

Review of Body Area Network Technology & Wireless Medical Monitoring

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ABSTRACT

Body area network (BAN) is an emerging technology in computer world, and plays very vigorous role in a society, mainly in health services. BAN helps in monitoring vital signs of a patient and can monitor patient's history in routine life activities to provide them accurate treatment. Doctors can check the complete details of patients from remote location and can recommend a suitable medication. The main purpose of this technology is to reduce the load at hospitals and provide efficient healthcare facility remotely using medical implant communication system (MICS) and Wireless medical telemetry system (WMTS). To monitor the patients in their natural environments is not practical when devices or sensors are connected through a wire that is why we use Wireless body area network (WBAN) to carrying out daily activities through unobtrusive and contented way. This technology can provide very cheaper, easier and quick respondent history of patient.

Keywords: WBAN, BSN, Health Monitoring system

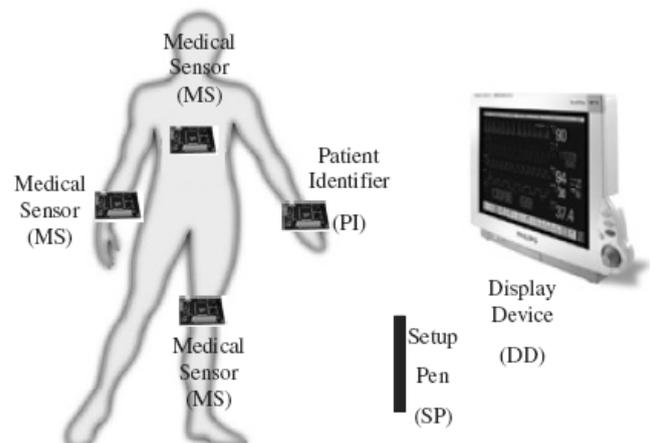
I. INTRODUCTION

Body area network (BAN), is also called Body sensor networks (BSN) and wireless body area network (WBAN). It is being very popular in society because patient's data monitoring is a leading issue for health & disease management, when patient enters the hospital, doctors & paramedical staff question him about symptoms and try to find the actual symptoms through different tests and prolonged stay at hospital, now the patient is equipped with different sensors, all these are connected by wires, it is very uncomfortable situation. The core concept behind Wireless body area networks is to remove all wires connecting sensors on the patient and developing wireless network between sensors. All these devices are connected without cables and without reducing patient comfort. Moreover, patient could be monitored remotely. Doctors are mostly interested in diagnostic of cardiogram, blood pressure, oxygen saturation, sugar level and cancer, which can be measured using a number of sensors nodes attached to the patient [1,7]. The goal of e-health approach is to empower the citizen to fight against diseases and reduce the logistic constraints for patients and doctors. This technology has potential to revolutionize the health care diligence by providing real time patient monitoring capabilities to the health care professionals, Implanted wireless body area networks (IWBAN) have emerged as an important and growing area of research [4,8]. The healthcare servers keep electronic medical records of registered users and provide different services to patients, medical consultants and informal caregivers. The patient's consultant can access the data from office via internet and examine the patients history, current symptoms and patient's response to a give treatment. Once WBAN network is configured, the healthcare server

manages the network, taking care of channel sharing, time synchronization, data retrieval and processing[10].

II. ARCHITECTURE OF WIRELESS SENSOR NETWORK/WBAN

There are three kinds of devices used in wireless body area network: medical sensors, special sensor for patient identification and setup pen as show in below diagram. We connect all these devices with health care system for display diagnostic results and further processing. One sensor node has a unique patient identifier which is used in hospital wide identification of patient. All sensors are connected to a patient from complete monitoring system. It works as medical sensor system having knowledge about the sensor configuration. The actual usage of these sensors are to discreetly sample vital signs and transfer the respective data on health care system using ZigBee and Bluetooth wireless technology[9,8].



We can implement health care server on PDA (personal digital assistant), smart phones and personal computer, and it control wireless body area network, provide suitable graphic or audio interface to client and transfer health related data to medical server through internet, wimax, volte or mobile telephone networks. [10]

III. TYPES OF HARDWARE REQUIRED for WBAN

There are two types of hardware devices required of BAN.

- Wearable devices are used on the body surface of human.
- Medical Implanted devices are inserted inside human body

In wireless body area network, wearable systems for incessant health monitoring are a key technology in helping the transition to more pre-emptive and affordable healthcare. They allow monitoring the diagnostic status of patient and providing feedback to maintain an optimal health status and provide her /his better healthcare. From last few years we are getting variety of wearable health monitoring devices, ranging from simple pulse monitors, activity monitors, and holter monitor, to sophisticated and expensive implantable sensors. Body area network describes the application of implantable or Wearable health monitoring devices as smart sensors. [7,10] (Fig 1.1)

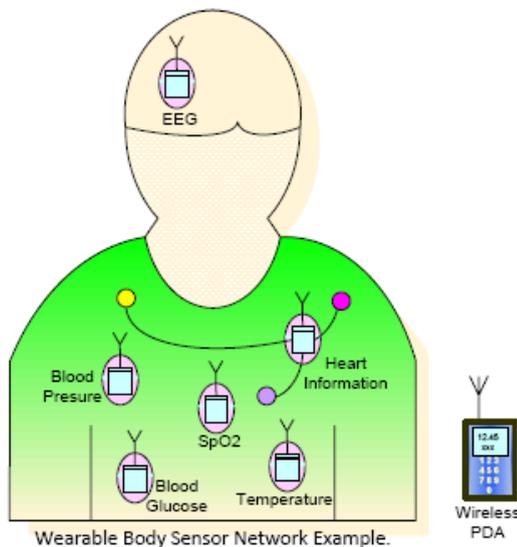


Figure 1.1: Wearable Body Sensor Network Example.

The main purpose of wearable system is to continuous monitoring of biomechanical and physiological data, in their normal activities.[8] The patient's sensor devices are connected with Body network controller (BNC) and then this BNC is connected with any Internet

device for outside communication with Hospitals or Doctors. The main purpose to support a low complexity, ultra-low power and highly reliable communication to, or inside the human body to identify the health care products and services [1,8].

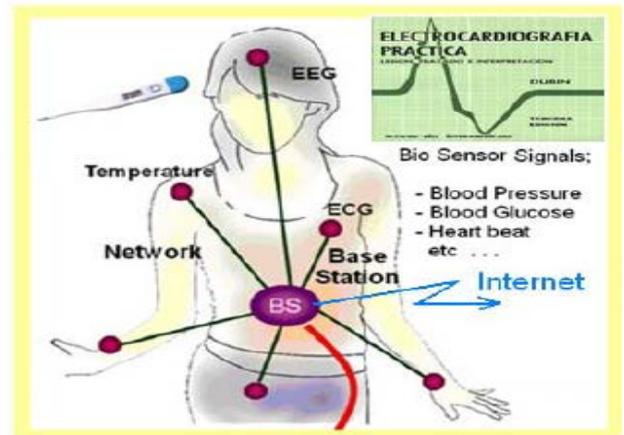


Fig 1.2

Types of Diseases

We can use this technology to take prearrangement measures to control the following diseases:

- Blood pressure
- Heart Attack
- Diabetes
- Glucose Level
- Cancer & many others

Heart attack is foremost cause of death in all over the world; above twenty million people are affected through this disease; we can use this technology to monitor and log the patient's history around the clock and can plan how to control impending heart attack after getting ECGs reports and other indicators. Similarly we can control all other diseases as mention above, and also can reduce the load in hospitals, and can provide quick treatment to patient remotely.

WBAN Traffic Categories

WBAN traffic is divided in three categories

- **On demand**
- **Emergency**
- **Normal traffic**

On-demand traffic is initiated by the doctor or consultant to acquire certain information for diagnostic purpose. Emergency traffic is initiated by nodes when they



exceed a predefined threshold and should be accommodate immediately. Such type of traffic is totally unpredictable.

Normal traffic is the data traffic which we use to monitor the normal condition of patient without any criticality and on demand events.

This technology includes unobtrusive & routine health monitoring of patient, and treatment of many other diseases like gastrointestinal tract, neurological disorders, cancer detection handicap rehabilitation and the most threatening heart diseases. We collected data through body network coordinator.[1]

IV. CONCLUSION

Wireless body area network is integrated into telemedical system that promises inexpensive, unobtrusive and ambulatory monitoring during the routine activities. It has the potential to provide a better and less expensive alternative for rehabilitation healthcare and may provide benefit to patients, physicians, and society through continuous monitoring.

To make this technology ubiquitous and affordable, a number of challenging issues should be resolved, such as system design, configuration and customization, seamless integration, standardization, further utilization of common off-the-shelf components, security and privacy, and social issues

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