Design and Design Thinking to Help the Aged People in Fallen Situations

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Abstract. Falling down is a serious problem for the aged people since they are degenerated in the physical and psychological. In some areas, when aged people is fallen it will be nobody around and will be dead in a painful situation. The research focuses on developing a carry on device by mobile technique connected with cloud computing by some emergency departments to help them. The design thinking and the protocol device is developed and expected to be simulated. The research expects to implement the real device at economic price for the needed people to save their lives.

Keywords: Aged people · Fallen situation · Design · Design thinking

1 Introduction

World Health Organization definition of the elderly population is aged 65 and over [1]. Taiwan, the US Census Bureau estimated the population in 2020 more than 14 % of the elderly, into an Aged Society. And even more rapidly than the rate of aging in Japan, will reach 20 % in 2029, to enter the Super Aged Society [2].

For this social phenomenon, the government also launched a related academic re-search. In a period of three years project, Silver Health Care Research and Development Community Habilitation in Taiwan, research selects two regions and involves architecture, landscape departments to the fields. After development of design thinking, specific output of useful products attempt to help the two regions' elderly people.

In the study conducted last year, took place on a real case, an elderly woman living alone with ability to have independent living alone in the mountains. In the backyard garden after fall tillage, she keeps conscious but unable to move and stood. It causes anxiety and helplessness more than two hours. Fortunately one of research member wants to do in-depth interviews again, find her and give emergency relief. This case reflects low birth rate, social change, living alone, and no proper support, could not immediately notice the plight of medical injuries caused by the accident.

Lack of manpower, the use of technology may be to choose a program to solve. How to apply network technology, sensing components, communication technology, and mobile phone functions to prevent falls is the research topic.

M. Antona and C. Stephanidis (Eds.): UAHCI 2015, Part II, LNCS 9176, pp. 447–454, 2015.
DOI: 10.1007/978-3-319-20681-3_42

2 Literature Review

Elderly research in recent years is more and more. Since design thinking in the re-search is application. The literature review focuses on in the range of fall detection system:

2.1 Sensing System

Fall protection mechanism, the primary protection can reduce possibility but it is difficult to avoid. The previous proposal [3–5] focused on secondary prevention, harm reduction and shorten response time. Benny [8] proposed to do with wisdom camera motion analysis to determine the status and send message rescue. But technology, costs are high, to be more restrictions on the development of privacy. Majd [10] places vibration sensor to detect the main floor, but the group is difficult to fully construct and cost is also high. Karantonis [6] uses ZigBee transmission on belt with two rows of triaxial acceleration detector operates motion analysis then transfer information to backend computer to operate help analysis, although the action recognition rate, fall detection rates are up to 90.18 % and 95.6 %, but the reaction time is too long (happened to inform 60 s). If the situation is urgent, there is still considerable risk. Wang C. [7] axis accelerometer will postharvest ear hearing aid, detection time can be shortened to two seconds. According to that research, Chang improves it by ear hook to solve transmission line constraints and inconvenience [9].

2.2 Wireless Technology

Bandwidth and transmission speed is shown in Fig. 1 [12].

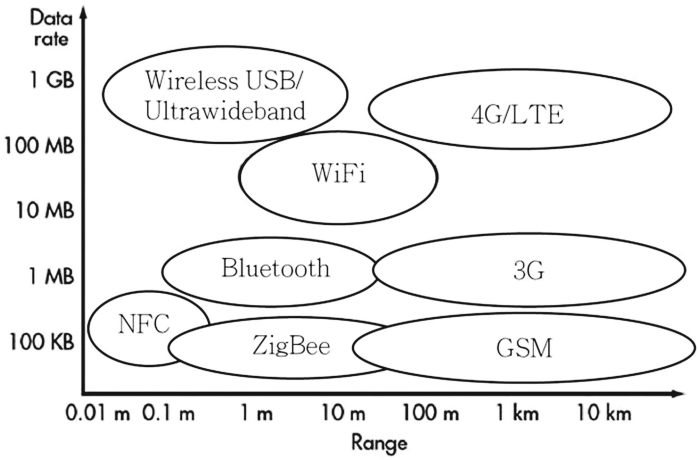

Fig. 1. Data rate and range of wireless network applications

Table 1 Compares weaknesses and good points of ZigBee and Bluetooth [11].

Table 1. Pros and cons between ZigBee and Bluetooth

Comparison project \Technology	ZigBee	Bluetooth
Target market	Monitoring applications or wireless sensor networks	Replace the transmission line
Costs	<4USD	5USD
Typical current	<20 mA	<30 mA
maximum bandwidth	250 kbit/s	201 Mbit/s
maximum number of nodes	65536	7
Transmission distance (ft)	30 ~ 100(Indoor) 150 ~ 300(Outdoor)	30 ~ 300
Main application	Low duty cycle equipment ex: 8-bit, battery-powered control center	PDA Mobile phone handheld device

3 Methodology

Observation method is used to understand the community elderly, their environment, behavior and reaction events, and interactive scenarios. Through notes and photos, record videos, and to observe the structural formula of the locking system environment and behavioral elements clear case definition to look for patterns of everyday life or physical psychological trend. After obtaining a large number of audio and video records, it attempts to identify the mode of photo analysis among elderly peoples dress, behavior, reactions and interpersonal contact. Finally, the empirical design life requirement (EBD) expands the design and user experience to converge preset gap between design alternatives.

4 Implementation

4.1 Field Investigation

The first year of fieldwork focuses in the mountains (Skun). The second year field-work launches on seaside (Chinsui) areas. The reason is that geographic, cultural relativity of the two major ethnic groups in Taiwan. Photos, interviews questionnaire are the main record. Some representatives of the photo shown as Figs. 2 and 3:

After the photo analysis, elderly person's behavior and the scope of their activities are observed:

Skun District simple family contacted more consistent, daily meal is also consistent, and fruit farming, mountain farming are the main daily jobs

Chinsui District is high degree of commercialization, and involves the military com-munity, quite different in other regions.

Skun District

Fig. 2. Photos of Skun area

Chinsui Distict

Fig. 3. Photos of Chinsui area

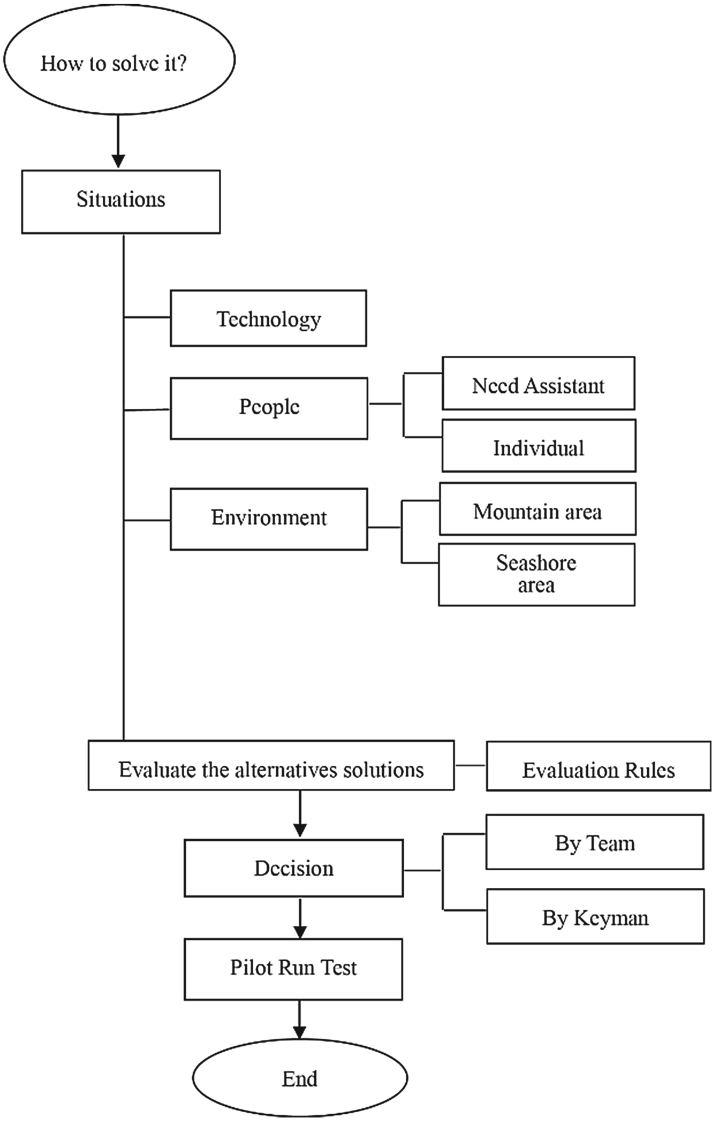

Fig. 4. Flowchart of development and final stages

United military community area, aging people meals are mostly pasta. Elderly person has been in a long and mutually support by the next generation or neighborhood.

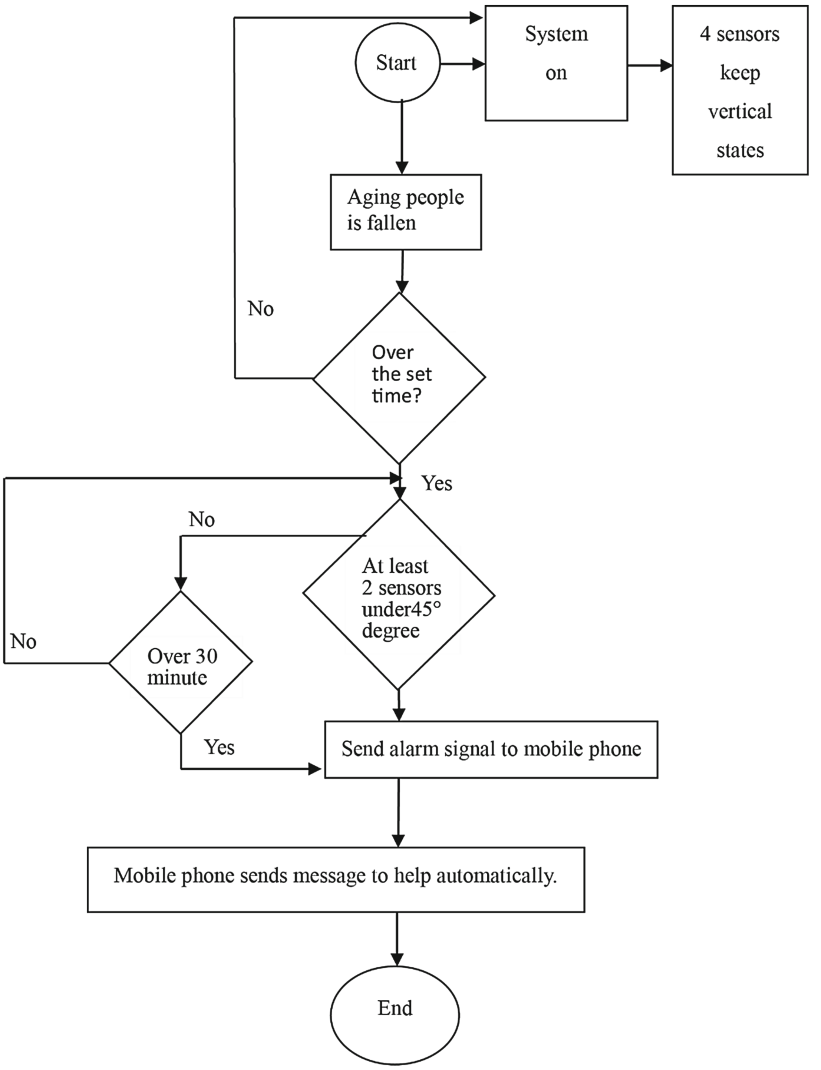

Fig. 5. Algorithm of the System

The other areas are heavy personal ideology, high commercial value and protect their own interests first. The aged present similarities in two areas also are:

(a) Physical body and routine daily schedule is the same. By organizing specific events in the two regions in the characteristics of the interior space (puzzles, dough, body dance) with all free food, observation finds that all will be early arrived at the appointed time. It seems all of them look forward to participating in the reaction of pleasure. In the process, just one or two leave when they feel tired.

(b) Respect for the food presentation is consistent. Generally they will be willing to pack extra food back. Appetite is no different from ordinary people.
(c) Clothing, apparel, aids also show consistency.

4.2 Design Thinking

Design thinking on the development and final stage is as Fig. 4.

The algorithm of the system is as Fig. 5.

5 Conclusion

After long-term care for the elderly subjects, selecting the mountain stages, two Tai-wan seaside communities, conduct fieldwork and import design thinking, expand the essence of the design. Because of the resources, early in the fieldwork, and propose specific outputs active notification for the two regions after an elderly person fell habit wearable button-type design.

In addition, to specific design thinking to research an attempt to simulate the future entity is suggested to adjust the user experience.

This product design features some single parts [12–16], effectively evoke the wireless network equipment and contact the community support is expected to avoid the fall tragedy.

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