

# A DEVELOPMENT PROGRAM FOR BALANCING EXERCISE OF ELDER BASED ON XBOX KINECT DEVICE

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## ABSTRACT

This research aims to analyze and design a program to balance the exercise of the elderly base using Xbox Kinect and exercise program development. The sample was 107 people by simple random sampling. The questionnaires were used to collect data and analyze by percentage, mean, and standard deviation. The results showed that the evaluation of the system in the program found that overall the better level and each aspects functional test found that the better level, functional requirement test, usability test and integrity test are in the good level, respectively. The researcher summarizes the results of the project found that the program shows the proper exercise style, correct, easy to use program. Equipment problems found that there are limitations in use the system can only be used with Windows and the system can be used with maximum efficiency when connecting to the Kinect diver. Suggestions for program development are beautiful designs and regularly updating information and increase the stability of the sensor.

**Keywords:** Balance exercise, Elderly, Kinect device.

## 1. INTRODUCTION

United Nations (UN) defines the term "elderly" means a person or a group of people who are aged by calendar age from 60 years and over which is the same age threshold as the World Health Organization (WHO). [1] Calling the older person is often referred to as Old age, Old people, Senior citizen, the aged, Ageing and Elderly people etc. [2] Rapid global population structure changes as a result of the advancement of medical technology and health administration in the medical field is up-to-date with modern health promotion effective disease prevention leads to good health, longevity. In the past three decades, the elderly population has increased in size and proportion to the entire population due to reduced mortality and fertility rates. [3]

Recently, the number of elderly in Thailand has increased continuously every year due to the improved health system. As a result, the government sector is aware of the importance of quality of life for the elderly. Determine measures to take care of the elderly for a better quality of life defined as a country strategy "Preparing to step into an aging society in Thailand" is part of the strategy of The ten national economic and social development plan (2002 - 2021) establish policies, measures for government agencies, supervision system and providing assistance to the elderly, such as providing health service provision of social welfare promoting good quality of life. [4] The Act on the Elderly (2003) mentioned the medical service and public health education, occupation or professional development Participation in social activity facilities and safety in the building vehicles or public services. [5]

Physical Activities Research Center (PARC), Thai Health the study of elderly exercise helps increase the amount of physical activity of the elderly the exercises are different in intensity, duration and frequency. As well as forms and methods Depending on the goals and main objectives that are needed to promote health or physical fitness and the type of exercise that is currently used. Virtual reality (VR) technology has developed rapidly with more accurate detection accuracy is suitable for use with the elderly or people needing special care. The virtual reality technology, Life situations, environment or real events. As a result, virtual reality technology has played an important role in public health. [6] As mentioned previously, the researcher is interested in a development

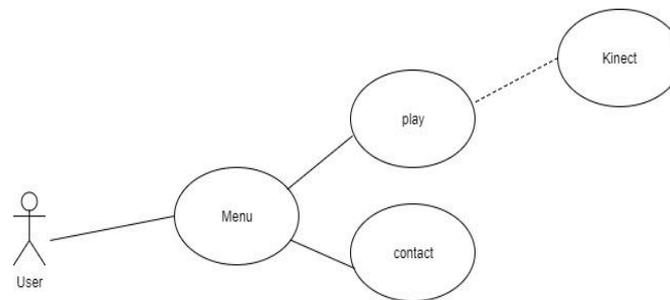
program for balancing exercise of an elder based on the Xbox Kinect device to facilitate the exercise of the elderly and helpful for the development of programs for the elderly to be more effective.

## 2. RESERCH OBJECTIVES

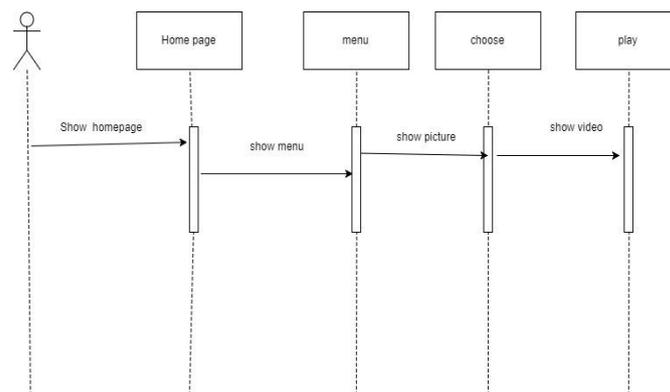
- 1) To analyze and design program for the balanced exercise of elderly on Xbox Kinect devices.
- 2) To development program for balance exercise of an elder based on Xbox Kinect device.

## 3. ANALYSIS AND DESIGN

In order to perform this work, the authors investigated and collected data from several research and users that consists of the elders and the application experts. A lot of information was used to analysis and design state that perform to manage the mobile application and database. It also was helpful the researcher to make the system fast and works easily. In this work, the technique to use for analysis and design that can be divided into 2 steps as follow: use-case diagram of the system and sequence diagram of the system as shown in Figure 1-2 consequently. Moreover, this research was studying and analysis of system problems and needs to use the information system development to meet the needs of users based on system requirements analysis (problems of the work system, guidelines for solving problems and system requirements) and system design (scope of the new system).



**Figure 1** Use-case diagram of the system



**Figure 2** Sequence diagram of the system

## 4. RESULTS AND DISCUSSION

In this work, the results were divided in 2 parts: development of mobile application and evaluating performance and satisfaction of program for balancing exercise of the elder using the Xbox Kinect device.

4.1 The application development, PHP, HTML, CS6, AJAX and Java Script were used to implement and coding with MySQL database. The system consists of program, exercise information, search system, categorization system and function. The home page is displayed the menu keys and some information that is necessary for all users. On each page can be shown in the exercise program and example steps that depend on user selection or automatically show. Besides, the user can click to select the level of appropriate programs. For a backend, the system administrator used to manage the policy such as log-in name and password. This system also offers the administrator to edit or updating more information any time that corresponded to the related information in the database as shown in Figure 6-8 [7], [8].



Figure 3 Homepage of mobile application



Figure 4 The page of exercise steps and information



Figure 5 The statistic of exercise steps and information



Figure 6 Administrator and copyright page

#### 4.2 Evaluating the performance and satisfaction of mobile application

In the step of evaluating the performance and satisfaction of the system, questionnaires were analyzed statistically using computer statistical software packages to calculate the statistics. Descriptive statistics were used to explain a development program for balancing exercise of elder base on Xbox Kinect device using frequency, mean and standard deviation. The results of the program for balancing exercise of an elder based on Xbox Kinect in each aspect as shown in Table 1-5 respectively.

**Table 1**  
The Results of the Functional Requirement Test

| Functional Requirement Test  | Performance level (n = 75) |    |   |   |   |             | $\bar{x}$   | S.D.        | Interpretation |
|--|----------------------------|----|---|---|---|-------------|-------------|-------------|----------------|
|  | 5                          | 4  | 3 | 2 | 1 |             |             |             |                |
| 1. The data information for the presentation<br>Appropriate.       | 19                         | 17 | 4 | 0 | 0 | 4.32        | 0.72        | Good        |                |
| 2. The display of various Types of screen devices are appropriate. | 15                         | 24 | 1 | 0 | 0 | 4.35        | 0.49        | Good        |                |
| <b>Mean</b>  |                            |    |   |   |   | <b>4.42</b> | <b>0.60</b> | <b>Good</b> |                |

Table 1 shows results evaluation of systems in functional requirement test. It was found that the overall performance is good level ( $\bar{x}=4.42$ , S.D. = 0.60). When considering each item, it found that the display of various types of screen devices is appropriate ( $\bar{x}=4.35$ , S.D. = 0.49) and the data information for the presentation appropriately ( $\bar{x}=4.32$ , S.D. = 0.72) is in good level performance.

**Table 2**  
The Results of the functional test

| Functional Test                  | Performance level (n = 75) |    |   |   |   |             | $\bar{x}$   | S.D.          | Interpretation |
|----------------------------------|----------------------------|----|---|---|---|-------------|-------------|---------------|----------------|
|                                  | 5                          | 4  | 3 | 2 | 1 |             |             |               |                |
| 1. Information correct           | 26                         | 10 | 4 | 0 | 0 | 4.55        | 0.67        | better        |                |
| 2. The system can actually work. | 15                         | 22 | 3 | 0 | 0 | 4.30        | 0.60        | better        |                |
| <b>Mean</b>                      |                            |    |   |   |   | <b>4.43</b> | <b>0.63</b> | <b>better</b> |                |

Table 2 shows results evaluation of systems in a functional test. It was found that the overall performance is better level ( $\bar{x}=4.43$ , S.D. = 0.63). When considering each item, it found that Information correct ( $\bar{x}=4.55$ , S.D. = 0.67) and the system can actually work. ( $\bar{x}=4.30$ , S.D. = 0.63) are in better level performance.

**Table 3**  
The Results of the usability test

| Usability Test   | Performance level (n = 75) |    |   |   |   |             | $\bar{x}$   | S.D.        | Interpretation |
|--|----------------------------|----|---|---|---|-------------|-------------|-------------|----------------|
|  | 5                          | 4  | 3 | 2 | 1 |             |             |             |                |
| 1. Easy to use and comfortable.                            | 22                         | 14 | 4 | 0 | 0 | 4.42        | 0.67        | Good        |                |
| 2. Arrange the elements appropriately                      | 17                         | 22 | 1 | 0 | 0 | 4.37        | 0.48        | Good        |                |
| 3. The appropriateness of component placement at the point | 23                         | 14 | 3 | 0 | 0 | 4.50        | 0.64        | Good        |                |
| 4. Suitability in planning or decoration system            | 22                         | 14 | 4 | 0 | 0 | 4.42        | 0.67        | Good        |                |
| <b>Mean</b>  |                            |    |   |   |   | <b>4.42</b> | <b>0.63</b> | <b>Good</b> |                |

Table 3 shows results evaluation of systems in the usability test. It was found that the overall performance is good level ( $\bar{x}=4.42$ , S.D. = 0.63). When considering each item, it found that the appropriateness of component

placement at the point ( $\bar{x}=4.50$ , S.D. = 0.64), suitability in planning or decoration system and easy to use and comfortable ( $\bar{x}=4.42$ , S.D. = 0.67) and arrange the elements appropriately ( $\bar{x}=4.37$ , S.D. = 0.48) are in good level performance, respectively.

**Table 4**  
The Results of the integrity test

| Integrity Test                                     | Performance level (n = 75) |    |   |   |   |             | $\bar{x}$   | S.D.        | Interpretation |
|--|----------------------------|----|---|---|---|-------------|-------------|-------------|----------------|
|  | 5                          | 4  | 3 | 2 | 1 |             |             |             |                |
| 1. Complete composition.                           | 17                         | 20 | 2 | 0 | 0 | 4.25        | 0.74        | Good        |                |
| 2. Creativity.                                     | 19                         | 17 | 4 | 0 | 0 | 4.32        | 0.72        | Good        |                |
| 3. Finding the right information                   | 16                         | 22 | 2 | 0 | 0 | 4.35        | 0.67        | Good        |                |
| 4. The display is appropriate for the screen size. | 12                         | 21 | 7 | 0 | 0 | 4.12        | 0.68        | Good        |                |
| <b>Mean</b>  |                            |    |   |   |   | <b>4.26</b> | <b>0.70</b> | <b>Good</b> |                |

Table 4 shows results evaluation of systems in integrity test. It was found that the overall performance is good level ( $\bar{x}=4.26$ , S.D. = 0.70). When considering each item, it found that the finding the right information ( $\bar{x}=4.35$ , S.D. = 0.67), the creativity ( $\bar{x}=4.32$ , S.D. = 0.72), the complete composition ( $\bar{x}=4.25$ , S.D. = 0.74) and the display is appropriate for the screen size ( $\bar{x}=4.12$ , S.D. = 0.68) are in good level performance, respectively.

**Table 5**  
The Results of the System Evaluating

| Evaluation of System Test                  | Performance level (n = 75) |    |   |   |   |             | $\bar{x}$   | S.D.          | Interpretation |
|--|----------------------------|----|---|---|---|-------------|-------------|---------------|----------------|
|  | 5                          | 4  | 3 | 2 | 1 |             |             |               |                |
| 1. The system has a correction protection. | 14                         | 17 | 9 | 0 | 0 | 4.13        | 0.75        | Good          |                |
| 2. Can be used by the user                 | 12                         | 28 | 0 | 0 | 0 | 4.30        | 0.46        | better        |                |
| <b>Mean</b>                                |                            |    |   |   |   | <b>4.21</b> | <b>0.60</b> | <b>better</b> |                |

Table 5 shows results evaluation of the system. It was found that the overall performance is better level ( $\bar{x}=4.21$ , S.D. = 0.60). When considering each item, it found that the Can be used by the user ( $\bar{x}=4.30$ , S.D. = 0.46) on better level performance and the system has correction protection ( $\bar{x}=4.13$ , S.D. = 0.75) on good level performance.

## 5. CONCLUSION AND DISCUSSION

In this work the proposed for balancing exercise of the elder base on the Xbox Kinect device. The result of evaluate of system testing each aspect, we found that functional requirement test in overall in good level performance, The functional test in overall with the better level performance, the usability test in overall in good level performance and the evaluation of the system test in overall with the better level performance. That can be used to recover the health of an elderly to a normal state, development of elderly life quality and apply for exercise development of highest efficiency.

## 6. ACKNOWLEDGEMENT

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