A Survey on Wireless Body Area Network Technologies

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Abstract – A wireless body area network is a collection of wearable computing devices. These devices may be implanted inside or outside the body. These devices send and receive information with the help of gateways. This type of technology is used in diverse fields such as therapy, telemedicine, military, posture detection but the medical field is the one which has had the most benefit.

Keywords: Body Area Network, Radio Frequency, WBAN

I. INTRODUCTION

A wireless body area network is also sometimes commonly referred to as a Body Area Network (BAN) or a Body Sensor Network (BSN). These terms stand for a collection of wearable computing devices which in turn consists of a number of nodes. These types of devices can be implanted either inside or outside the human body depending upon the requirements. The implementation outside the human body can be done in the objects which are mostly in contact with a person such as wallets, watches, glasses, cloth pockets etc [1]. The device under Wireless Body Area Network takes the help of various types of sensors in order to gain and transmit the required information. It is easier and is very cost efficient [2]. The basic Principle or idea behind it is for communication within a limited range around the human body [3].

Although it can be implemented in diverse fields, the main users who benefit from this technology are the doctors and patients. The patient can be diagnosed or monitored with the help of this technology from a distant location. The nodes present in the network find a path for transmitting the information across. It can also be done with the help of internet.
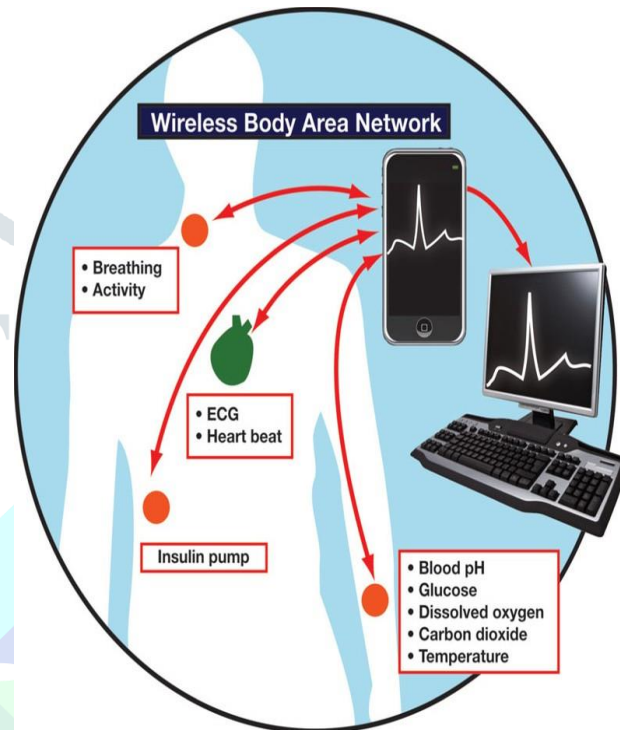

Figure 1: Wireless Body Area Network

II. ARCHITECTURE OF WBAN

WBAN have expanded its horizons in the recent years. It has found its existence in numerous numbers of applications which has grown exponentially. Tele-medicine and e-healthcare systems have found the most application of this technology. Apart them it can also be used in diverse fields such as military, driving assistance, security etc. WBAN is an example of wireless networking technologies, whose functioning revolves around the technology of Radio Frequency (RF). RF does the work of connecting the nodes with the sensing units(sensors) or actuators.   These nodes operate within a low range such as on or within the human body. They are used to support various medical and non-medical applications. WBAN along with RF makes the use of medical bands to obtain the data acquired by the sensors which tells certain information. The data which is collected is then sent for further processing to the remote stations.
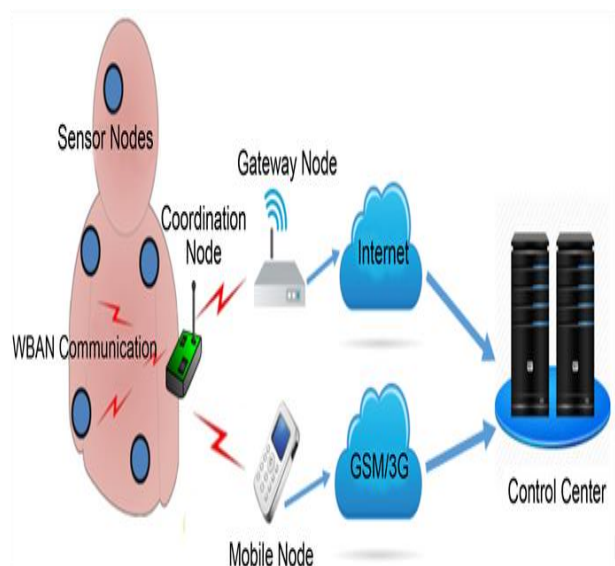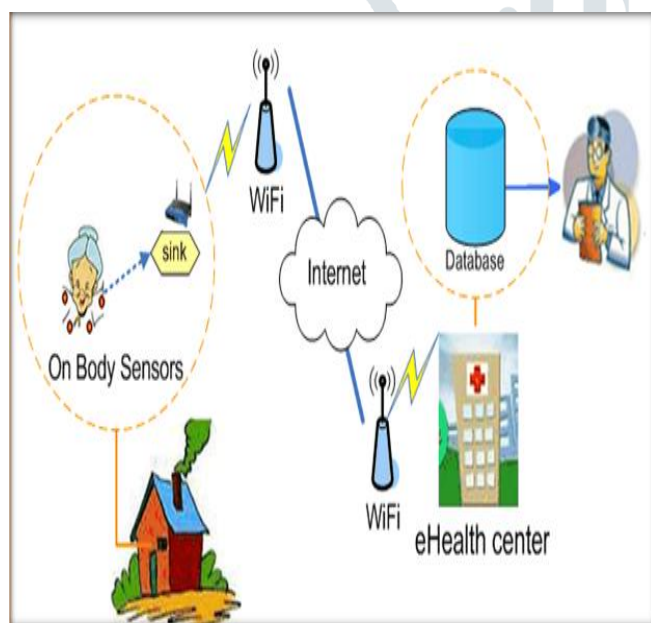
Figure 2: WBAN Architectre

Figure 3:Use of WBAN in e-health center

III.   APPLICATIONS

Sensors which are placed in the human body allow self-monitoring. They help the individual to maintain their health through proper feedback and alertness. This is done by analyzing the individual's body temperature [7], blood pressure etc. Any irregularity in the internal functioning will activate the sensors hence alerting the affected person. This allows the user to learn how to control his body which aims at the betterment of the individual's health in general.

3.1. TELEMEDICINE AND PATIENT MONITORING

The subsequent increase in the population and the evolution in the technologies have paved the way for several advancements in the medical technologies. One such advancement is telemedicine. This kind of advancement helps n monitoring the patient and helping the doctors, physicians, scientists etc to identify the disease that the patient is diagnosed with. The signals that are emitted by the human body is the key to identify the disease without the physical presence of the patient and the doctor together. This system not only helps in identifying the disease but also helps in providing the real time solutions for diagnosis [6], prescription, procedures to be followed, maintenance of the condition and supervised recovery from the ailment. This also has various other advantages. Some treatments may need the supervision of the doctor, or requires the patient to be physically present in front of the doctor which consumes a lot of patient's money. This technology is very useful especially for the elderly [5]. Also being physically present at the hospital most of the time may interfere with the daily life routine of the patient. WBAN provides everyone with continuous updates regarding the ailment, hence such technology helps in saving time and money and is also way cheaper, safer, faster and more convenient than the regular system. Some of the diseases that can be monitored with this technology are cardiovascular diseases, cancer detection, diabetes [4] asthma, artificial retina etc.

3.2. THERAPY

After diagnosing the disease, the next step must be the treatment and its therapy [8]. This technology helps the patient to undergo the proper treatment or therapy once they are relieved from the hospital and doctor's supervision. A person who has recently recovered from a disease is at high change for getting affected by the same [9]. A person who has recovered from a stroke attack must be monitored regularly without interfering in their routine. The movements of the patients can be monitored in order to avoid any further chances of ailment.

3.3. SPORTS

This technology can also be used to monitor the health of the sportsmen especially when they are on ground. It can determine the psychological activities of the sportsmen [10] such as heart-rate, temperature, respiration

rate, blood pressure and also the posture of the athlete. All the above-mentioned traits are important in determining the performance of the sportsmen.

3.4. MILITARY

This technology can be used in the battleground or the war field to communicate between the soldiers and exchange information such as attacking, running, reporting to the commander etc. the sensors such as RF, camera can be implanted within the uniform. This helps in easier accessibility and connectivity.
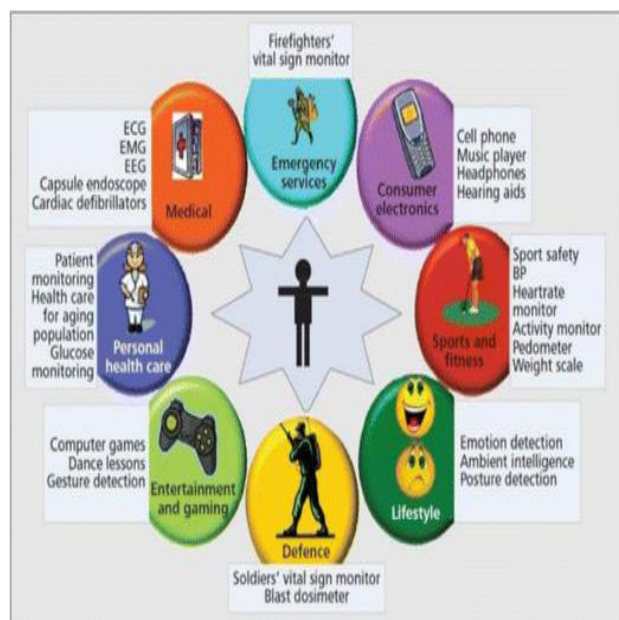

Figure 4: Applications of WBAN in various fields

IV. BENEFITS OF WBAN

- Used for the detection of chronic disease before hand
- Assists the effortless and seamless communication between the individual and the machine.
- Useful in various fields such as healthcare, military, security, driving assistance etc.

V. CONCLUSION

A WBAN plays vital role ubiquitous healthcare applications. Its advancements have been the result of interdisciplinary research and development. In this paper, we have mentioned about technologies, architecture and applications of WBAN. WBAN technology provides a promising platform in healthcare. The current technological evolutions will bring us closer to a fully operational WBAN that acts as an enabler for improving the quality of life.

VI. REFERENCES

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