

Enhancement Over Energy Consumption And Network Lifetime Of Wireless Body Area Network: A Review

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DOI: <https://doi.org/10.26438/ijcse/v7i4.780782> | Available online at: www.ijcseonline.org

Accepted: 19/Apr/2019, Published: 30/Apr/2019

Abstract—Recently the wireless body area network (WBAN) is an emerging technology in various network applications. A WBAN is composed by implanting sensor nodes on human body and are used to sense the thermal effects on human body. The architecture of WBAN uses some communication technologies to send or receive data among nodes and the communication occur either between node to node, nodes to cluster head or cluster head to sink. This paper presents the survey on different techniques used to implement WBAN and the role in different network applications. The purpose of this paper is to study problems accomplished during the communication and data sensing (power consumption, lifetime, path loss, attenuation).

Keywords— WBAN, Gateway node, cluster Head, Energy consumption, lifetime

I. INTRODUCTION

Wireless body sensor network is an emerging technology in wireless sensor network which has a vast importance in medical application and is an autonomous system composed of set of tiny devices called sensor nodes planted on a human body to monitor daily activities of a person and measure biological parameters. This is emerging used to detect the chronicle diseases like asthma, heart attack, blood pressure, diabetes etc.

The development of WBAN early started in 1975, after then number of number of wearable devices are used to monitor the activities on human body ranging from simple pulse monitoring to expensive sensors. The purpose of these variety of implanted sensors devices on the human body is to collect various physiological changes in human body and to monitor the patient's health status in the form of information. Then this information is transmitted to some external processing unit called sink. This form of information collected by the sensors are transmitted to the doctors throughout the world. If any emergency is detected, the doctors will immediately inform the patient through the computer system by sending appropriate messages or alarms. This information collected by the sensors needs some energy resources for data collection and transmission, this energy have a limiting factor in sensors. Another factor is communication factor between these implanted sensors and topology used for communication.

Our purpose is to present the comprehensive survey on WBAN and the working architecture used for deploying the nodes on human body with some advance nodes.

II. LITERATURE SURVEY

[1] This paper presents a heterogeneous model for the deployment of sensor nodes on human body. The architecture composes of 8 nodes and a sink planted on different parts of human body, 5 nodes are deployed on lower parts of body, two on wrist and one on upper part which is fixed. The working model used in this paper works in phases with multilevel multihop scheme for the selection of some advance nodes called forward nodes planted on lower part of body as shown in figure 1. This scheme helps in to reduce path loss and to increase throughput by implementing two forwarding nodes on each side of lower part of body. The distance between nodes are measured in feet's which is quite difficult to enhance the performance of small area, to accomplish this we can use distance in meters by implementing smart node.

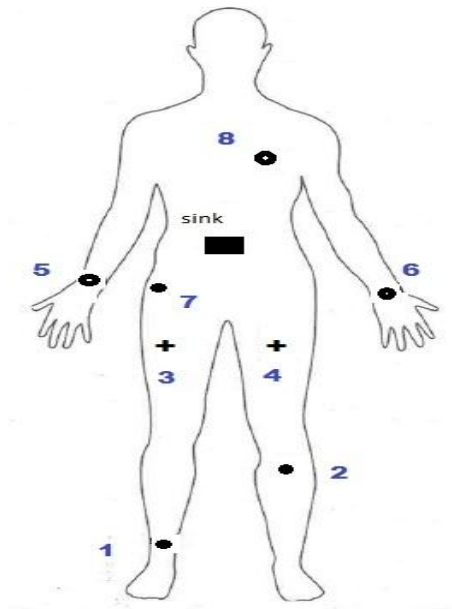


Figure 1. Deployment Model [1]

[2] This paper presents the survey study of WBAN by explaining different key challenges like life time, energy consumption, Vulnerability etc. This paper provides some key snapshots regarding the development of wireless body sensor network in medical system which helps to minimize the need for caregivers and help to live an independent life, for ill and elderly people. The main focus of the author is to study the system parameters and how to improve these parameters by enhancing the performance of the system.

[3] This paper presents the overall study of WBAN and different types of networks. This paper defines various types of nodes like ECG sensor, Blood sensor, EEG, blood glucose, CO₂ gas sensor, Pulse Oximeter etc and the architecture in different areas homogenous or heterogeneous system.

[4] This paper proposes a architecture which is based on cost function, residual energy of node and its distance from sink. Which helps in choosing the nodes either a cluster head, advance node or normal node. Nodes with less value of cost function choose as parent, and other nodes will become child nodes. They proposed the model having one forwarder node which is based on cost function and load during communication is maximum and has a chance of path loss. The model works in phases and the communication depends upon the distance between nodes and the movement of the nodes.

[5] This paper we present a model with mixed-integer programming problem which is used to balance the energy consumption and maximize network lifetime. The

architecture is based on some parameters, initial energy, the energy received and transmitted by sensors, the rank or significance of sensors, the reliability of sensors, current temperature of sensors, and link bandwidth during transmission. The model uses some linear programming technique which shows a significant improvement in lifetime of the network with bandwidth, rank of sensor and reliability of sensor.

[6]. This paper gives the concept of a new advance node which is fixed called forward node and multi hop technique. This forward node accomplish a forwarding procedure, this procedure works according with the transmission range of the source node within the network coordinates, if it is with the range then it transmits data to the coordinator directly. Otherwise, the data is send to one of the neighbour sensor node within that coordinates. The performance of the network is measured using throughput, reliability, stability period and residual energy of the nodes.

[7]. This paper presents a multi-hop technique and a model in which set of nodes are deployed on the human body, sink is placed at the waist and two main nodes of glucose and blood pressure are placed near to it which helps to reduce the energy consumption. The selection of the CHS are based on cost function which computes the reliability of path on the basis of distance and residual energy; resulting in higher network lifetime.

III. KEY CHALLENGES

To increase the performance of network and sensor nodes there are number of challenges which we have to keep in mind during the implementation of the network. The performance parameters are:

1) *Network lifetime*: This parameter defines the time during till last node dies. This is the key factor to keep the nodes alive.

2) *Throughput*: To transfer all the data packets during communication without loss is another challenge for a protocol. This parameter defines the total number of packets delivered successfully.

3) *Stability Period*: This defined the time period of the network untill first node in the network dies.

4) *Path loss*: To keep the power of transmitting node and receiving node same is the key factor for any protocol, this defines the loss of the network power of transmitting and receiving node.

5) *Residual Energy*: It defines the consumption of the node energy during each round. So minimum consumption of energy of node keeps the node alive for maximum time.

IV. CONCLUSION

From the study, the main focus of different techniques are based on the energy consumption and the path loss parameters and the distance between nodes are measured in feets which is quite difficult to enhance the performance of small area, to accomplish this we develop an energy enhancement model in which the distance are measured in meters by implementing smart node.

ACKNOWLEDGMENT

The above contents and survey we mentioned is true to my knowledge.

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Authors Profile

Mr. Jatinder Singh is pursuing M Tech in computer science from Punjab Technical University. He is working on Body Sensor Networks and her main focus is to impliment the concept of smart node to minimize the dataloss of Wireless Body Sensor Networks.



Mr Navjeet Saini pursed Bachelor of Engineering and Master of technology from Punjab technical University. He has worked as Assistant Professor in Department of Computer Science, SSCET Pathankot. He has published many research papers in reputed international journals. His main research work focuses on wireless sensor network. He has teaching experience and more than 3 years of Research experience.



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