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Issues in Internet of Things for Wellness Human-care System

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Abstract

Wellness is a continuous process to keep individuals' physical, spiritual, environmental, occupational, and emotional health. It is a method of life towards health optimization and optimized well-being status. For better life for human being, wellness human care monitoring system using wired/wireless sensors is a shapely growing research application in recent years. Recent Internet of Things (IoT) already offer the possibility and efficiency in smart healthcare systems to autonomous monitoring feature of patient's activity and body signal measurement. This research addresses two major contributions as followings: First, we present Wellness & Internet of things (WIoT). It can be a new IoT paradigm for wellness human care area. We discuss about possibility of WIoT in wellness ecosystem. Second, we address several issues in wellness human care system to increase physical and mental wellness in corporate wellness applications.

Keywords: internet of things, wellness, data integration, human-care.

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1. Introduction

E-Healthcare systems for chronic disease patients and elderly have been spotlighted and researched in this decade [2], [4], [5]. But, the several countries' medical law such as Korean medical law, do not allow tele-medicine and tele-treatment for patient group, and it blocks revitalization of remote healthcare industries. In order to improve the quality of life around the world, many people are concerned their health and tries keep in optimized well-being status in physical and mental conditions [1].

Wellness is a continuous process to keep individuals' physical, spiritual, environmental, occupational, and emotional health. It is a method of life towards health optimization [1].

In recent years, wellness service applications have sharply gained interest to keep health conditions of ordinary person in the state of being well [6], [7]. It is not scoped on patient care, and it can serve to an ordinary person who wants to enhance his physical and mental conditions.

In this paper, we focus on promotion of public health with the use of IoT(Internet of Things) based wellness human-care system. This research addresses two major contributions as followings: First, we present Wellness & Internet of things (WIoT). It can be a new IoT paradigm for wellness human care area. We discuss about possibility of WIoT in wellness ecosystem. Second, we address several issues in wellness human care system to increase physical and mental wellness in corporate wellness applications

Figure 1. Categories of wellness [3]

The rest of this paper is organized as follows. In Section 2, we broadly study exposed issues of wellness service IoT. In Section 3, we propose a pervasive wellness human-care architecture. We discuss our conclusions in Section 4.

2. Issues on Internet of Things for Wellness Human-care

Internet of Things (IoT) is one of the most advanced network structure with combination of Internet Protocol Version 6 (IPv6), Radio Frequency Identification (RFID), and wireless sensor technologies. It allows to link every IP assigned sensing devices and objects of interests by internet in a given architecture [8]. In this section, we discuss about major issues when the wellness human-care system uses IoT platform.

Monitoring sensor: In pervasive physical/mental condition monitoring system, the sensors have important role to measure the signal of interest of person. The sensors can place on body, as called as wearable and attachable sensors, and external positions as environmental sensors. Additionally, in order to obtain spatial information of the person of interest at a certain time, a type of sensor must provide its absolute or relative position.

The system also guarantees well synchronized time among deployed monitoring sensors. Moreover, time-stamp of obtained information is one of most necessary issue on IoT based wellness human-care system.

Data Reliability: In IoT based Wellness Human-care system, reliability is the most critical issue for accurate and precise services. For the Data Reliability, the system must satisfy followings as: Reliable signal measurement and sampling, Standardization of Data transmission protocol as known as HL7 (Health Level 7), Data classification and integration, and Data Analysis

Authentication and Identification: In order to protect a privacy of a person who is served by the proposed system, the wellness human-care system must provide well defined authentication and Identification technologies. Identification of the person of interest and many number of deployed sensors guarantee more accurate wellness monitoring results. Also the system must consider high volume of data traffic the case of large size of service member in a specific area. Each data packet has to contain correct identification of person and sensed device.

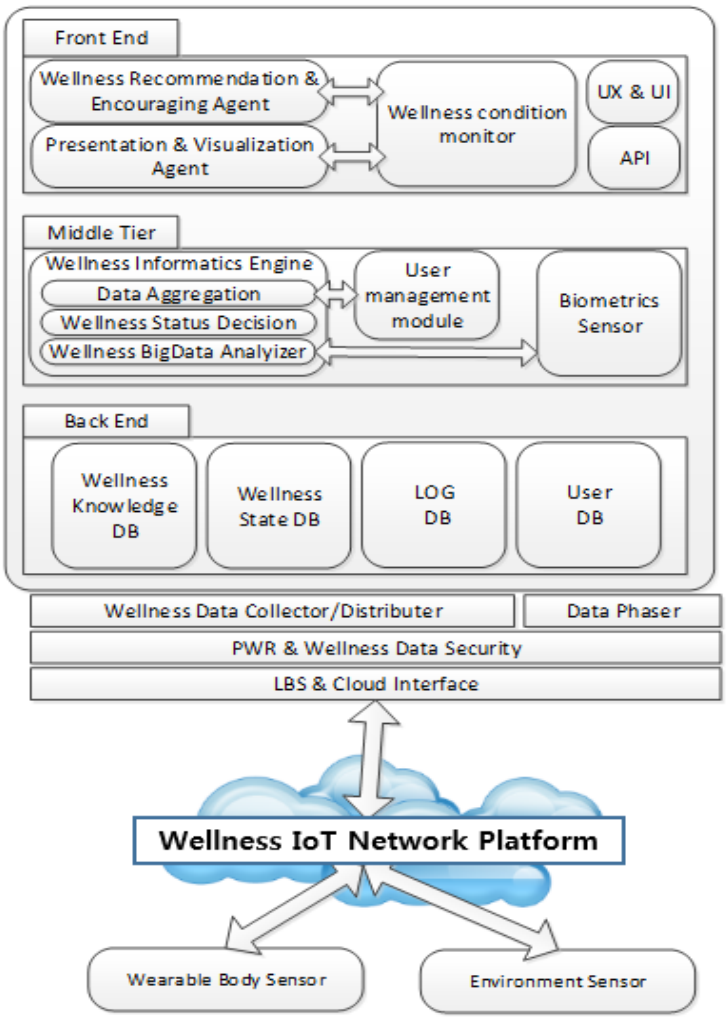

Figure 2. Wellness Service Architecture

Compatibility and Openness: For revitalization of wellness human-care ecosystem, we have to consider an external foundation of the system which meets compatibility and openness. Among the

wide spread system, each data should be formed by uniform record type. Also, if there are an open SDK and API for the well-constructed service system, wellness and IoT ecosystem can be invigorate easily.

3. Wellness Human-care Service Architecture

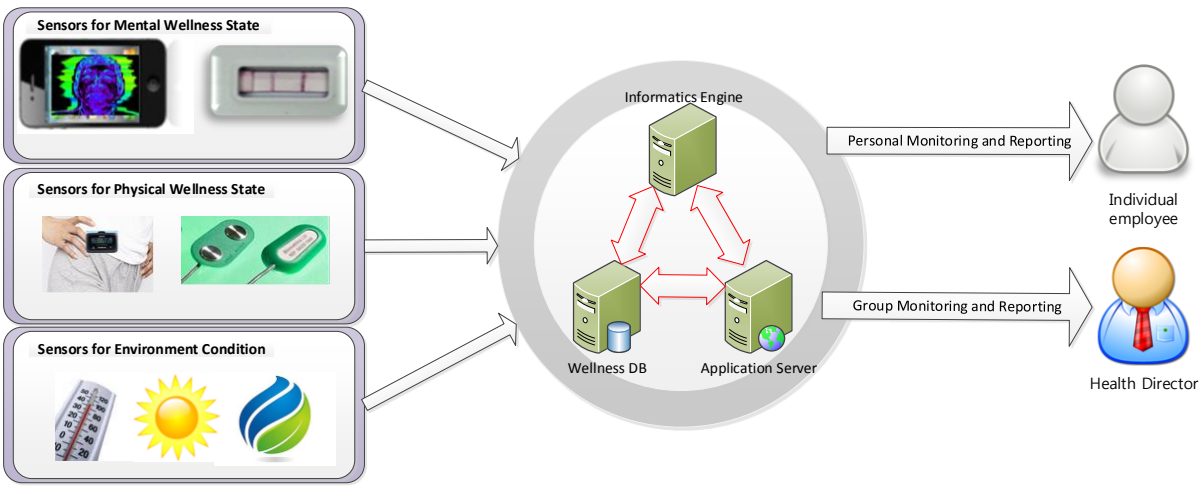

Figure 3. Corporate wellness service system

We proposed a Pervasive Wellness Human-care Architecture (PWHA) as shown in Figure 2. The PWHA broadly consists of three parts: monitoring sensors, wellness IoT network platform, data manager and analyzer. In monitoring sensor level, each sensor obtain bio-signal or related data and it sends collected data through the wellness IoT network platform. Each sensor's communication protocol is standardized as ISO/IEEE 11073 for compatibility. The wellness IoT network platform is independent network platform which is operated separated partial-infrastructure from ordinary wired and wireless Internet platform. In data manager and analyzer level, there are four separate modules such as data acquired module, data management module, and wellness informatics module for a person's wellness condition decision and knowledge generation in middle tier. The last is a wellness recommendation module for wellness condition enhancements. Figure 3 shows an application of the proposed service architecture for corporate wellness service system.

4. Conclusion and Future work

In this paper, we discussed several issues in pervasive wellness human-care applications. Especially, we presented Wellness & Internet of things (WIoT) which can be a new IoT paradigm for wellness human care area. Also we discussed several issues in wellness human care system to increase physical and mental wellness in corporate wellness applications. Last, we proposed a noble system to serve health enhancement to the public with the case of corporate wellness service system.

For our future work, we will consider the detailed wellness information analysis and integration of different data from heterogeneous sensors. Also we will consider context reasoning for decision of wellness condition and state.

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