

A Novel Approach for Wireless Body Area Network Challenges and Energy Management

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Abstract — A Wireless Body Area Network (WBAN) typically consists of a collection of low-power, miniaturised, invasive or non-invasive, lightweight devices with wireless communication capabilities that operate in the proximity of a human body. These devices can be placed in, on, or around the body, and are often wireless sensor nodes that can monitor the human body functions and characteristics from the surrounding environment. Wireless Body Area Networks (WBANs) is an emerging technology where used in healthcare environment to improve the quality of life. In WBAN, type of variable are attached or implemented on the body. These technology bring new application where called medical application. The objective of medical application is to collect sensitive data which using with healthcare service provider. Healthcare service provider access to the resource to monitor the state of object in any time of day and night. Using these technologies and medical application help to reducing the cost of medical application and also the healthcare service provider able to

monitor the objects remotely instead of face to face. In this paper we focused on the concept of WBANs.

Keywords — *Wireless Body Area Networks (WBANs), Healthcare.*

INTRODUCTION

computer science is constantly evolving to process larger data sets and maintain higher levels of connectivity. At same time, advances in miniaturization allow for increased mobility and accessibility. A Body Area Network (BAN) is defined formally as a system of devices in close proximity to a person's body that cooperate for the benefit of the user. A WBAN is based on IEEE 802.15.6, allowing near field communication up to one-meter range from the human body. A body area network (BAN), also referred to as a wireless body area network (WBAN) or a body sensor network (BSN), is a wireless network of wearable computing devices. A Wireless Body Area Network (WBAN) allows the integration of intelligent, miniaturized, low-

power sensor nodes in, on, or around a human body to monitor body functions and the surrounding environment. A Wireless Body Area Network (WBAN) typically consists of a collection of low-power, miniaturised, invasive or non-invasive, lightweight devices with wireless communication capabilities that operate in the proximity of a human body. These devices can be placed in, on, or around the body, and are often wireless sensor nodes that can monitor the human body functions and characteristics from the surrounding environment [1]. Furthermore, the measurements can be recorded over a longer period of time, improving the quality of the measured data. In order to realize communication between these devices, techniques from Wireless Sensor Networks (WSNs) and ad hoc networks could be used. When referring to a WBAN where each node comprises a biosensor or a medical device with sensing unit, some researchers use the name Body Area Sensor Network (BASN) or in short Body Sensor Network (BSN) instead of WBAN. However, because of the typical properties of a WBAN, current protocols designed for these networks are not always well suited to support a WBAN.

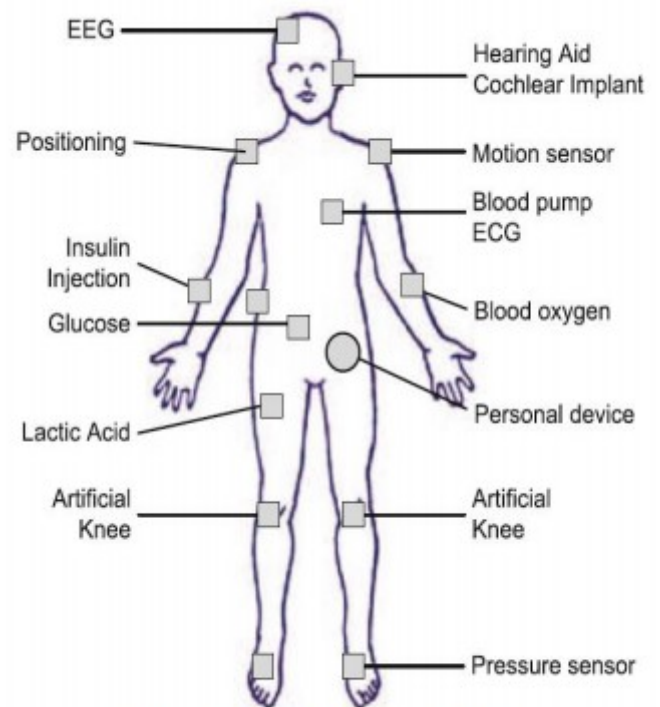


Figure 1: Type of Sensors in BANs

The main applications in wireless body area network (WBANs) is medial application where using in healthcare area. The example of this application illustrated in Figure 1. As shown in Figure 1, the plenty of sensor can be attached on body or may implemented under skin [6-8]. These sensor collect vital data from body where the patient is in different situation such as bed, running, working at office and so on [2, 9]. In addition, the safety domain is the other domain that we able to use WBAN to collect sensitive data and transfer collected data to the server for further services.

Type of device in WBANs Sensor nodes: as we discussed earlier, there are plenty of sensor that used to collect vital data and then these data transfer to next node called PDA (Personal Digital Assistance). Personal Digital Assistance

(PDA): PDA or other exiting device such as smart phone aggregate medical data from body sensors and process it. The aggregated data will be transfer to next hop called base station. Base Station (BS): there are plenty of device such as access point that working as a switch in the network. The data will be redirect from local place into cloud via the internet. As a result the medical data will be recorded in different server in cloud or any medical server in hospitals.

PROPOSED SYSTEM

Existing System: -

WBANs may interact with plenty of wireless technologies such Rube, ZigBee, type of Bluetooth and so on. Regarding to this, this technology help to people to freely move within different environment while healthcare service provider need to access to their health record to monitor the remotely. This opportunity bring some new challenges regarding the nature of WBAN and wireless technologies such as active and passive attack . It is important to focuses more on the interaction of WBAN with existing technology such as Wireless Sensor Network, which can help to identify the security requirement in medical environment. This can be archive by investigate the existing study in WBAN.

There are several advantages introduced by using wireless BANs which include:

–**Flexibility:** Non-invasive sensors can be used to automatically monitor physiological readings, which can be forwarded to nearby devices, such as a cell phone, a wrist watch, a headset, a PDA, a laptop, or a robot, based on the application needs.

– **Effectiveness and efficiency:** the signals that body sensors provide can be effectively processed to obtain reliable and accurate physiological estimations. In addition, their ultra-low power consumption makes their batteries long-lasting due to their ultralow power consumption.

– **Cost-effective:** With the increasing demand of body sensors in the consumer electronics market, more sensors will be mass-produced at a relatively low cost, especially in gaming and medical environments.

WBAN APPLICATIONS

The ability to deploy a finite number of wireless sensor nodes on the human body leads to the opportunity of developing a large number of applications in several fields.

- i) **Healthcare:** At a first glance this is the most promising field of application for a WBAN. Several nonintrusive sensors deployed inside or on the human body allow the patients and the doctors to sample continuous waveform of biomedical signals in a remote and continued fashion. Events that require prompt assistance like

heart attack and epileptic seizure can be detected and even foreseen thanks to the continuous monitoring of the heart and brain activity, respectively. The use of WBANs is expected to augment health care systems to enable more effective management and detection of illnesses, and reaction to crisis rather than just wellness.

ii) Sport and Entertainment: A real-time log of vital parameters like blood pressure, heart beat; blood oximetry and posture can improve fitness and sport experiences. In this way users can gather information concerning their sport activity and use them to prevent injuries and to plan future training to improve their performance. WBANs bring more realism in the user experience in the field of entertainment. Motion capturing techniques make possible to track the position of different parts of the body by means of a network of gyroscopes and accelerometers wirelessly connected to a central node and worn by the user. The real-time information about the motion allows the user to use his body as a controller in videogames. Moreover, film industry takes advantage of motion capture along with post production techniques to realize highly realistic digital

movies where actors play the role of nonhuman subjects .

iii) Military and Defence: Network-Enabled Capability (NEC) is the name of the long term program aimed to achieve enhanced military effect through the use of information systems. New capabilities added by a WBAN will enhance the performance, at both individual and squad level, of soldiers engaged in military operations. At individual level, a set of sensors can monitor vital parameters and provide information about the surrounding environment in order to avoid threats, while information taken at squad level will make the commander able to better coordinate the squad actions and tasks. Spatial localization techniques and communication between different WBANs (inter-WBAN communications) play an important role in this field, as well as security in order to prevent sensitive information from being caught by the enemies.

CONCLUSION

In this paper, Wireless Body Area Networks (WBANs) is an emerging technology where used in healthcare environment to improve the quality of life. In WBAN, type of variable are attached or implemented on the body. These technology bring new application where

called medical application. The objective of medical application is to collect sensitive data which using with healthcare service provider. Healthcare service provider access to the resource to monitor the state of object in any time of day and night. Using these technologies and medical application help to reducing the cost of medical application and also the healthcare service provider able to monitor the objects remotely instead of face to face. In this paper we focused on the concept of WBANs.

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Good Teachers are worth more than thousand books, we have them in Our Department.

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