participants than others because he rarely use the gallery features. Elderly may have lack of mental flexibility where they slow to recap the fresh scenario (Sabatino, 2005). For task 7 google browser & type keyword, P4 takes 41 seconds to accomplish the task which the slower participants than others. He also explains that he rarely used the Google browser because he like reading books rather than find information on the Internet. There are many features and icons also confusing the elderly people in the smart phone (Olwal et al., 2011).

b) Interface Design Discussions

In this section, it discuss about interface design feedback from the eight participants. The important icons that used in this study are power button, camera, call, message, contact, calendar, camera icon and clock. Figure 3 shows elderly recommendations of smart phone main screen.



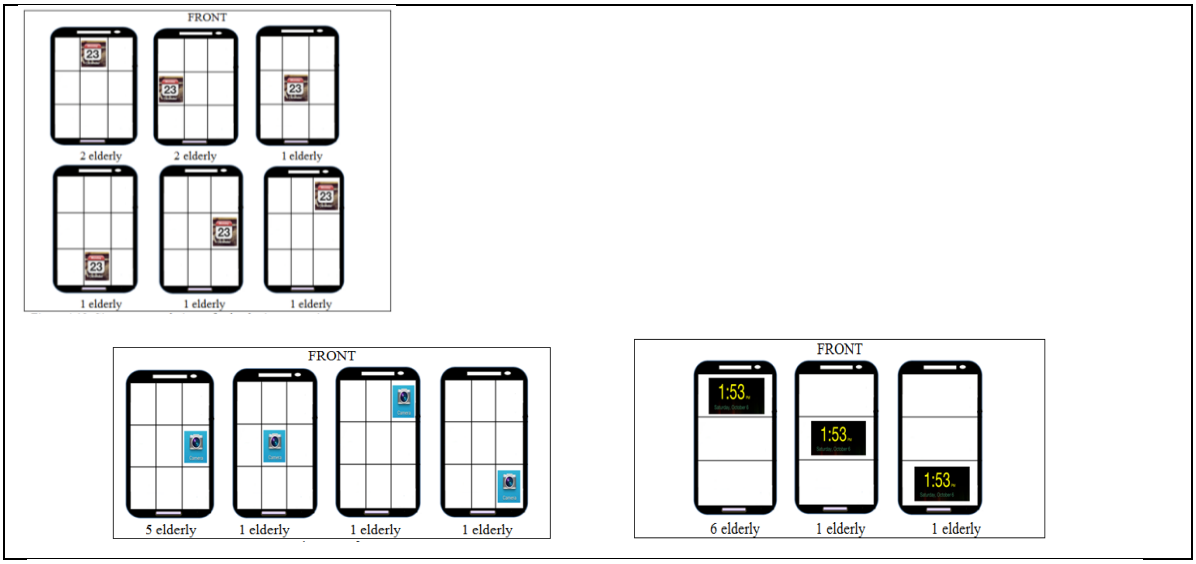


Figure 3. Elderly Recommendations of Smart Phone Main Screen

These recommendations of interface may reflect from frequent use of smart phone in their daily life and depends on right or left handed people. The crucial points are participants want the easy features and simple to adapt the smart phone technologies that might help the elderly people to arrange according to their features priority.

CONCLUSION & RECOMMENDATIONS

As a conclusion, by having this study with the user testing and drawing method, requirements and recommendation for elderly smart phone make them convenience to use the smart phone.

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