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Wireless Body Area Network

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Abstract - The increasing use of wireless networks and Internet of Things helps to create device for health care using Wireless Body space Networks (WBANs). A WBAN provides a continual health observation of a patient rather his/her traditional way of health condition monitoring. Several technologies have established their potency in supporting WBANs applications, like remote observation, training program and power-assisted living by responding to their specific quality of service (QoS) necessities. Because of various obtainable technologies, choosing the suitable technology for a medical application is being a difficult task. WBAN consist of sensor nodes attached in and around the human being that is used to monitor human body activities very efficiently.

***Key Words*:** Wireless Body Area Network, WBAN, IoT in health care, WBAN in health care, Internet of Things in health care.

1. INTRODUCTION

WBAN or BAN, short for (Wireless) Body space Network, consists of a collection of mobile and compact intercommunicating sensors, either wearable or deep-seated into the material body, that monitor very important body parameters and movements. These devices, communication through wireless technologies, transmit knowledge from the body to a home base station, from wherever the info is forwarded to a hospital, clinic or elsewhere, time period A Body space Network could be a network containing detector nodes in shut proximity to a person's body watching very important signals of the material body and IoT of intelligent node capable of handle a lot of advanced signal process. A Wireless Body Area Network (WBAN) connects independent nodes (e.g. sensors and actuators) that are situated in the clothes, on the body or under the skin of a person. The network typically expands over the whole human body and the nodes are connected through a wireless communication channels. A Wireless Body Area Network (WBAN) consists of several small devices close to, attached to or implanted into the human body. These devices communicate by means of a wireless network. Interaction with the user or other persons is generally handled by a central device, e.g. a PDA. The ascension in physiological sensors, low power integrated circuits and wireless communication has enabled a brand new generation of wireless sensing element network. These wireless sensing element networks are won't to monitor traffic, crops, infrastructure and health. The body space network field is associate degree knowledge domain space that might allow cheap and continuous health observance with time period updates of medical records via web. A number of intelligent physiological sensors are often integrated into a wearable wireless body space network, which can be used for laptop power-assisted rehabilitation or early detection of medical conditions. This space depends on the practicability of implanting terribly tiny bio-sensors within the physique that are comfy which do not impair traditional activities. The constituted sensors within the physique can collect numerous physiological changes in order to observe the patient's health standing in spite of their location. The knowledge are transmitted wirelessly to associate degree external process unit and monitored people. In particular, a fundamental task is the invention of the adaptive and computationally efficient framework which will continuously monitor the health of the patient by analyzing its different physiological signals.

2. SYSTEM DESIGN

The proposed system will consist of hardware such as Raspberry Pi, Accelerometer, Gyroscope and Pulse sensor. The system also includes a mobile app which can be built with React Native. The hardware part of the system will communicate with the mobile app over the internet and the sensor will communicate with the app using ZigBee Technology (Protocol) and the Raspberry Pi will be connected to internet via Ethernet LAN or Wi-Fi that will send data to mobile device. This device will help to monitor a patient's health condition in real time from other devices (mobile application) over the internet and also facilitates alarm if any unusual behavior happens in the patient's body. It also helps us sense any changes in a critical patient's body like patients who are in coma or paralyzed patients and even those body movements which human beings can't notice and will notify it the user's mobile application and then app user can take the necessary step required to help patient.

3. TECHNIQUES BEHIND SYSTEM

3.1 XBee

Figure 1: XBee

ZigBee is a communication device used for the information transfer between the controllers, computers, systems, extremely something with a port. Because it works with low power consumption, the transmission distances is restricted to 10–100 meters line-of-sight. ZigBee devices will transmit knowledge over long distances by passing knowledge through a mesh network of intermediate devices to succeed in additional distant ones. ZigBee is usually employed in low rate applications that need long battery life and secure networking. Its main applications area unit within the field of wireless detector network supported industries because it needs short-range low-rate wireless knowledge transfer. The technology outlined by the ZigBee specification is meant to be less complicated and fewer costly than alternative wireless networks.

3.2 Pulse Sensor

Figure 2: Pulse Sensor

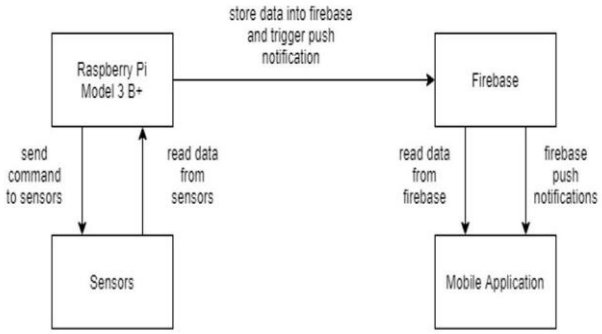
The pulse sensor helps to monitor the heart rate of human and send the data to the receiver attached to raspberry pi using XBee attached to it.

3.3 Accelerometer

Figure 3: Accelerometer

An accelerometer is an electromechanical device used to measure acceleration forces. Such forces may be static, like the continuous force of gravity or, as is the case with many mobile devices, dynamic to sense movement or vibrations. Acceleration is the measurement of the change in velocity, or speed divided by time. This device will send reading to raspberry pi with the help of XBee.

Here, Raspberry Pi works as the main server and the brain of the whole system. As we know XBee works in mesh topology, so this help to send and receive data from the sensors wirelessly. The main motive of using ZigBee protocol is its low power consumption. The sensors can be attached on human cloths, over the body or even inside the body. The sensors read data from human body and send it to the server i.e. raspberry pi though XBee and then raspberry pi read the data and continuously match the data with the given rules and will send notification the user's mobile device if any unusual things happens and raspberry pi also send real-time data to the user's mobile device with the help of internet.



CONCLUSIONS

Recently, with the fast development in wearable medical sensors and wireless communication, wireless body space networks (WBANs) have emerged as a promising technique that will revolutionize the manner of seeking health care that is usually termed e-healthcare. Instead of being measured face-to-face, with WBANs patients' health-related parameters is monitored remotely, incessantly, and in real time, and so processed and transferred to medical databases. This medical data is shared among and accessed by varied users such as health care workers, researchers and Government agencies. During this manner healthcare processes, like clinical diagnosing and emergency medical response, will be facilitated and speeded up, thereby greatly increase the potency of health care. Since the patient-related information keep within the WBAN plays an important role in medical diagnosis and treatment, it's essential to confirm the safety of those information. Failure to get authentic and proper medical information can probably forestall a patient from being treated effectively, or even result in wrong treatments. In reality, patient-related information is usually keep in a very distributive manner; the open and dynamic nature of the WBAN makes the information liable to being lost. Therefore, it's equally vital to guard patient-related information against malicious modification and to confirm its responsibleness (i.e., having it promptly recoverable even beneath node failure) and its reusability.

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REFERENCES

1. Li. Huan-Bang, Takahashi Takashi, Toyoda Masahiro, Mori Yasuyuki and Ryuji Kohno, "**Wireless Body Area Network Combined with Satellite Communication for Remote Medical and Healthcare Applications**" in Wireless Pers Commun, springer, vol. 51, pp. 697-709.

2. Ashraf Darwish and Aboul Ella Hassanien, "**Wearable and Implantable Wireless Sensor Network Solutions for Healthcare Monitoring**", Sensors, vol. 11, pp. 5561-5595.

3. M. S. Mohammed, S. Sendra, J. Lloret and I. Bosch, "**Systems and WBANs for controlling obesity**", J. Healthc. Eng., vol. 2018.

4. X. Hu, M. Liu, D. Sui Shao and L. Wang, "**Wireless Energy and Information Transfer in WBAN: An Overview**", IEEE Netw., vol. 31, no. 3, pp. 90-96.

5. Y. Kim, S. S. Lee and S. K. Lee, "**Coexistence of ZigBee-based WBAN and WiFi for health telemonitoring systems**", IEEE J. Biomed. Heal. Informatics, vol. 20, no. 1, pp. 222-230.

6. A. Samanta and S. Misra, "**Energy-Efficient and Distributed Network Management Cost Minimization in Opportunistic Wireless Body Area Networks**", IEEE Trans. Mob. Comput., vol. 1233, pp. 1-1.

7. E. Aguirre et al., "**Design and performance analysis of wireless body area networks in complex indoor e-Health hospital environments for patient remote monitoring**", Int. J. Distrib. Sens. Networks, vol. 12, no. 9.

8. S. Singla and K. Sharma, "**A Review Paper on Wireless Body Area Network for Health Care Applications**", vol. 5, no. 10, pp. 1-11.

9. Segolene arrigault and vaia zacharaki, "**Design of a ZigBee magnetic sensor node**".

10. LI Wenzhong, DUAN Chaoyu et al., "**Introductory and actual combat of Zigbee wireless networks**", Beijing University of Aeronautics And Astronautics Press, pp. 4