Development of Fire Information Integration Application Platform

Ching-Shun Chen[1], Yu-Tsung Ho[1], Yi-Lin Chen[2], Chung-Chyi Chou[3]

[1]College of Mechatronics, Quanzhou University of Information Engineering
[2]Department of Environmental Engineering, Da-Yeh University
[3]Da-Yeh University of Department of Fire and Safety

dustin@mail.dyu.edu.tw

Abstract. The aging society is a challenge facing all countries in the world. The collection and analysis of fire information in elderly care institutions has become a key factor in seeking shelter time. This study will build a fire information platform and its reporting mechanism through HTML, PHP, MySQL and other software development tools, and through the source and distribution of fire information. Public announce technology to improve the fire response capacity of the elderly institutions. This paper quotes Marchant (1980), a British scholar, who regards fire and refuge action as the parameters of elderly people's refuge. The system of fire information platform consists of three parts: the "manager interface", "cloud database" and "fire information platform". The results show that the fire information reported after the confirmation of the management personnel can improve the residents' confidence in the source of the information. The test results in the experimental field show that the higher the integrity of fire information content and the more rigorous distribution process are, the more helpful it is to shorten the judgment time of pre-avoidance tragedy, and the visual fire information platform is helpful to the correct judgment of the refuge route. Adding a call button to the platform can also increase residents' sense of security. Fire information integration platform can help elderly care institutions take immediate shelter action in case of fire.

1. Introduction

France has experienced 115 years to come, "aged society" from "aging society", perhaps because of advances in medical science, people on average life expectancy, coupled with the low birth rate trend factors, Japan went to the "aged society" from "aging society" within 25 years. In response to the needs of an aging society, many governments enacted long-term care services regulations. A. Khitab et al. [1]. It is believed that nanotechnology is going to play an important role in the development of futuristic building materials. The innovations could be two-fold; one is the modification of classical materials and the other should cover the invention of novel materials. Disaster prevention also requires innovative technology to integrate fire information.

Many international long-term care facilities are converted from other uses of the building, even if the world building and fire codes conform to the conditions of time and upgrading, but the old building in which the establishment of long-term care institutions, only a refuge or safe stairs stairs. The fire information, shelter information, fire extinguishing information cannot be immediately regrouped, and the evacuation guide is carried out. As older people over the age of 65, auditory, visual and other physiological functions may deteriorate due to age, the ability to judge fire messages has not been as quick and agile as young people. Groner (2016) [2]. Point out that the user behavior of the

usual place will be related to the architectural form, and the user and the user will also be related to each other. Besides the four correlations, the correlations of building types to evacuation behavior of the vulnerable, fire response of the vulnerable, fire response of the vulnerable, and between the vulnerable and the general users during the period of fire refuge become eight more complex correlations.

Deng et al (2012) [3] definition of the refuge of the weak: "refers to the refuge of the weak elderly patients (contains disabilities), children and other persons with reduced mobility or bed and so on, when a fire or disaster, unable to complete action on their own or evacuate personnel, to be assisted by the actions of others evacuation of vulnerable persons belong. " Elderly home or long-term care institutions not only to face the refuge of the weak elderly, but also consider the issue once the place of fire, whether the elderly person will immediately evacuate. Shen (1993) [4]. Put forward the content of Formula 1 according to the sequence of fire and refuge action, using the concept of time.

$$\frac{Tp + Tr + Ta}{Tf} \leq 1 \tag{1}$$

Research by D'Orazio et al. (2015) [5]. Shows that proper setting of reflective index, night light index, luminous index, dynamic guidance system and voice guidance system can effectively shorten the time of refuge. This study builds a fire information platform and reporting mechanism to enhance the trust mechanism of fire information in pre-evacuation process by improving the source, quality and distribution process of fire information. The development process of fire information platform adopts on-the-spot investigation and interview to understand the needs and past problems of the elderly residents and managers, and to serve as an important reference for the development of information system foreground and background. After the completion of the fire information platform, qualitative interviews with managers and residents were conducted at the site again.
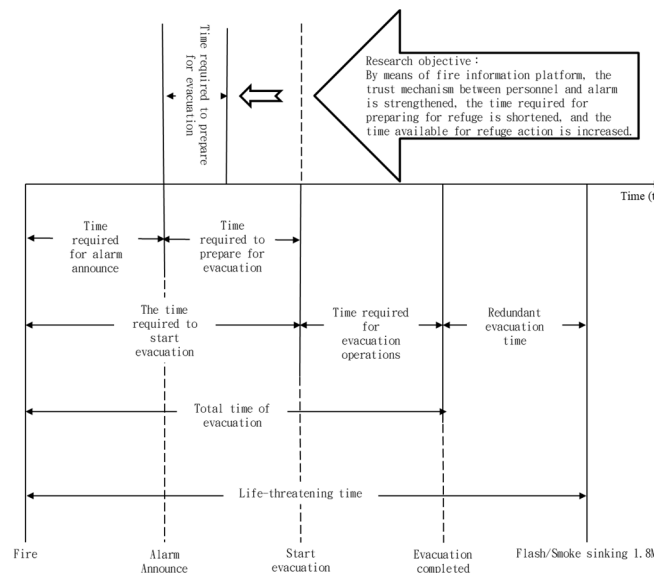

Figure 1-2. Research Concept Description.

2. Research Methods

Based on the relevant literature, this study infers that the behavioral decision-making of fire occurrence depends on the degree of risk perception. Risk perception is influenced by "source of information", "quality of information" and "mode of information announce". Therefore, this study

intends to improve the trust mechanism of fire information in the process of avoiding distress by improving the source, quality and publishing process of fire information. Based on this, a research framework is proposed as shown in Figure 2-1.
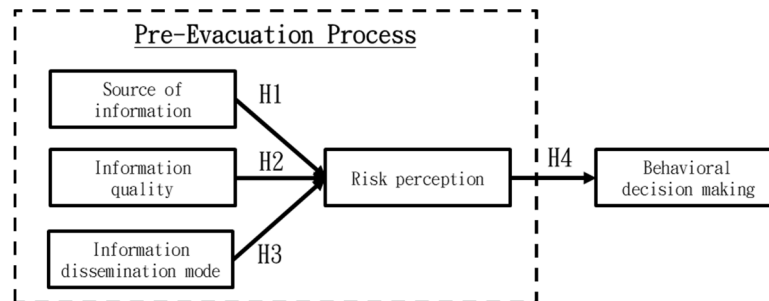
Figure 2-1. Research Architecture Diagram.

To ensure the reliability of fire information announces, information announce must be audited and confirmed. When the system collects fire detector signals, the system will automatically send messages to the mobile phones of authorized personnel above the level 2 supervisor. If the evacuation action is deemed necessary after verification and confirmation, the fire information platform can be announced immediately after entering the account password through the mobile phone, instead of the detector action. In the part of information quality, referring to Wiegman et al. (1992) [6], there are three psychological assessment processes before a decision is made: clue, situation and risk, while the three assessment processes are not sequential. Mileti and Sorensen (1990) [7] Humans undergo a specific process before responding to asylum, including hearing, understanding, belief and personalized warning. As Ramachandrn (1990) [8] pointed out, when people receive fire alarms, whether through fire, smoke, or alarm bells, they will try to understand the reasons and verify, if found to be false, they will choose not to change. Make the fire information platform conform to Mishra (1996) [9], "When people make decisions based on the information they trust, they are mainly based on four beliefs: Competent, Open, Concerned and Reliable". The research process can be divided into three stages:

1. Investigation stage: after exploring the behavior of the elderly, the behavior of pre-refuge, the behavior of fire refuge, the research of evacuation plan for the weak and the research of information trust, the feasible ways to improve the trust mechanism are summarized and the research process is established accordingly.

2. Construction stage: design fire information platform from three directions: information source, information quality, information announces mode, referring to the theory and results put forward by scholars, establish the fire information platform release mechanism, by whom, how to announce and what content should be included in the fire information announces.

3. Adjustment stage: After interviewing the elderly housing administrators and elderly resident through the use of survey questions, the paper analyses whether the administrative administrators and senior residents can enhance the trust mechanism between the fire information platform and the alarm, and then assists the senior citizens in decision-making of evacuation action in case of fire, so as to increase the time available for evacuation action.

3. Results and Discussions

3.1. System components and development tools
This study divides the system of fire information platform into three parts: "Management Interface", "Cloud Database" and "Fire Information Platform". Use 4G or Wifi network connection to enable administrators to immediately receive fire signals through mobile vehicles and evacuate immediately. The transmission format of the Web page as the "manager interface" should be consistent with the

research intention. The administrator connects to the management webpage of Amazon Web Service through the action vehicle, edits and adjusts it, and the changed data will be linked with the cloud database written by MySQL inside AWS and update the data synchronously.

In the critical situation, when evacuation is necessary, the fire information platform is also released through this interface to force the pre-set display. The system uses Hypertext Preprocessor (PHP, Hypertext Preprocessor) as a development tool for the administrator's user interface. In order to make the fire information platform more convenient and convenient, and to avoid the obstacles that the use organization may be unfamiliar with the information program and difficult to replace or adjust the platform content, this study first uses the PHP hypertext preprocessor syntax to create the background interface. 3-1 cases. In the editing of each web page, according to the design requirements of the platform information, the attributes (text, picture, film) of Cascading Style Sheets (CSS, splicing style sheet) can be selected, and the input/output action logic or hyperlink can be given to other URL or file.

Figure 3-1. Fire information platform PHP syntax example.

System foreground development uses Hyper Text Markup Language 5 (HTML, Hyper Document Markup Language) and jQuery: a cross-browser JavaScript library that can be used to simplify the operation between HTML and JavaScript. Figure 3-2 shows the partial syntax of HTML in the fire information platform, and integrates the functions of the Internet and remote monitoring of the smart networking function TV. It can be customized for individual TV broadcasts according to different situations.

Figure 3-2. Example of HTML syntax for fire information platform.

Figure 3-3. Fire Information Platform MySQL Syntax Example

The database is written by MySQL (My Structured Query Language), in which SQL is Structured Query Language, which is an open source relational database management system, which can be used together with PHP for database development [20], Figure 3-3 shows the MySQL syntax example of the fire information platform. This study stores the information about the Fire Information Platform on the Amazon Elastic Compute Cloud (Amazon EC2) cloud computing server. And uses Amazon Web Service (AWS) to adjust computing resources and program, store, query and update files.

3.2. Fire information platform
The programming of the research platform uses PHP + MySQL as the background webpage and database system. The database is set up on the Amazon EC2 cloud server, and the Amazon Web Service (AWS) system is used to convert the server data into a webpage operation interface for programming and storage., query and update files. The front page is used with HTML5 and jQuery. It is currently installed in a private network space. It is preset to automatically request updates from the server every 1 second. The fire information platform functions completed in this study include "Evacuation Location", "Floor Plan", "Escape Path", "Fire Location", and "Call for Help". The evacuation site is a text warning message. The administrator can edit the evacuation instruction or the collection location in the user interface. Can immediately edit any message that you want to inform the asylum seeker according to the fire situation or pre-edit the settings according to your own plan.

Mishra (1996) [12] and believes that the recipient of the message will be since the other party is "Qualified," "Confessed," "For Care," and "Depends on"; the message can only be Designated professional editors to meet the above four reasons. The platform provides a top-level plan view of the user's floor structure, allowing the user to quickly understand the floor structure and the stair position in the screen, and the dynamic escape path window is displayed in the upper right corner, so that the user can switch to the size screen according to the requirements.

The results of the interview conducted by the elderly care field showed that the higher the integrity of the fire message content and the more rigorous the management level of the message has a higher degree of trust; the user can shorten the judgment time of the pre-avoidance process in the event of a fire. The fire information is integrated with the imaged evacuation direction to the fire information platform to help the correct judgment of the evacuation route. At the same time, users also expect to be able to add a call for help button on the platform, which can increase the security of residents. The fire information integration platform can assist elderly care institutions to take refuge actions immediately in the event of a fire.

4. Conclusion and Recommendations
This study builds a fire information platform and its reporting mechanism through HTML, PHP, MySQL and other information tools to enhance the fire response capability of the elderly institutions through fire message sources and release technologies. The fire information platform system is divided into three parts: "Manager Interface", "Cloud Database" and "Fire Information Platform". The results of the study show that the fire message sent by the manager after confirmation can increase the trust of the residents in the source of the message. Test results in the experimental field show that the higher the integrity of the fire message content and the rigorous release process, it is helpful to shorten the judgment time of the pre-avoidance process. The visual fire information platform is helpful for the correct judgment of the evacuation route. Adding a call for help button on the platform can also increase the security of the residents. The fire information integration platform can assist elderly care institutions to take refuge actions immediately in the event of a fire.

References
[1]   Khitab A, Anwar W, Mansouri I, Tariq M K 2015 Future of civil engineering materials: A review from recent developments, *Rev. Adv. Mater. Sci.* **42(1)** 20-7.

[2]   Groner N E 2016 A decision model for recommending which building occupants should move where during fire emergencies, *Fire Safety J.* **80** 20-9.

[3]   Deng Z, Zeng W, Shen Z, Cai Z, Yang S 2012 Research on the Impacts of Building Fire Asylum Weak Refuge and Human Factors Data, *J. Architec.* **79** 131-45.

[4]   Shen Z 1996 Theoretical analysis of human asylum in fire, *Police Series* **26(6)**.

[5]   D'Orazio M, Bernardini G, Tacconi S, Arteconi V 2016 Fire safety in Italian-style historical theatres: How photoluminescent wayfinding can improve occupants' evacuation with no architecture modifications, *J. Cultur. Herit.* **19** 492-501.

[6]   Wiegman O, Komilis E, Cadet B, Boer H, Gutteling J M 1992 The Response of Local Residents to a Chemical Hazard Warning: Prediction of Behavioral Intentions in Greece, France and the Netherlands, *Int. J. Mass Emerg. Disas* **10(3)** 499-515.

[7]   Mileti D S, Sorensen J H 1990 Communication of Emergency Public Warnings: A Social Science Perspective and State-of-the-Art Assessment, *Oak Ridge National Lab., TN(USA)* No. ORNL-6609.

[8]   Ramachandrn G 1990 Human Behavior in Fire--A Review of Reserch in the United Kingdom, *Fire Technol.* **26(2)** 149-55.

[9]   Mishra A K 1996 Organizational Responses to Crisis, *Trust Org. Fronti. Theor. Res*. **261**.