Physical Signal Control System for Preservation of Posture Balance

Jeong-lae Kim[1,a], Ho-jun Yeom[1,b] and Ki-young Lee[2,c],

[1]Department of Biomedical Engineering Eulji University, Seoul, Korea
[2]Department of Medical IT and Marketing Eulji University, Seoul, Korea
[a] jlkim@eulji.ac.kr , [b]hyeom@eulji.ac.kr , [c]kylee@eulji.ac.kr

Abstract

This study was designed the physical signal control system of posture balance for preserving body sway. It was necessary to constantly monitor their physical parameters, especially body balance, to effectively control their health condition and care body moving. There signified body movement by the parameter that was neck moving and eye moving such as forward/backward body moving. This system consist of a data acquisition system, which was responsible for capturing and sending data signal, which was responsible for gathering data signal processing, and to control the received data through feedback system. There were evaluated their body sway through a physical data, and identified to maintain the stability. It was expected to control a body activity and to confirm the physical signal system.

Keyword: Physical signal control system, Signal processing, Data acquisition system, body sway

1. Introduction

Recently with an increasingly aging population, the need to supply healthcare services for the elderly people who need special care and mostly live at home all alone is essential and constantly increasing [1, 2, 3]. In order to provide proper home healthcare services and timely handle an emergency for the elderly, it is indeed necessary to monitor their physiological parameters at home over a long period of time[4, 5, 6].

Physical signal control system through posture moving can give objective measures of balance responses using more sophisticated, computerized equipment. This equipment can be used to evaluate sensory organization as well as the patient's motor performance. A visual surround is used instead of the dome head piece. Both the surround and forceplate are referenced to the patient by means of hydraulic mechanism. A printed bar graph tells how well the patient did during each of the six conditions. Ratios comparing one condition to another can provide information regarding reliance on one sensory system over another [7].

In this study, Physical signal control system was developed to integrate a physical multi-signal in order to monitor physical parameters, especially those physical condition such as eye open and close. This system was used to validate the information capability with local data archive to a acquisition system in the area.

2. Paper Preparation

2.1 Component of Sensory Compound Parameter

Body moving can be defined as the stability produced on each side of a vertical axis on the Balance. Balance was the center of mass to maintained over the base of support. Limits of

stability refers to the maximum angle from vertical that can be tolerated without a loss of balance [8, 9]. Body Balance while sitting down is activated either when there is movement of the center of weight over the stable limit or body movement in the hip joint. On the other hand, balance while standing up is activated as the center of weight moves and shakes over the stable limit, making 3 types of corrections[10, 11, 12]. The postural control system consists of three main subsystems: visual, vestibular, and somatosensory [13]. The method relies on parameter relationships to measure body balance. Sensory compound data collects signal using body exercise on the parameter as shown Figure 1.
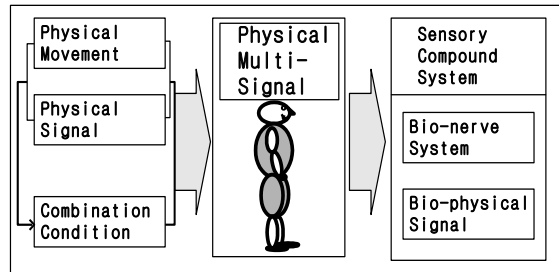
Figure 1. Structure of Physical Multi-signal Compound Parameter

2.2 Component of Physical Condition and Postural Balance

Physical organization condition was posture forming motion to stay in balance from eye open and eye close, and to add body movement such as forward /backward and right/back. In addition, for data analysis give a account of a vision, vestibular, somatosensory and central nervous system as shown Figure 2. Collected data was achieved from stability through frequency transforms [14, 15, 16].
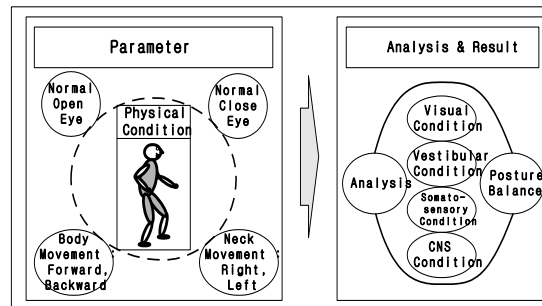
**Figure 2. Signal Processing of Health Care System**

3. System Design

3.1 System of Physical Signal System

The proposed physical signal system mainly takes care of the monitored subject (such as the body movement or posture balance) who can keep normally when the body condition is stable , while are assistance of body condition when the physiological condition becomes abnormal and unstable.

The architecture of the proposed system are depicted in Fig 3. The whole system can be divided into two parts: (1) data acquisition system (2) Signal processing system. The equipment were designed as to measure body moving from data acquisition system and Signal processing system (PXI-6251 DAQ, PXI-1409, NI., USA) were used computer

analysis for acquiring signal. Feedback system is signal delivering device of data for correction. Data signal measuring range was 0.01Hz~2Hz or more in Fourier frequency. Software measured data acquisition system.
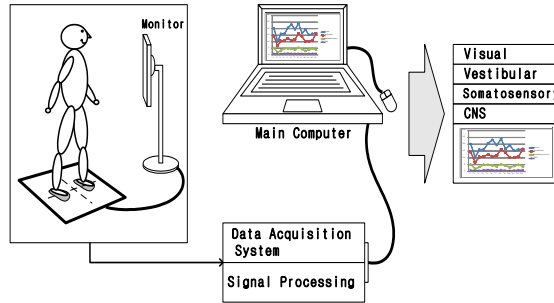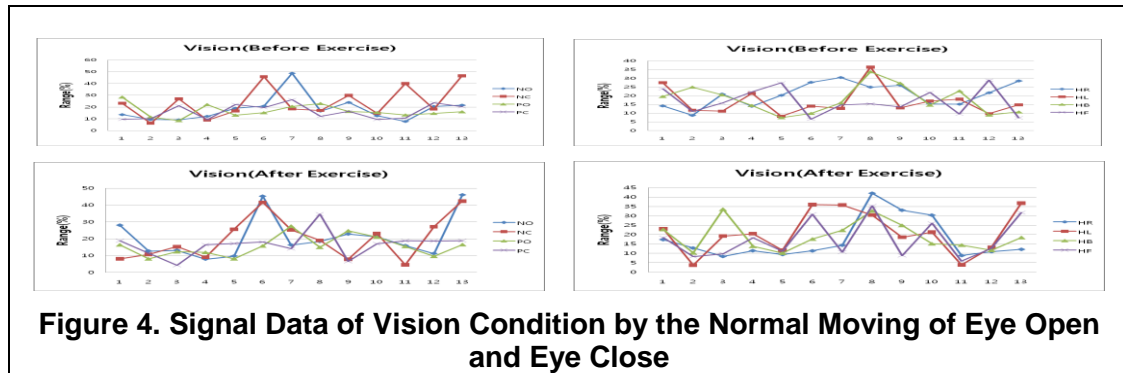

Figure 3. Design of a Physical Signal System

4. Experimental Results

4.1 Experimental Results

The subsection gives a analysis for our proposed system, these parameters and condition are dependent on each other. In order to further understand how to use these parameters to design multi parameter. Several data are performed and results are explained as follows.
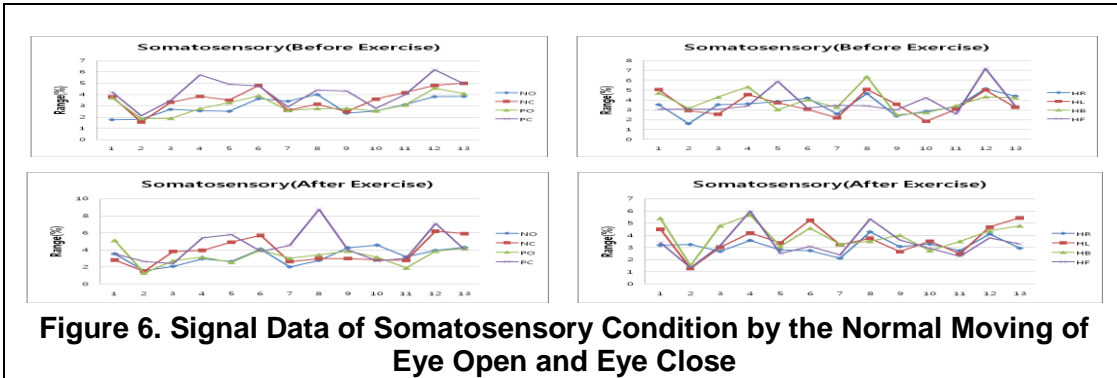

Figure 4. Signal Data of Vision Condition by the Normal Moving of Eye Open and Eye Close

As shown in Figure 4, the performance evaluation results of the normal moving of eye open and eye close. On the posture of body showed difference to the Vision condition. And number of subject shows the performance evaluation results of moving before and after
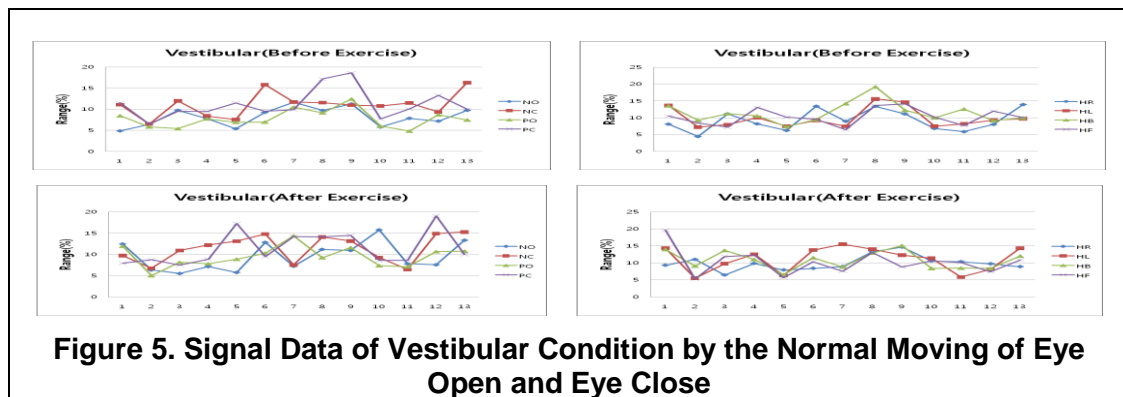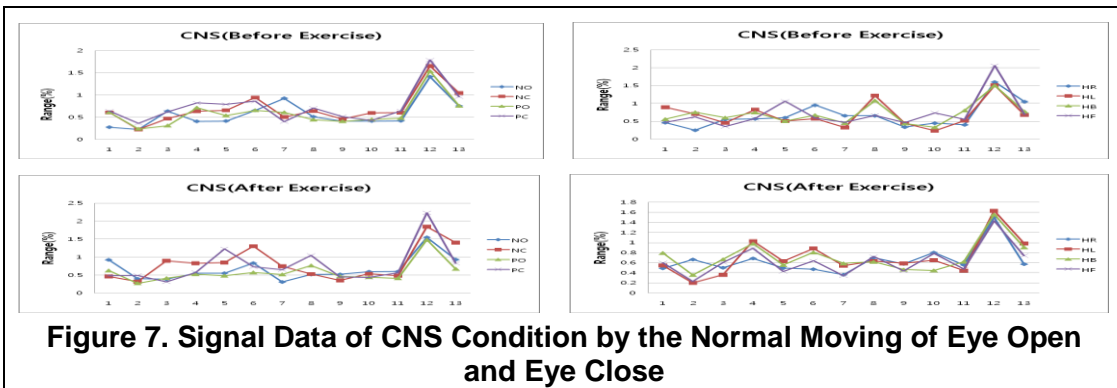

Figure 5. Signal Data of Vestibular Condition by the Normal Moving of Eye Open and Eye Close

As shown in Figure 5, the performance evaluation results of the normal moving of eye open and eye close. On the posture of body showed difference to the Vestibular condition. And number of subject shows the performance evaluation results of moving before and after
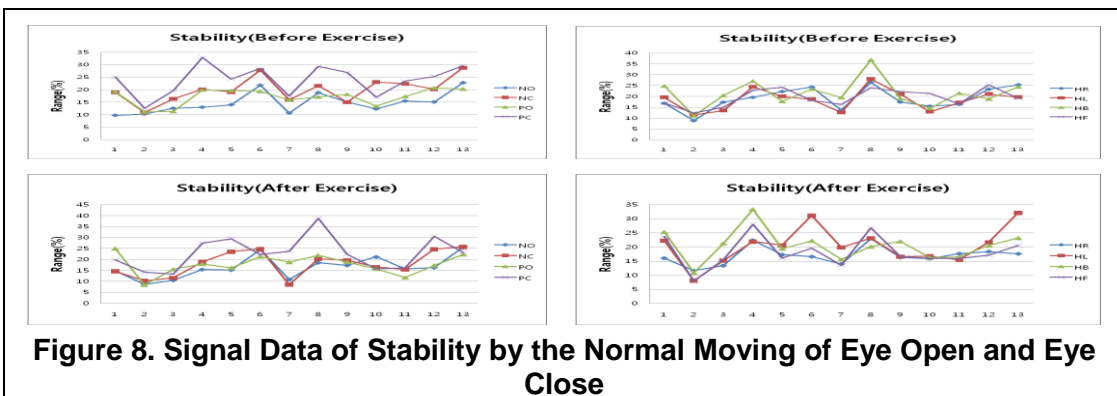

Figure 6. Signal Data of Somatosensory Condition by the Normal Moving of Eye Open and Eye Close

As shown in Figure 6, the performance evaluation results of the normal moving of eye open and eye close. On the posture of body showed difference to the Somatosensory condition. And number of subject shows the performance evaluation results of moving before and after

Figure 7. Signal Data of CNS Condition by the Normal Moving of Eye Open and Eye Close

As shown in Figure 7, the performance evaluation results of the normal moving of eye open and eye close. On the posture of body showed difference to the CNS condition. And number of subject shows the performance evaluation results of moving before and after.

4.2 Performance Evaluations

Figure 8. Signal Data of Stability by the Normal Moving of Eye Open and Eye Close

As shown in Figure 8, the performance evaluation results of the normal moving of eye open and eye close. On the posture of body showed difference to the body condition such as forward /backward body. Their situation presents the relation between before exercise and after exercise. We can be ensured that the body stable in time.

5. Conclusion

In this paper we implement the physical signal control system of posture balance for preserving body sway. Using method does not only evaluate posture balance with somatosensory, vestibular, visual, CNS and evaluated stability based on relations parameters, which measure and analyze posture balance status.

Observation for at physical signal measured change parameter from sensory organ in posture balance. This shows stability part become less stable reacting high while closing the eyes. There is a slight change to circadian overall in visual, vestibular. Furthermore, in case the signal data stored in the main computer, it prevented the redundant storage of the same spatial data. This system was evaluated a data through the stability and body sway. These system can be expressed to an assessment for body sway. It was expected to confirm a body activity and to control for physical system.

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Authors

Jeong-Lae Kim

He received his B.S. degree in Bio-medical Engineering at Yonsei University in 1983, M.S. degrees in Electric Engineering at Konkuk University in 1989, and certificate program Ph.D. degrees in communication at KAIST in 1996, and Ph.D. degrees in biomedical Engineering at Yonsei University in 2011, South Korea. He joined Eulji University, South Korea, where he is now a professor in the department of Biomedical Engineering. He is a head of department of equipment management and bi-medical electronic instrument in Bio-Meditech Regional Innovation Center at Eulji University. He had worked in KOSOMBE (Korea Society Medical and Biological), South Korea as a researcher of data information & processing department from 1983 until now. His research interests include Medical image communication, Bio-physical signal communication, Bio-sensor system.

Ki-Young Lee

He received his B.S. degree in Computer Science at Soongsil University in 1984. In 1988 and 2005, he received M.S. and Ph.D. degrees in Databases at Konkuk University, respectively. From 1984 until 1991, he worked for Korea Ocean Research & Development Institute (KORDI) as a researcher in Data Information & Processing department. He is currently a professor at the department of Medical IT and Marketing at Eulji University. He was also the head of department of S/W development in Bio-Meditech Regional Innovation Center at Eulji University. He is the director of the Korea Webcasting, Internet & Telecommunication(IWIT). His research interests include spatial databases, geographic information systems (GIS), location-based services (LBS), u-Healthcare, ubiquitous sensor network (USN), moving objects databases, and telematics etc.

HojunYeom

He received his BS, MS and Ph.D in Biomedical Engineering from Yonsei University. He spent a three years as postdoctoral fellow at the Georgia Institute of Technology. He has been an Assistant Professor of Medical Engineering at the Eulji University since 2008. His main research interests involve studying rehabilitation engineering and biomedical signal processing.