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PERFORMANCE ANALYSIS OF WIRELESS BODY SENSOR NETWORK WITH IOT INTEGRATION

Puneet Kalsi[1], Dr. Vikrant Sharma[2]

[1]*Research Scholar, School of Engineering, Design and Automation,GNA University, Phagwara*

[2]*Professor, School of Engineering, Design and Automation, GNA University, Phagwara*

Email:puneet.kalsi@gnauniversity.edu.in

Abstract

The IoT is a technological concept that connects everyday objects from various fields and communicate over the internet. Due to the fast growth rate of actuators, low-cost sensors and communication technologies devices IoT device implementation becomes extensive. The Mobile Health and Wireless Body Sensor Network are popular IoT based healthcare benefits because the Wearable devices are increasingly used and available. A Wireless Body Sensor Network is a network that can deliver real-time data, voice and video as well long-term continuous monitoring for important organs implanted within the human body. WBAN is also implemented in numerous mediums like power saving to sustain data quality services in e-Health monitoring systems. The paper aim is to target the technologies used in wireless body area network deployment which includes the cognitive radio network and energy harvesting techniques and also discusses parameters for improvement of performance evaluation of networks that relies on essential information support system. It includes the methods to reduce the energy consumption of the sensors by using cognitive radio. Energy harvesting techniques are important to implement which provide continuous energy to the sensors to improve the efficiency of the network.

Keywords: *WBAN, wearable sensors, Internet of Things, Cognitive Radio, Power Consumption, energy harvesting*

1. INTRODUCTION

Current research on Wireless Body sensor Networks is introducing innovative technologies to improve health care. The real-time tracking of the health issues is implemented by using Wireless body area network technology. The use of wireless devices allows to exchange data and communicate freely (Ayyub, Q.,2023). Short-range distances are the emphasis of wireless technology. Nowadays, sensor and actuator nodes are used in the rapidly developing WBAN technology which is going advance in terms of long-distance wireless communication. To measure the patient's condition, the sensors and actuators of WBAN are positioned either within or outside the human body (Yuce, M. R., 2010). The physical data is gathered by means of sensor nodes, data transmission via various media, including hardware and processors unit. The sensor node transmits data to the actuator node and WBAN supports about 256 nodes to process the data in the network (Latre, B., et al.,2011).

WBAN employed the designated sensor to satisfy the design system requirements. The medical field among many others, uses this technology to react fast. In order to measure the patient's temperature, pulse rate, electrocardiogram (ECG), electroencephalography (EEG) and other parameters, a WBAN is attached to the patient body network (Yuce, M. R., 2010). In the event that something uncommon occurs, prompt action is taken preventing the patient's condition from getting worse. Access online patient conditions also includes all past data, which is useful in accurately identifying the patient's health. WBAN offers greater advantages at a cheap cost, which leads to a considerable rise in patient monitoring now a days (Hayajneh, T., et al., 2017). Sending dependable and secure data is crucial to WBAN, this relies on the Medium Access Control (MAC) layer and the physical layer.

A WBAN is a standalone technology that seeks a proximate transmission network for data transfer and storage or it may own its communication network for data exchange and storage. To share information, this communication network can be used as a public network, a dedicated network or a typical mobile network (Ullah, S., et al.,2014). Data transmission inside the WBAN range from the main or host transmission ranges from 10 Kbps to 10 Mbps (Filipe, L., et al., 2015). WBAN communication is based on the MAC protocol. The WBAN collects diverse physiological data for sampling to monitor and manage the patient's health. The patient's physiological condition and the creation of the signal for the data rate; the signals may be either random or periodic. For instance, the MAC adjusts for changes in a patient's heart rate. Node has a high capacity and can send out signals instantly (Negra, R., et al., 2016). In the medical field, WBAN applications are used to continually monitor the health condition of patient.

2. LITRATURE REVIEW

Internet of Things applications are employed in biological instruments in Wireless body sensor network. Ayyub, Q.,2023 focused on health monitoring and utilizing various wireless body area network strategies that were able to determine which techniques yield superior outcomes in terms of throughput and delay for data transmission, storage and privacy protection for patient data. Arefin, M. T., et al., 2017 reviewed to develop a feasible and appropriate wireless medium for WBAN implementation. There have also been debates on a variety of acceptable short range wireless communications technologies that can be employed in WBAN. Taleb, H., et al., 2021 aimed to highlight current advancements in WBAN platforms as well as anticipated issues. This paper presented a complete examination of the essential properties of WBAN systems, covering latency, electrical consumption, interference, privacy, safety, reliability and choosing the correct sensor. The current status of a number of wireless communication technologies, including the recently developed

LPWAN communication technologies to assess their viability for WBAN medical applications was also mentioned. Poongodi, T., et al., 2020 provided an overview to assess the performance of localization systems and emphasizes the importance of localization within the body area networks. Additionally, it offered many kinds of sensors and methods for combining the data that they produce. This paper aimed of utilizing the DTN and ADOV protocols, outcomes surpass those of other protocols. By utilizing the cloud, it can enhance patient security and privacy while promptly accessing emergency data. Additionally, a comparison of several approaches has been examined in terms of throughput and delay allowing to choose the best approaches based on the intended use. Khan, J. Y., et al., 2020 aimed to propose a novel interference management scheme based on a bonded channel. Interference management approach based on a bonded channel using cognitive radio can concatenate low interference adjacent channel by using the concept of primary users and secondary users. Using this scheme high-quality free channels are used to achieve high throughput between the sink node and the destination. Pramanik, P. K. D., et al., 2019 provided recent advancement in energy harvesting in WBAN. Furthermore, a classification of energy harvesting in WBAN and future research direction is provided with appropriate references. In addition, energy energy harvesting methods mentioned can be used in other applications for small-scale energy.

Table 1: Review of Literature

Paper No	Key Findings	Outcomes
Ayyub, Q.,2023	Health monitoring strategies in WBAN	Discussed short-range wireless technologies for WBAN and documents applications in healthcare and non-medical sectors.
Arefin, M. T., et al., 2017	Feasible wireless medium for WBAN	Examined WBAN properties (latency, power, interference, privacy, safety, reliability, sensor choice) and reviewed wireless technologies including LPWAN and discussed role of 5G and 6G in healthcare.
Taleb, H., et al., 2021	Advancements & challenges in WBAN	Performance assessment of localization systems and types of sensors and data fusion methods and also reviewed fundamentals & applications of wearable sensors for monitoring daily physiological & physical changes
Poongodi, T., et al., 2020	Localization in WBAN	Compared WBAN techniques for throughput & delay and ADOV Priority method for emergency data and used Omnet++ in DTN for low latency.

Khan, J. Y., et al., 2020	Load Aware channel bonded Algorithm	High throughput was achieved with the use of bonded channel. Using cognitive radio, bonded channels depend upon adjacent channel with the help of primary and secondary users.
Pramanik, P. K. D., et al., 2019	Methods of Energy harvesting	Future research directions on energy harvesting techniques in WBANs is mentioned Accordingly, emerging areas such as reinforcement learning and distributed optimization in WBAN applications have been explored

In this research paper, performance of wireless body area networks may be increased by managing aspects such as energy consumption, compact size and reduced propagation time. Multiple methods are beneficial for linking the sensors that are used in wireless body-based network to boost the energy efficiency. Several characteristics necessary for the establishment of a wireless body area networks is also mentioned that includes reliability and choosing the correct sensor. Energy harvesting techniques indicates the methods to improve the energy consumption the sensor nodes which consumes power during working conditions.

3.IMPLEMENTATION OF SENSORS IN WBAN

WBSN is evolving into a unique use of this method. There are some noteworthy differences between WBAN and other wireless sensor networks (WSN). Mobility is the primary distinction between a WBAN and a WSN. A user can travel with sensor nodes in WBAN using the same mobility pattern, however WSN is typically utilized to remain still. In comparison to other WSN configurations, WBAN uses a lot less energy (Khan, J. Y., et al., 2020). Furthermore, WBAN sensor devices are discovered to be less expensive than WSNs.

Prompt identification and efficient tracking might lessen the consequences of many illnesses and cut down on medical expenses. These days, improvements in wireless technology guarantee patient monitoring from a distance. Numerous technologies have been developed for medical systems, enabling constant patient monitoring and assisting medical personnel in diagnosing and administering treatment (Pramanik, P. K. D., et al., 2019). The WBAN, or Wireless Body Area Network, is a set of devices that are inserted in or on the patient's physique to gather particular measures associated to target diseases or health metrics. Numerous technologies offer connection between different components to send data gathered from a patient to the doctor and resend again (Gardasevic, G., et al., 2020). Because there are so many different technologies accessible, selecting the best one that are already in use. (Nelson, B. D., et al., 2020). When utilized for healthcare purposes, each of these technologies has unique functional properties and should adhere to certain limitations. In order to investigate the most popular technologies appropriateness for WBAN medical applications, this article highlights the energy harvesting techniques. WBAN technology typically comprises of a central hub and several tiny sensors. The functions of data rates, power requirements, and sizes of the sensors may vary depending on the illness to be monitored and the patient's circumstances. These sensors gather data, which then wirelessly transmit to the medical center through personal device that can be recharged and has a higher processing capacity than the sensors themselves (Wang, J., et al., 2013).

WBAN contains a special sensor that is capable of developing connections with a variety of equipment and sensors, within as well as outside of the human being. WBAN structure that is composed of different components is shown in Figure 1. The network structure is separated in four components here. The WBAN section, which is the first element, is made up of multiple sensor nodes. These are low-cost, low-power nodes that are strategically positioned throughout the human body and equipped with inertial and physiological sensors. All of the sensors may be used to continuously monitor blood pressure, heart rate, ECG and other vital signs as well as the surroundings.

Any connection in a monitoring system might cause issues like uncomfortable for the wearer and limit their range of motion. WBAN can be useful option in IoT field, particularly in a healthcare system where a patient needs mobility and constant monitoring. The Central Control Unit (CCU) coordination node is the component where all of the sensor nodes will be directly connected.

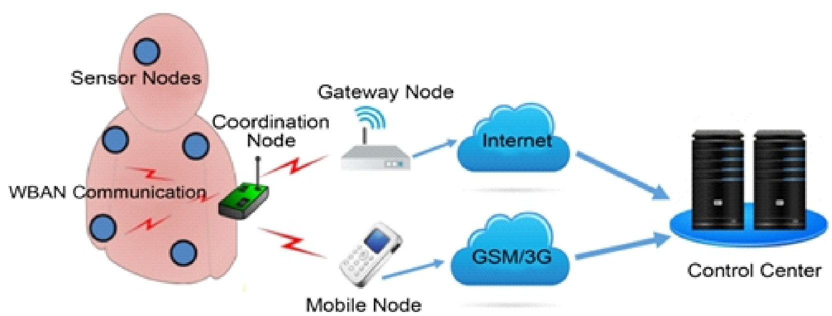

Figure 1: Wireless body area network Architecture (Ayyub, Q.,2023)

The CCU assumes responsibility for collecting data from the sensor nodes and forwarding it to the subsequent section. There isn't any wireless device specifically designed to monitor human body functions that targets WBAN. The most widely used wireless technologies for medical monitoring systems include WiFi, WLAN, GSM, 3G, 4G, and WPAN (ZigBee, Bluetooth), among others nodes. These technologies are widely available for short-distance communication with the exception of the cellular network standard. Ultra-Wide Band (Ragesh, G. K., et al., 2012) and WMTS (Wireless Medical Telemetry Service) are two more technologies that could be utilized in body monitoring systems because of their low transmission power operation.

The WBAN communication function as gateway to send the data to the destination, is the third section. When sending mobile messages to a cellular network via GSM, 3G, or 4G, now 5G a mobile node might serve as a gateway to a distant station. The final part is a control center made up of end node devices like a server for database storing which includes a desktop for monitoring and a mobile phone for sending messages.

4. SENSORS USED FOR MONITORING IN WBAN

Wireless body area networking is capable of monitoring a person's movements in real time. Different types of sensors are used to monitor the physiological, biochemical and environmental parameters of a person. These sensors are small, low-power, and often wearable or implantable. Two kinds of monitoring sensors can be identified depending on the operating situations in which they are employed. Wearable devices for sensing are employed on the outer layer of human body and implanted gadgets work inside human body. Wearable sensor technology gives a person the ability to continuously monitor changes in both their immediate environment and their own processes. It also offers feedback for sustaining an ideal and instantaneous state (Zafar, J. A. F. 2012).For instance, a GPS sensor can be used to pinpoint a location, an ECG or EEG can be utilized to monitor a critically ill patient, and various types of sensors can be used to detect movement, temperature, distance, and other variables. Table 1 shows the parameters required for the implementation of sensors (Poongodi, T., et al., 2020) using WBSN technology.

Table 2: Parameters Required for WBAN

Parameters	Requirements
Devices	Sensors, actuators, smart phones, base station
Sensors	Heart Beat. temperature, blood pressure, glucose level, sweat, stress, oxygen saturation
Traffic Pattern	Periodic, event driven, burst traffic
Traffic Type	Audio, Video, Encoded Data
System Co-ordination	Centralized (Intra-BAN) Distributed (Inter-BAN)
Environment	Wearable and Implantable sensors

Implantable sensors are connected close to the skin, and sometimes even inside patient's body to monitor health markers. Because they can constantly measure the levels of metabolites without human influence and irrespective of somebody's physiological state, implanted biosensors are an important type of biosensors. Implantable biosensors have a significant impact on trauma and diabetes patients, as well as active military personnel. WBAN also uses a combination of motion sensors, biochemical sensors and environmental sensors to continuously monitor the health status of a person in real-time.

For WBAN applications, sensors that are compact, light, flexible, and low power consumption are crucial. One of the most important research areas when creating WBAN-focused sensors is choosing or creating appropriate materials for wearable sensors. Conventional polymers including polyimide (PI), polyurethane (PU), polyethylene naphthalene (PEN) and polyethylene terephthalate (PET) are the primary materials utilized in wearable sensors (Preethichandra, D. M. G., et al., 2023). Based on their mode of operation, wearable sensors can be broadly divided into four groups: optical, electrical, electrochemical and microelectromechanical systems. The use of nanomaterials and nanocomposites in the production of flexible wearable sensors has become more popular. Human activity monitoring (HAM) sensors are employed in healthcare filed where WBANs offer temporal data on the intended and unintended activities of senior citizens residing in assisted living facilities, such as unexpected falls. Oximetry sensors, magnetometers, gyroscopes, accelerometers, electromyography, electrocardiography, bending curvature sensors, GPS sensors, and body temperature sensors are among the often-utilized HAM sensors.

5. INTEGRATION OF COGNITIVE RADIO AND ENERGY HARVESTING IN WBAN

The Cognitive Radio is a transceiver that is capable of sensing the frequency spectrum at regular intervals to monitor both user and unrestricted channels. Basic function elements for channel sensing, including the fusion center, scheduling center and free channel list comprise the CR control unit. Information regarding the utilization of various technologies channels is transmitted to the fusion center. The priority is adjusted and the transmission order is scheduled by the scheduling center in accordance with the environment (Niaz, F., et al., 2020). The correct and efficient utilization of channel information is essential for the performance of CR. Interference management is the main focus of current WBAN techniques. It depends on the single-channel for data transmission and fail to capitalize on the potential of the bonded channel which can achieve a high data rate and as a result, enhance the capacity of the WBAN. It explains that WBAN networks with high-frequency cognitive abilities CRWBANs can help solve these problems. In addition, channel connectivity can also meet the bandwidth requirements of sensor nodes. In fact, in the channel connection a set of nonoverlapping contiguous channels (Khan, M. U., et al., 2017) is interconnected to create a single broadband-connected channel. This results in high overall bandwidth, higher packet transfer rates and improved bandwidth requirements.

Energy Harvesting based cognitive radio WBAN is characterised by combination of primary sensor network and secondary sensor network. The main network shown in figure 2 is composed of transmitter node A and receiver node B whereas other secondary network consists of transmitter node C which is energy constrained and corresponding receiver sensor node D (Shukla, A. K., et al., 2021). Node A can communicate directly to the node B but indirectly through the help of secondary node C. It is energy constrained sensor node, therefore it must first harvest energy from the primary transmission before sending the primary signal to node B and transmitting its own data.

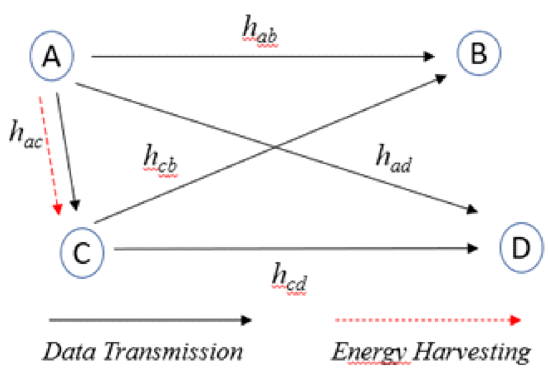

Figure 2: Cognitive radio-WBAN analytical framework

Each sensors use one antenna due to its size constraints and operates in half duplex mode. Radio frequency-based energy harvesting node is the secondary node C and performs the decode and forward relay for primary data communications while simultaneously utilizing the spectrum for its own transmissions (Smith, D. B., et al., 2013). All communication links are subject to log-normal fading, and the channel gain from node A to node B is denoted by hab and from node A to node C is represented as hac. It is noteworthy that a log-normal distribution effectively characterizes small-scale fading in WBAN environments. The transmit powers of nodes A and B are represented by Pa and Pb respectively. The duration T denotes the energy harvesting (EH) time during which node C collects energy from node A.

Thus, during the energy harvesting interval T, the amount of energy harvested at node C can be expressed as

$$E_s = \Phi P_a |h_{ac}|^2 T$$

Where Φ represents the efficiency of energy conversion of the sensor nodes that changes from 0 to 1(Sui, D., et al., 2018). This shows the energy harvesting of the sensor node is varies with the time interval and power consumption the main node from which it is receiving data to make the node as energy harvesting node.

6. PERFORMANCE EVALUATION BASED CHARACTERISTICS FOR WBAN

For Wireless body area network, there are some characteristics that are required for performance evaluation.

6.1 Power Consumption

In WBAN systems, the sensors are powered by tiny batteries. Certain batteries, especially those used in implant gauges, are non-replaceable or need years of continuous operation before having to be refuelled, making getting new ones uncomfortable (Antonescu, B., et al., 2013). Thus, the purpose of WBAN is to employ smaller batteries to establish a successful energy system. Selecting a wireless medium for WBAN that's also energy-efficient is the first phase towards developing an efficient electrical system. Secondly, we must enable gadgets to enter sleep state most of the moment in order to conserve energy. Third, eliminating interference is vital because it produces a WBAN platform that sends data greater than one time.

6.2 Latency

The length of time it takes data to flow from one of them to another is termed as latency (Seferagic, A., et al., 2020). It spans from 5G/6G speeds that last a few nanoseconds to 3G/4G readings of a few tens of minutes, and for low-power wide- technologies, it may reach more than one millisecond. Real-time data is effectively delivered to the medical facility with minimum transmission delay.

6.3 Real-Time WBAN applications

Several WBAN application in the medical area demand data that is important and cannot be accessed for long time. Hence, ensured performance in real-time is essential. For real-time WBAN usage, monitors must be able to perceive and react instantaneously, giving information to medical professionals so they can understand the data with a low delay. While transferring information to real-time WBAN technology. systems as a whole criticality are assigned to sensors vary with each sensor's severity dependent on its exigency level and type information under surveillance (Cavallari, R., et al., 2014). Identifying which sensors are relevant is a vital step in providing a specific attention to each sensor in WBANs. Data may be scheduled to minimise collisions to differentiate between uncritical and urgent data and either elevated and low priority. A sensor's data must be transmitted with high priority if it surpasses the typical threshold value, indicating a high critical level of data. High criticality data must meet two requirements: minimal latency and high reliability.

6.4 Interference Reduction

One significant difficulty is the rising interference caused by the ever-expanding WBANs (Le, T. T., et al., 2015). When interference stops data from accurately arriving at its destination, it can lead to repeated retransmissions, which can impact not only performance of networks, also the power utilization of sensors. There are two types of interference in WBAN systems, as Figure 3 illustrates. First, asynchronous transmissions between nearby sensors cause intra-network interference.

The second type of interference is inter-network interference, which is caused by outside sources using the same WBAN frequency channels. Inter-network interference can also happen when two or more WBANs send data at the same time.

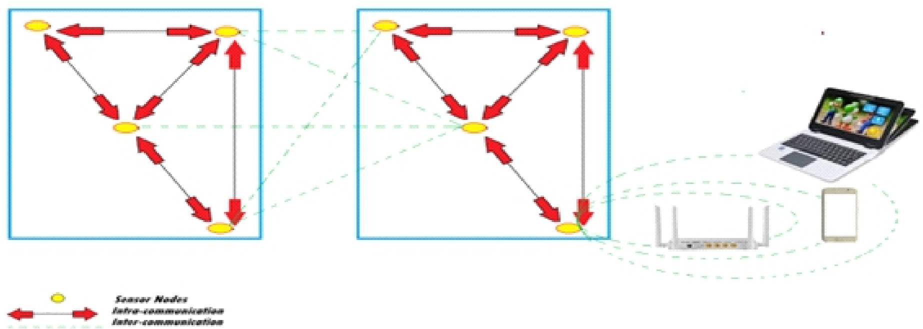

Figure 3: Inter and Intra WBAN Interference

Avoiding or decreasing these two forms of interference is vital to assuring the signal's quality of WBAN. The packet transport ratio is significantly influenced by both elevation in the total amount of WBANs and an increase in data rate (De Silva, B., et al., 2009). In regards to the loss of packets rate, the impact of the distance, the receiver and transmitter introductions, size of packets and power transfer between the sensing devices on the noise level.

Table 3: Characteristics of the WBAN

Characteristics	Data Range	Description
Transmission Range	1-2 metre	Implemented around the body
Power Consumption	1mW – 10mW	For Wearable and implantable sensors
Latency	Less than 250 ms	Depends upon real time and general applications
Throughput	10kbps-10mbps	Based upon application
Network Capacity	10-20 nodes	For efficient communication
Packet Delivery Ratio	More than 95%	For medical use

7. WIRELESS BODY SENSOR NETWORK IN IOT MODEL

The Internet of things is technical concept that utilises the internet to connect devices from numerous areas. The WBAN has grown more common in Internet of Things-driven healthcare applications. Several nodes of sensors are positioned at different sites across the human body to measure variables like body temperature and pulse rate. Wearable sensor technology may be utilised in security-related uses to monitor the health of human beings. Portable sensor devices could supply the needed data. WBAN is a structure made up of numerous nodes that may be implanted to the body of a person and give a variety of functions. The human body's sensors are nodes that are connected to a regional or global network illustrated in figure 4 to allow users to utilise services offsite (Poon, C., et al., 2015) on the impact on the wellness of the patient. Users have the capacity to perceive the surroundings (Bibin, A. D., et al., 2023) in accessible manner. IEEE 802.15, the communication standard for tiny devices adhered to the structure of the human body in WBAN.

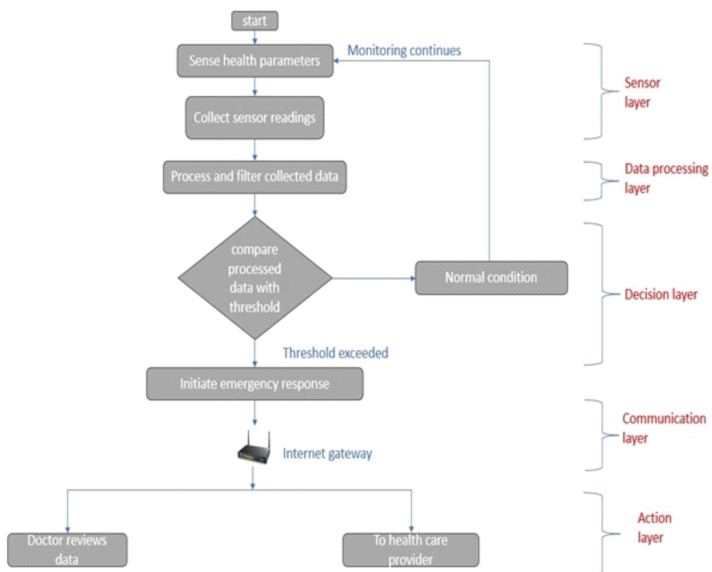

Figure 4: WBSN System Flow Diagram

WBAN interfaces use a local controller to connect with the hubs. An important part of patient treatment is the data collected from different sensors. Maintaining high-quality data is essential for effective decision-making. Because WBAN creates so much data, it can be quite difficult to manage such a large dataset. In order to minimize the formation of false alarms, it should be mandatory to authenticate all sensor readings in the healthcare area. There is a requirement to compile the data from various devices and the quality of the healthcare system will naturally decline if a medical practitioner's mobile device lacks sufficient patient-related information.

WBAN is a self-organizing network made up of diverse hardware constraints (limited processing and storage capacity) and small, low-power devices that are linked or implanted, into the human body. Three primary parts make up wearable gadgets: a display unit, a processing architecture, and sensing devices. Sensor devices receives information about particular user in grouped form, the information is processed and displayed to be used in decision-making.

8. TECHNOLOGIES USED IN WIRELESS BODY AREA NETWORK

New cellular technologies have implemented in response to expanding number of wireless communication-based applications. These technologies aim to address various issues such as high data rates, large numbers of linked devices and low latency. This section focuses on the implications and difficulties associated with the cellular future technologies for WBAN applications.

8.1 6G Technology

6G will send data at a better capacity and data capacity by employing a terahertz signal. High data speed (more than one Tbps), minimal latency (1 ms), large reliability, excellent speed (1000 km/h), and substantial capacity (more then 5G) are the demands of 6G technology for communication for the future of healthcare (Chowdhury, M. Z., et al., 2019).

Other applications, including holographic communication for mobile diagnosis and medical treatment observation will also be available. In these instances, physicians can examine patients remotely saving time (Nayak, S., et al., 2020).

8.2 Low Power Wide Area Network (LPWAN) technologies

Because of its extended range and low battery consumption, LPWAN technologies appear promise; nevertheless, significant changes to the LPWAN protocols are still needed to allow e-health applications. While many LPWAN protocols, including LoRaWAN, are primarily built for uplink broadcasts, they do not provide urgent or on-demand transmissions, which are often needed in medical applications. Since many of the patients do not enable mobile objects communication, these protocols (Ayoub, W., et al., 2018) must address additional mobility-related issues.

8.3 Wireless Wearable Devices

The IEEE 802.15.6 specification was established primarily to address the design demands of wearable applications. The primary aspects relating to the IEEE 802.15.6 standard's Media Access Controller (MAC) layer are reviewed here in order to fulfil the design needs of diverse applications.

a) Data transfer rate

b) Energy efficiency

c) Dependability

d) Quality of service.

9. RADIATION ABSORPTION BY THE HUMAN BODY

The human body may be significantly damaged by radiofrequency radiation intake, especially in sensitive organs. Since the highest permissible rate of contact value was 2W/kg in the EU and 1.6W/kg for the USA, being exposed to infrared rays is particularly higher as shown in the figure 5. Exposure to electromagnetic waves with an absorption rate per kilogramme of 8W/Kg in the skull or chest for a period of 15 minutes might result in the danger of harm to tissues(Fernandez, M., et al., 2020). Thus, decreasing the ionisation rate is one among the primary difficulties with WBAN. The electrical sensors need to work at low power consumption in order to limit the quantity of electric power that the human system accumulates. As a result, WBAN devices have shorter operating times and use lower transmission power. This has to do with the technology selected and the system's technique; LPWAN technologies with less transmission power and short duty cycles can become one of the solutions.

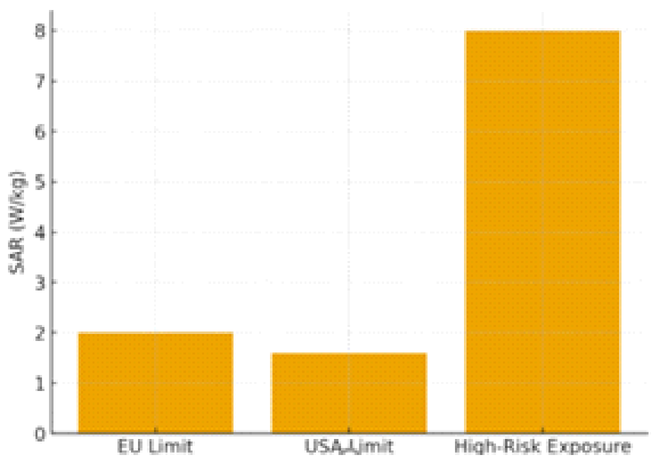

Figure 5: Graph of comparing SAR limits in human body using WBAN

The impact of frequency on the attenuation of body tissues within the WBAN channel, focusing on the 2–6 GHz frequency range is studied (Mauludiyanto, A., et al., 2021). Attenuation data for body tissues is obtained by measuring the magnitude response under both line-of-sight (LOS) and non-line-of-sight (NLOS) conditions, where the attenuation corresponds to the difference between the two responses. Results show that frequency influences attenuation across all body parts with attenuation increasing as frequency rises. Moreover, different tissues exhibit varying levels of attenuation depending on the body region. According to existing theories, particularly the skin depth concept in conductive materials, higher frequencies reduce the skin depth, thereby causing greater tissue attenuation. At higher frequencies, devices with lower reception sensitivity are required due to the significant attenuation caused by body tissues. Since the human body acts as a propagation medium, it contributes to considerable losses in radio wave transmission.

10.CONCLUSION

WBAN is a technology that promises to have significant impact on both the medical and non-medical fields, as well as on our society. An overview of WBAN has been provided in this work, where the deployment needs and WBAN architecture have been emphasized.

The aim of this paper is to create an adequate and appropriate wireless communication for network implementation. Thus explored a variety of short-range wireless methods that are suited for WBAN deployment. Different technologies are mentioned used in WBAN for high data rate and low latency. With the use of different sensors that are intended to gather and send data via wireless networks, medical professionals check on patient's health and provide diagnoses in real time with WBAN. The effect of attenuation on the body tissues increases as the frequency rises. The patient's condition may simply check using WBAN without having to go to the hospital. The approach for the use of Internet of Things in Wireless body area network is helpful by evaluation of performance factors of lower consumption, small size and less propagation time. The future scope will be the implementation of WBAN network with sensor node is capable of adjust the battery life time according the scenario of the network and its depicted applications.

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