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Multilevel Multi-Hop Technique for more than one Forward Node to increase the Stability of Wireless Body Sensor Networks

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***Abstract*—** As wireless body area network is used to keep watch on patient body by deploying nodes on human body, in this work we propose a heterogeneous model to enhance the network lifetime by minimizing path loss, low power consumption, increase throughput and dividing the load through the nodes with more than one forwarder node in each round. The selection of the forwarder nodes is based on cost equation having minimum distance from the sink and maximum energy. Which helps in having high stability and contribute high packet delivering to the sink.

***Keywords*—**Wireless Body Area Network, Forwarder Node, Residual Energy, Cost Function

I. INTRODUCTION

A wireless body area network (WBAN) or a body sensor network (BSN), is a wireless network of wearable computing devices called sensors[1]. These sensors may be planted inside the human body, it may be surface-mounted on the human body in a fixed position Wearable technology or may be some accompanied devices which humans can easily carry in different positions, it may be in clothes pockets, by hand or in various bags. The function of the sensors are to monitor the human body by collection a particular data depending upon the node type, and to send the collected data to the sink in a order defined by the protocol used in that body area network[2][3]. The network protocol used should have to increase the network life time by enhancing the throughput, by minimizing the path loss or data loss, maximum packet delivering to the sink. There are many techniques used to enhance the network life time each depends upon the number of nodes deployed, a parent node, path followed and energy of the nodes.

In this work we propose a heterogeneous model with eight sensors deployed on different parts of the body and a sink nearly at the center of the body i,e at waist. The purpose is to enhance the network lifetime by minimizing path loss, low power consumption , increase throughput and dividing the load through the nodes. The load divide is done by creating more than one forwarder node(Advance nodes) in each round. The selection of the forwarder nodes is based on cost equation having minimum distance from the sink and maximum energy. Which helps in having high stability and contribute high packet delivering to the sink. The forwarder node directly sends data to the sink by collection the data from the normal nodes (which are nearer to that forwarder node).

II. RELATED WORK

Q. Nadeem et et al. in their paper had proposed a stable Multi-hop Protocol used Wireless Body Area Networks[1]. In this paper author propose a cost function based on residual energy of node and its distance from sink. Nodes with less value of cost function choose as parent, and other nodes will become child nodes. Two critical nodes can be placed near to sink, so that their energy not deplete early. They proposed the model having one forwarder node which is based on cost function and two fixed nodes. The total load to this node is maximum and there is a chance of path loss. By implement the concept of multilevel multihop we can further increase the stability period of the network with minimum path loss and high throughput. This can be done by creating more than two forwarder nodes through which the load can be divided.
The main objectives of the work is :

To design and simulate the proposed approach for achieving the minimum energy consumption with minimum path loss and maximum network stability using multilevel multi-hop with more than one forwarder node among 8 nodes.

To transfer data based on minimum distance from forward node and cost effective ness and compare the proposed technique with the conventional technique.

III. METHODOLOGY

The model is designed having 8 sensor nodes in a Heterogeneous mode and a sink which is deployed at the waist, some nodes are deployed at upper part of body and some at lower part of the body. Node 8 is ECG node and Node 7 is Glucose node which are fixed as shown in figure 1.

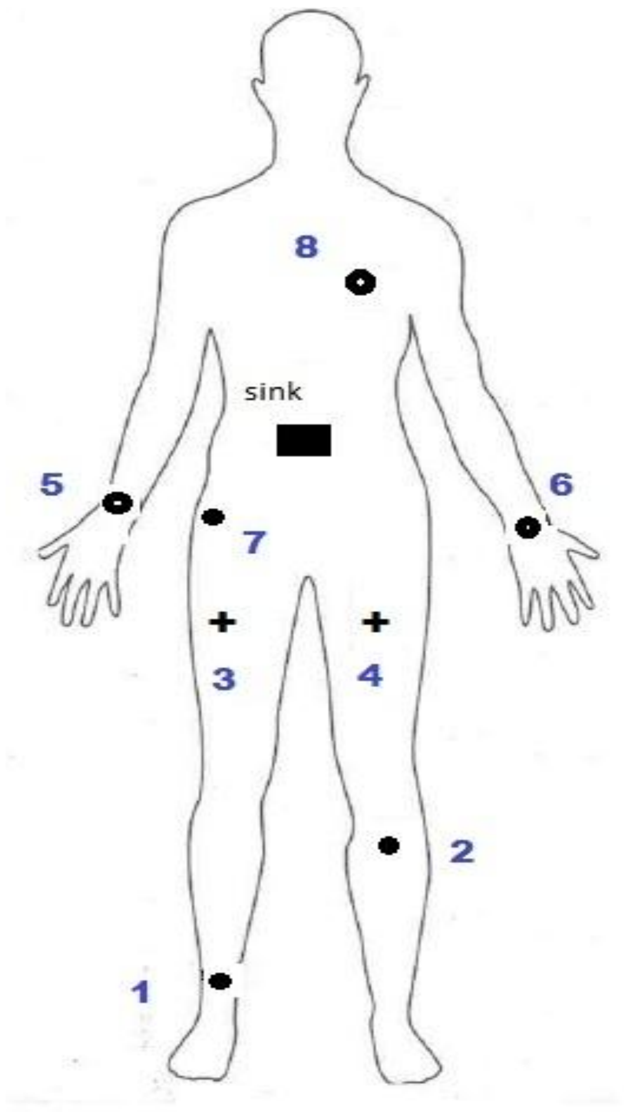

Figure 1. Node Deployment

The working of the model is accomplished in phases, in first phase the location of the sink and sensor nodes are defined.

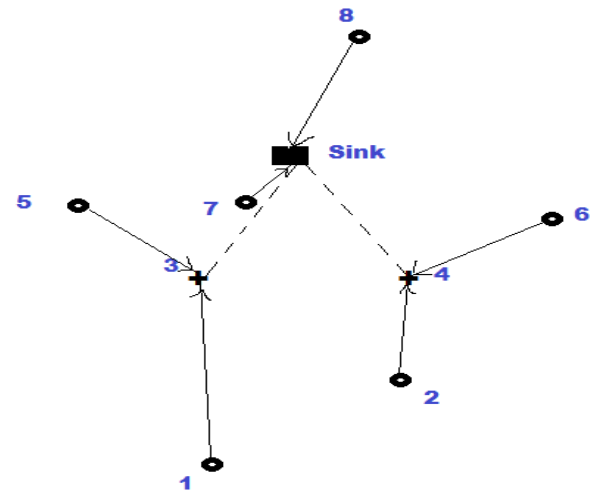

Figure 2. Network Model

In second phase the multilevel multihop scheme is used for the selection of forwarder nodes based on cost function. Which divides the load among two forwarder nodes, and minimizes the path loss and increases the throughput. If i is the number of nodes then cost function of node i is defined by[1]

$$C.F(i) = \frac{d(i)}{R.E(i)}$$

Let Node 3 and Node 4 are advanced nodes having more energy than other nodes, then Node 3 and Node 4 can be forwarder nodes in certain round and other Nodes 1,2,5,6 are normal nodes. The forwarder nodes sets in network model are [1,3,5] and [2,4,6].

In final round the data are received by the forwarder from the normal nodes or child nodes and all sensed data by the normal nodes are sent to the forwarder nodes.

IV. RESULTS AND DISCUSSION

MATLAB is used as test bed to implement the desired objective proposed in the work by comparing the proposed work with SIMPLE protocol. The performance of the model is calculated by number of Dead nodes, packet received at CH, packet received at Sink, Path Loss and residual energy. Figure 3 shows the general layout of sensor nodes deployed.

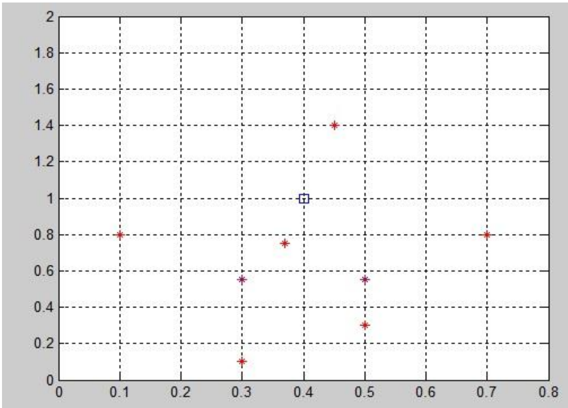

Figure 3. Network Model Layout

Figure 4 defines the network life time compared with SIMPLE protocol with less number of nodes dead during the rounds as compared to previous technique.

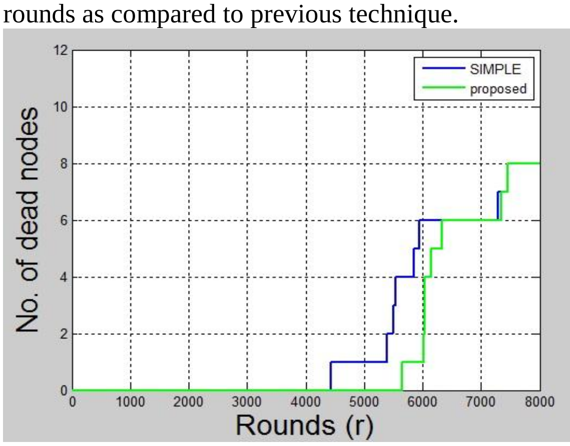

Figure 4. Analysis of Network Lifetime

Figure 5. shows the performance of the Forwarder nodes during each round which is improved as with SIMPLE protocol.

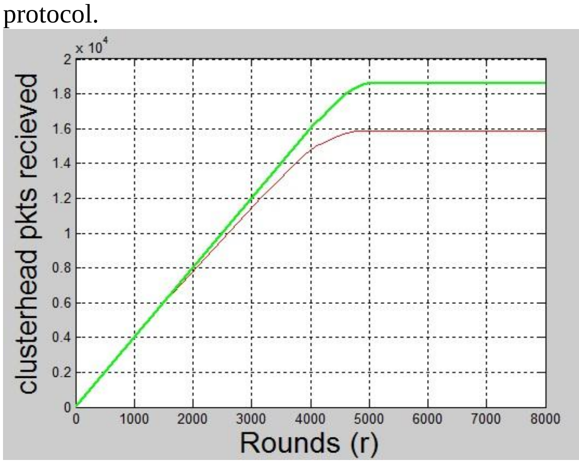

Figure 5. Performance of Forwarder nodes

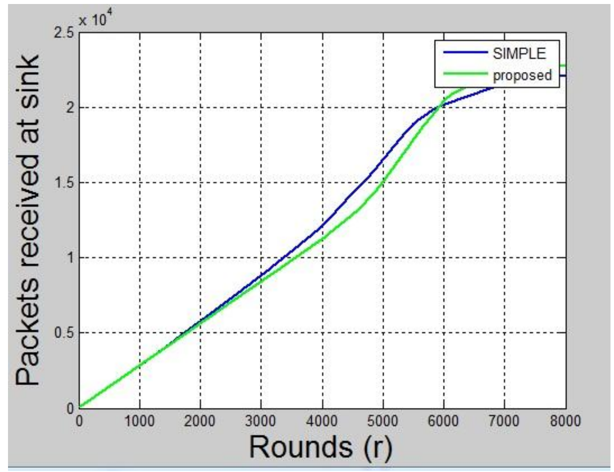

Figure 6. Analysis of Throughput

Figure 6, Figure 7 and Figure 8 defines throughput, path loss and remaining energy of the nodes performance.

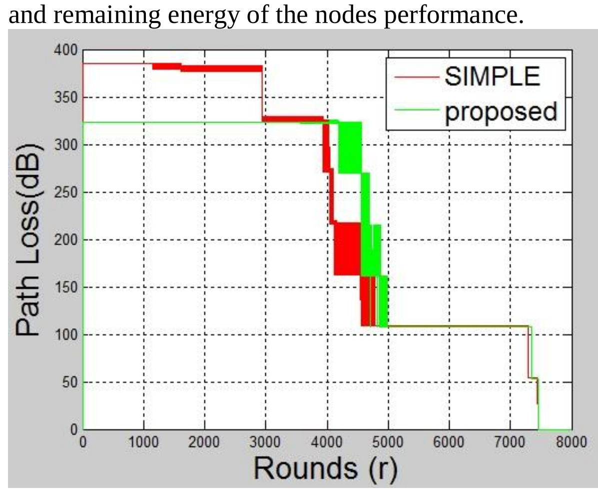

Figure 7. Analysis of Pathloss

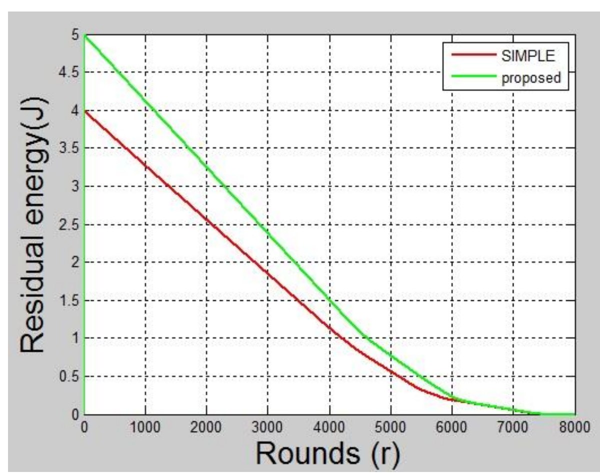

Figure 8. Analysis of Remaining Energy

V. CONCLUSION and Future Scope

By dividing the load through the nodes with more than one forwarder node in each round enhances the network lifetime by minimizing path loss, low power consumption , increase throughput. The selection of more than one forwarder node makes the whole network high stability and contribute high packet delivering to the sink.

ACKNOWLEDGMENT

The about contents and research method we used is true to my knowledge and the result at every step we concluded is according to my research work.

REFERENCES

[1] Q. Nadeem et et al, "SIMPLE: Stable increased throughput-multihop protocol for link efficiency in wireless body area networks", vol1, 2013.
[2] Professor Guang-Zhong Yang, "Body Sensor Networks –Research Challenges and Applications" Imperial College London.
[3] Yiming, Fan, and Yu Jianjun."The communication protocol for wireless sensor network about LEACH." Computational Intelligence and Security Workshops, International Conference on. IEEE ,2007.
[4] Karthick .K et al, " An Energy-Saving Routing Algorithm for Wireless Body Sensor Network using Data Compression Technique", ijca-2015.
[5] Shakshi Mehta et al " Improved Multi-Hop Routing Protocol in Wireless Body Area Networks ", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 5, Issue 7, July 2015.
[6] Jung, W. S., Lim, K. W., Ko, Y. B., & Park, S. J. "A hybrid approach for clustering-based data aggregation in wireless sensor networks", In Digital Society,. ICDS'09. IEEE, Third International Conference on (pp. 112-117), 2009.
[7] Muhammad Nasir Khan* and Mohsin Jamil," Performance Improvement in Lifetime and Throughput of LEACH", ijst 2016.
[8] Satyajeet R. Shinge, "Increase the Lifetime of Wireless Sensor Network using Clustering and Compression", ijca-2015.
[9] Aslam, M., Nadeem Javaid, A. Rahim, U. Nazir, Ayesha Bibi, and Z. A. Khan. "Survey of extended LEACH-Based clustering routing protocols for wireless sensor networks." IEEE 9th International Conference on Embedded Software and Systems (HPCC-ICESS), pp. 1232-1238, 2012.
[10] Li, Hongjuan, Kai Lin, and Keqiu Li. "Energy-efficient and high-accuracy secure data aggregation in wireless sensor networks." Computer Communications 34.4 (2011): 591-597.

Authors Profile

Mrs. Nitu Choudhary is pursuing M Tech in computer science from Punjab Technical University. She is working on Body Sensor Networks and her main focus is to impliment Multilevel Multi-Hop Technique for more than one Forward Node to increase the Stability of Wireless Body Sensor Networks.

Mr Deepak Kumar pursed Bachelor of Engineering and Master of technology from Punjab technical University. He is working as Assistant Professor in Department of Computer Science, SSCET Pathankot. He has published more than 3 research papers in reputed international journals. His main research work focuses on Cloud Computing. He has 7 years of teaching experience and 2 years of Research experience.

