Chapter 16
Wireless Body Area Networks Combined with Mobile Cloud Computing in Healthcare: A Survey

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ABSTRACT

This chapter introduces the combination of wireless body area network and mobile cloud computing in healthcare. The increased growth of low-power integrated circuits, physiological sensors and wireless communication has introduced a new generation of wireless sensor networks. Cloud computing is on high demand, whereas in case of mobile cloud computing the device is much more user friendly to manage the information. The combination of wireless body area network (WBAN) and mobile cloud computing (MCC) promises a better performance to the users immediately. It is more feasible to wire a sensor which performs the required medical tests and provides the information through devices like mobile phones and tablets. In this chapter, a theoretical study on the combination of WBAN and mobile cloud computing has been done.

INTRODUCTION

Wireless Body Area Network (WBAN) and Healthcare

A Body Area Network (BAN) also known as Wireless Body Area Network (WBAN) are wearable computing devices based on wireless sensor network technology.

The network comprises of several mini Body Sensor Units (BSUs). Advancement of physiological sensors, wireless communication technology and low power integrated circuits have given rise to a new

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generation of wireless sensor networks. WBAN is interdisciplinary fields which allow low cost and uninterrupted health monitoring along with real time updates of medical data through Internet. Several perceptive physiological sensors have been implemented into wireless body area network which is wearable and applicable for computer – aided recovery or advance diagnosis of medical state. This technology is based on the achievability of introducing miniaturized biosensors inside human system that doesn't interfere with their normal activity. Implanted sensors in human's system gather different physiological changes for monitoring the health status regardless of their location. The data gathered are transmitted to an external processing unit via wireless network. The device immediately transfers all data in real time to the healthcare personnel throughout the world. When an emergency is detected, alarm or caution signals along with relevant information are sent to the subject by the healthcare personnel. This is a promising technology which is expected to revolutionize the healthcare system.

Mobile Cloud Computing (MCC) and Healthcare

Mobile Cloud Computing (MCC) is the integration of Cloud computing technology and mobile networks. It is slowly becoming promising technology with the ability of providing versatile stack of huge computing, storage and software based services in a virtualized process at affordable cost.

In this paper some underlying aspects of these technologies for providing the patients with advanced and reliable healthcare facilities has been described. Following topics like basic idea behind this field of research, literature reviews, statistical reports, target users, possible solutions and recommendations and future scope of this technology has been covered.

Main Objective

The main objective is integrating the wireless body area network with mobile cloud computing technology to revolutionize the field of medical sciences and healthcare.

In MCC enabled WBAN systems, wearable miniaturized biosensors coupled with wireless body area network are implanted into human body. This technology can be used for computer aided recovery or advance diagnosis of medical state. These miniaturized biosensors gathers physiological signals like changes in blood pressure, body temperature, changes in insulin level, nerve impulses etc. occurring in human body in real time regardless of the person's location. The physiological information gathered will be transmitted to external processing unit via wireless network. The physiological data received through wireless network are processed in the cloud and transmitted to the users selectively on their mobile devices. Here we will consider this concept based on three major possibilities.

- **Patients in Hospital Environment:** Wireless biosensor gathers the changes in physiological signals occurring in the patient's body which are transmitted to the cloud sever through wireless network. As soon as it receives the signals from the sensors it analyses the data and decides whether the patient needs immediate treatment or not. In case there is need for immediate treatment doctors, healthcare staffs and family are notified automatically with an emergency alarm along with all relevant information and rescue operation can be carried out. If the situation is not critical then, doctors get the patient's information, location and physiological data. Camera video, GIS and GPS systems are coupled with this technology.