Analysis on the Development of Wearable Intelligent Hardware Devices and the Applications on Assist Training System

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Abstract. This paper analyzes the issue in detail and the review on the development of the wearable intelligent hardware devices and the applications on assist training system. Intelligent hardware is based on the underlying hardware and software platform for sex, intelligent sensor connected, human-computer interaction, new display, and a new generation of information technology such as large data processing features, with new design, new material, new craft hardware as the carrier of the new type of the intelligent terminal products and services. Application of CAS technology is carried out in order to achieve such a goal and a research work. Its overall goal is: to study the general three-dimensional human body movement simulation for sports training and video analysis. We integrate the virtual computer graphic technology and the data mining technique to propose the new perspective of the systematic architecture that is meaningful. The effectiveness and feasibility is proved in part in this paper and we will analyze the further methodologies in the future.

Keywords: Wearable, Intelligent Hardware, Devices, Assist Training System.

1 Introduction

With the continuous development of the science and technology the sports training is moving from an era of experience toward the era of science, modern science and the technology have penetrated into all aspects of sports training, plays a more and more important role. Computer and information processing technology to improve the level of sports training as auxiliary means, in particular, is playing a role cannot be ignored. Application of CAS technology is carried out in order to achieve such a goal and a research work. Its overall goal is: to study the general three-dimensional human body movement simulation for sports training and video analysis, the key techniques such as to achieve the sports training methods: two progress, and change from traditional mainly based on the human eye observation method based on high resolution video capture and analysis to the change of the measuring methods of human movement; From training analysis method based on the experience to base on human motion modeling and simulation of that human motion analysis method of shift, thus more quickly and effectively improve the level of training and performance. The system can be generally summarized as the following architectures.
Physiological and general psychological indexes is important reflect athletes competitive state, according to the different sports, through a variety of the sensors and intelligent instrument on the physiological and biochemical data of athletes, psychological data acquisition.

According to specific sports training scenarios have specific requirements, such as: virtual training venues, virtual training equipment and virtual human modeling.

Record the movement of an entity directly by sensor tracking equipment data and use it to generate computer animation. The biggest advantage of this method is able to capture the real human motion data.

Action to reproduce is an important requirement of the physical simulation system based on CAS, traditional means of camera is not smooth realization in some of the specific conditions.

Intelligent hardware is based on the underlying hardware and software platform for sex, intelligent sensor connected, human-computer interaction, new display, and a new generation of information technology such as large data processing features, with new design, new material, new craft hardware as the carrier of the new type of the intelligent terminal products and services. Under this basis, in this paper, we will then analyze the issue in detail and review on the development of the wearable intelligent hardware devices and the applications on assist training system.

2 Wearable Devices

Wearable health monitoring system, including various types of biological detection sensor, data transmission module and the data processing module, and can therefore provide low cost throughout the health, psychological and behavioral state monitoring and that will not noticeable. At first, this paper tries to comprehensively introduce the composition of wearable health monitoring system and wearable health monitoring system is applied to the related technology, then introduced the current we have done the wearable health related research work, namely the wearable respiration and multi-parameter ECG acquisition and the domain network construction. Based on the review, we could summarize the features and characteristics of the devices as follows.

Such as Google Glass used the ti OMAP 4430, Galaxy Gear used the Samsung home Exynos 4212, is based on ARM architecture A9 architecture as is a typical application processor. Using this architecture can effectively use intelligent terminal has been accelerated development platform, with terminal peripheral devices on the market to choose from, and powerful.

In wearable device in the process of basic innovation, the operating system software such as a structure connecting ecosystem and that individuals, to promote the integration of the whole industry chain, and play a key role in the innovation, the wearable device operating system usually has several different technical routes.

Specifically for wearable devices operating system also began to appear, Google has been released for basic wearable devices AndroidWear system platform, provide rich sensing ability enhancement, and emphasizes on voice
services such as human-computer interaction support, in addition to the LG and MOTOROLA, Google is working with asus, HTC and that the samsung electronics manufacturers to seek cooperation and some other chip makers Broadcom, Imagination, such as the Intel, mediatek will also join the camp as wearable device operating system structure will have new changes.

![Diagram](image)

**Fig.1.** The General Architecture of the Wearable Devices

## 3 The Smart Assist Training System

Sports training purpose is to hope that through training to improve the athletes' competitive state, make the athletes during the game the best competitive state, to play the best competitive level. The traditional way is to rely on the experience of coaches, during the race to adjust and strengthen training will adjust the athletes' physical condition to the best. This requires the coaches have rich experience in training, and fully understand the health of athletes. To achieve this goal, we should consider the machine learning techniques as the follows.

- **Data mining methods.** Data mining is a multidisciplinary intersection of the disciplines, including the basic database system, statistics, machine learning, artificial intelligence, visualization, information science, such as integrated the mature methods and tools of many disciplines.

- **Statistical.** Statistical methods in data mining are established on the basis of the traditional method of mathematical statistics, and there are many algorithms are derived from the statistical methods. Commonly used with Bayesian inference, factor analysis, correlation analysis, regression analysis and other methods, can be used to solve practical problems in classification, modeling, and other issues.

- **Association rules.** Association rules between that different data items are described in the database have a certain correlation rule, while the discovery...
process is generally divided into frequent item-sets access and the rule of the two general steps and procedures.

Under this consideration, we should then consider the virtual training devices from the listed aspects. (1) The application of computer virtual technology in the diving training. Using computer virtual technology to activists in the diving process each action to display the details of the air and the use of 3D coordinate for labeling, so as to establish TJE diving three-dimensional motion data processing system. Sensors to capture the motion of the athletes during the diving, and compared with standard 3d motion coordinates. (2) The application of computer virtual technology in volleyball training. Apply computer virtual technology in the sports training, also can through the video demonstration method, carries on the slow-motion replay, especially in the process of general volleyball hitting hand movements, footwork and close-up, body coordination, etc., and the decomposition for each action to demo. (3) The application of computer virtual technology in the basketball training. In the use of the virtual computer technology to the basketball training, the players dribbling every movement can be captured, and the coaches can according to their own understanding of the technical movements athletes, told the athletes by using the method of the illustrate techniques of error, correct the training error problem.

![Smart Assist Training System](image)

Fig. 2. Smart Assist Training System

4 Conclusion

This paper analyzes the issue in the detail and review on the development of the wearable intelligent hardware devices and the applications on assist training system. Computer and information processing technology to improve the level of the sports training as auxiliary means, in particular is playing a role that cannot be ignored. Application of CAS technology is carried out in order to achieve such a goal and a research work. Its overall goal is: to study the general three-dimensional human body
movement simulation for sports training and video analysis, the key techniques such as to achieve the sports training methods: two progress, and change from traditional mainly based on the human eye observation method based on high resolution video capture and analysis to the change of the measuring methods of human movement. Under methodology integrates the machine learning and smart device technology to enhance the traditional system that will be meaningful for further analysis.

References