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Evaluation of Cluster Based GSTEB Protocol for WSN

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Abstract: ***The quick growth in network multimedia equipments have allowed additional real-time digital services such as video-conferencing, online games and distance education to grow the conventional internet tasks. Though many protocols has been proposed so far to improve the energy efficiency further but still much enhancement can be done. In order to overcome the constraints of the earlier work a new improved technique is proposed in this paper. The proposed technique has the ability to overcome the limitations of the GSTEB routing protocol by using clustering. From the comparison, it has been shown that proposed technique performs better in comparison to GSTEB protocol.***

Keywords**: WSN, GSTEB, Clustering**

I. INTRODUCTION

Wireless Sensor network consists of many small distributed sensor nodes that provide the reliable monitoring in various environments such as military and civil applications. In WSN every sensor node contains specific hardware receiving hardware, memory, processing unit, which are required. With the help of networking tiny sensor nodes, it becomes easy to acquire the data about physical phenomena which was quite difficult with conventional methods. These node process data and send it to base station called as sink. For communication of data between nodes and sink many routing technologies are used initially, such as direct communication and multi hop data transmission. But due to limited battery life of nodes these techniques were not so effective because of early death of some nodes in both techniques were fail to achieve the network suitability periods. Clustering techniques in wireless sensor networks aims at gathering data among groups of nodes, which elect leaders among themselves. The leader or cluster-heads has the role of aggregating the data and reporting the data to the BS. The advantages of this scheme is that it reduces energy usage of each node and communication cost. The clustering algorithms that are made are based on homogeneity and heterogeneity of nodes. One of the earliest works proposing this approach in WSNs is LEACH (Low Energy Adaptive Clustering Hierarchy). Recently, there have been lots of other clustering techniques which are mostly variants of LEACH protocol with slight improvement and different application scenarios. DEEC (Design of a distributed energy-efficient clustering), EDACH (Energy-Driven Adaptive Clustering Hierarchy) and EEUC (An Energy-Efficient Unequal Clustering Mechanism) are all clustering techniques proposed with the objective of minimizing energy usage, while extending network life time. Clustered sensor network can be classified into two main types: homogeneous and heterogeneous sensor network. While energy efficiency in WSNs remains a function of uniform distribution of energy among sensor nodes, classifying clustering techniques depends on the objectives in mind. The Optimal clustering technique is the technique for the heterogeneity nodes.

Clustering Objectives

Various objectives have been pursued by different literatures in designing clustering architecture for WSN. Most objectives are set to meet the application constraints. This section present three main objectives that are relevant to the focus of this thesis.

(i) Maximizing network Life-time

Unlike in cellular networks, where mobile gadgets (e.g. phones) can easily be recharged constantly after battery drainage, thus power management in these networks remains a secondary issue. However, WSN is heavily constrained in this regard, apart from being infrastructure-less system their battery power is very limited. Most of the sensor nodes are equipped with minimal power source. Thus, power efficiency will continue to be of growing concern and will remain one of the main design objectives of WSN. In order to cope with energy management in WSN, clustering scheme has been pursued, to extend network life-time and help ease the burden of each node transmitting directly to BS as in conventional protocols like Direct Transmission. When some nodes which are having less energy in the WSN then aim is to provide the energy to those nodes before they declared to be fully dead nodes.

(ii) Fault-tolerance

The failure of a sensor node should have a minimal elect on the overall network system. The fact that sensor nodes will be deployed in harsh environmental conditions, there is tendency that some nodes may fail or be physically damaged. Some clustering techniques have been proposed to address the problem of node failure by using proxy cluster-heads, in the event of failure of the original elected cluster-head or have minimal power for transmission. Some other literatures have employed adaptive clustering scheme, to deal with node failures such as rotating the cluster-head. Tolerating node failure is one of the other design goals of clustering protocols.

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(iii) Load balancing

Load balancing technique could be another design goal of clustering schemes. It is always necessary not to over burden the cluster-heads as this may deplete their energies faster. So, it is important to have even distribution of nodes in each cluster. Especially in cases where cluster-heads are performing data aggregation or other signal processing task, an uneven characterization can extend the latency or communication delay to the base station.

Cluster Properties

(i) Cluster Count: Cluster heads are prearranged in some of the approaches. So, the numbers of clusters are fixed. Cluster head selection algorithms usually choose randomly cluster heads from the deployed sensors thus yields variable number of clusters.

(ii) Intra-cluster topology: A few clustering schemes are based on direct communication between a sensor and its selected cluster head, but sometimes multi-hop sensor-to-cluster head connectivity is necessary.

(iii) Connectivity of cluster head to base station: Cluster heads transmit the aggregated data to the base station directly or indirectly with help of other cluster head nodes. It means there exists a direct link or a multi-hop link.

Cluster Head Selection Criteria

i. Initial energy: To select the initial energy cluster head is an important parameter. When any algorithm starts it usually considers the initial energy.

ii. Residual energy once some of the rounds are completed, the cluster head selection should be based on the energy left behind in the sensors.

iii. Average energy of the network: This energy is used as the reference energy for each node. It is the ideal energy that each node should own in current round to keep the network alive.

II. LITERATURE REVIEW

Ahmed Salim et al. [2014] In this they discussed about wireless sensor networks (WSNs) that are composed of many low cost, low power devices with sensing, local processing and wireless communication capabilities. Recent advances in wireless networks have led to many new protocols specifically designed for WSNs where energy awareness is an essential consideration. Most of the attention, however, has been given to the routing protocols since they might differ depending on the application and network architecture. Minimizing energy dissipation and maximizing network lifetime are important issues in the design of routing protocols for WSNs. In this paper, the low-energy adaptive clustering hierarchy (LEACH) routing protocol is considered and improved. They propose a clustering routing protocol named intra-balanced LEACH (IBLEACH), which extends LEACH protocol by balancing the energy consumption in the network. The simulation results show that IBLEACH outperforms LEACH and the existing improvements of LEACH in terms of network lifetime and energy consumption minimization.

N.Amjad et al. [2014] This paper evaluates the randomly deployed wireless sensors having low energy assets. Major problem of networks is energy constraint and lifetime, so, to overcome these problems different routing protocols and clustering techniques have been introduced. They proposed Distributed Regional Energy Efficient Multi-hop Routing Protocol based on Maximum Energy in WSNs (DREEM-ME), which uses a unique technique for clustering to cover these two problems efficiently. Clustering technique of LEACH does not assure a fix number of Cluster Heads (CHs) in each round. Therefore, its behavior is not so appreciable in case of network lifetime. DREEM-ME elects fix number of CHs in each round instead of probabilistic selection of CHs. They also implement the Packet Drop technique in this protocol which makes it more comprehensive and practical. The results show that DREEM-ME competes all of its identical protocols.

Ahlawat et al. [2013] has discussed a latest approach to advance network life span. Writer has suggested choosing a secondary cluster head as a resulting cluster head which will job in case Cluster head would expire .writer has explained that how secondary cluster head would be chosen. According to writer, these criteria could be less space between sensor nodes, highest residual power in sensor nodes, and lowest amount power loss. So according to author the cluster head would on no account expire. There are secondary Cluster Head which will substitute the lifeless cluster .Simulation results shows that this new approach raise life span in contrast of the conventional approaches.

Beiranvand et al. [2013] in this paper they have analyzed and proposed a new enhancement in LEACH named I-LEACH, An Improvement has been done by considering basically three factors; Residual Energy in nodes, Distance from base station and Number of neighboring nodes. A node has been considered as head node if it has optimum value for discussed three factors i.e. have more residual energy as compare to average energy of network, more neighbors than average neighbors for a node calculated in network and node having less distance from base station as comparison to node's average distance from BS in network. Reduction in energy consumption and prolongation in network life time has been observed.

G.Jayaseelan et al. [2013] This paper depends on cluster-based scheme that extends High Energy First (HEF) clustering algorithm and enables multi-hop

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transmissions among the clusters by incorporating the selection of cooperative sending and receiving nodes. The performance of the proposed system is evaluated in terms of energy efficiency and reliability. Simulation results show that tremendous energy savings can be achieved by adopting hard network lifetime scheme among the clusters. The proposed cooperative MIMO scheme prolongs the network lifetime with 75% of nodes remaining alive when compared to LEACH protocol. HEF algorithm proved that the network lifetime can be efficiently prolonged by using fuzzy variables (concentration, energy and density). Providing trustworthy system behavior with a guaranteed hard network lifetime is a challenging task to safety critical and highly-reliable WSN applications.

Khalid Hussain et al. [2013] In this study a cluster is supervised by a leader node called Cluster Head (CH). Purpose of CH is to maintain the list of affiliated nodes and communicate with other cluster heads. CH election is a vital process in cluster based networks. Many parameters can be used for electing the node as a cluster head such as location, mobility, battery, throughput etc. Numerous techniques for selecting cluster head have been proposed by researchers, focusing on parameters. Almost all the intra cluster traffic must pass through the CH; therefore it must be able to handle maximum packets

Chen et al. [2012]. In this paper study they have explained an improved model in WSN which has been based on heterogeneous energy of nodes for same initial energy and multi hop data transmission among cluster heads was proposed. New threshold has been introduced on the basis of current energy and average energy of the node to cluster head election probability and provide reliability that higher residual energy have greater probability to become cluster heads than that with the low residual energy. Problem of number of cluster heads reduces with the increase of the number of rounds. Confirmation has been provided with the approach that nodes with higher residual energy have greater probability to become cluster heads than that with the low residual energy. Thus results in extension in the network lifetime and guarantees a well distributed energy consumption model.

Yektaparast et al. [2012] This paper has explained the proposed technique in which they have divided the clusters into equal parts, called as cell. Every cluster divided into 7 cells. Each cell contains a cell head which is responsible for direct communication with Cluster Head. Cell head has aggregated the native member's information in that cell and communicate with Cluster Head, and prevent sensors unnecessary redundant information to Cluster Head. An improvement has also been done in computation of the threshold value for a cluster-head selection formula. Node residual energy has been considerate during cluster-head, cell-head selection process that is responsible for maintaining the balanced energy consumption of the sensor network. This approach has significantly improved the network lifetime and optimized the energy consumption.

Kashaf et al. [2012] has explained a protocol for three level of hetregeonity in a WSN. According to writer threshold is the main parameter while selecting the cluster head. So he proposes a latest approach which is helpful in time dangerous application means sensor nodes would pass on information only when there is great transform in the sensed worth. This latest approach has two features as at heterogeneity three levels and communication consumes more power than sensing and it is done just when a specific threshold is reached. In this approach three types of nodes with different power levels are assumed .These are advance nodes , which have power level better than all extra sensor nodes, intermediate sensor nodes with power in among normal and advance sensor nodes while remaining sensor nodes are normal nodes. Writer has also implicit two kinds of Threshold values named Hard Threshold and Soft Threshold. These ethics play a important role as nodes which sensed values pass on data to cluster head in case if it reaches the threshold value, for twice sensed information would be transmitted only when it complete certain situation. Hence decreases the needless communication. According to writer due to heterogeneity in power, power dissipation is reduced and raises number of alive sensor nodes in contrast of the dead sensor node.

Meenakshi Sharma et al. [2012] Routing protocols like EEE LEACH, LEACH and Direct Transmission protocol (DTx) in Wireless Sensor Network (WSN) and a comparison study of these protocols based on some performance matrices. Addition to this an attempt is done to calculate their transmission time and throughput. To calculate these, MATLAB environment is used. Finally, on the basis of the obtained results from the simulation, the above mentioned three protocols are compared. The comparison results show that, the EEE LEACH routing protocol has a greater transmission time than LEACH and DTx protocol and with smaller throughput.

Shuo Shi et al. [2012] LEACH-C is a cluster algorithm in which cluster heads are randomly selected from the nodes with energy above the average, and the simulated annealing algorithm was utilized to find the optimal solution with better position to reduce the energy loss of cluster heads. An energy-efficiency Optimized LEACH-C. First, they selected a group of cluster heads using LEACH-C. Next, taking retransmission and acknowledgment into consideration, we create a model of cluster head energy consumption. They have calculated the quadratic sum of the distances from each cluster head to its member nodes in the optimal solution. Finally, the largest energy consumption for a single cluster head in the next round will be estimated, and all nodes with residual energy larger than the calculated consumption will be taken to a new round of simulated annealing to find a better solution. Thus, loss of the cluster head for each round can be

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minimized, and the WSN lifetime can be extended ultimately.

Singhal et al. [2012] has described WSN as scattered network of nodes**.** A sensor is tool, which can sense something like heat, moisture, vibration etc. Author has described the five key features which require to be considered when rising WSN. Different principles for WSN protocols and working systems have been discussed. The applications of WSN can be in also a lot of fields like cultivation, environment Study, ecological Monitoring, Structural Health Monitoring, Heavy manufacturing Monitoring, and protection monitoring, armed applications include interruption discovery.

Bakr et al. [2011] In this paper they mainly focused on extending the WSN lifetime that is done by making WSNs redundant by adding spare nodes. The passive (switched off) spares has been made available to become active (be switched on) whenever any active WSN node energy gets exhausted. A new proposed LEACH-SM (LEACH Spare Management) has modified the prominent LEACH protocol by enhancing it with an efficient management of spares nodes. Addition of the spare selection phase has been done in LEACH; this functionality has been named as spare management as LEACH-SM. During Spare Selection phase, each node has been decided in parallel whether it would become an active primary node, or a passive spare node. The spare nodes decided to go asleep, while the WSN as the whole has been maintained the required above-threshold target coverage. (The spares have awakened when the probability that any primary node exhausted its energy reaches a predefined value.) Identification of spares alone has increased energy efficiency for WSNs as proved; Decentralized Energy-efficient Spare Selection Technique has been used in spare selection phase by spare manager. Reduction in the duration of the active interval for cluster heads has been observed as a side effect. Reduction in energy consumption by cluster heads has been observed mainly.

Peng et al. [2011] In this paper they have proposed a new technique in which adaptive clustering hierarchy algorithm has been proposed to meet QOS (Quality of Services) requirements. Modification has been done in basic LEACH and an improved protocol has elaborated in which improvement has been occurred in the energy efficiency and other QOS parameters by excluding the node with improper geographic location to be the cluster heads. The optimum measuring range of head nodes has been designed to be a criterion of cluster head selection, and every cluster head has been elected according to the node density threshold, which is defined by the node distribution situation process and communication among nodes. An Improvement has been shown in the network lifetime and the communication quality by selecting the Cluster head in the area of proper node density and achieves good results when there is uneven distribution of nodes.

Shilpa Mahajan et al. [2011] In this article a survey of various energy efficient techniques in a heterogeneous wireless sensor network is done. It is usually randomly deployed in inaccessible terrains, disaster areas, or polluted environments, where battery replacement or recharge is difficult or even impossible to be performed. For this reason, network lifetime is of crucial importance to a WSN. They first outline the basic network radio model and how this model can be used to study various trades off between network deployment costs, clustering approach in terms of energy efficiency.

Md. Golam Rashed et al. [2011] In this paper they develop an energy-efficient routing protocol in order to enhance the stability period of wireless sensor networks. This protocol is called weighted election protocol (WEP). It introduces a scheme to combine clustering strategy with chain routing algorithm for satisfy both energy and stable period constraints under heterogeneous environment in WSNs. Simulation results show that new one performs better than LEACH, SEP and HEARP in terms of stability period and network lifetime. It is also found that longer stability period strongly depend on higher values of extra energy during its heterogeneous settings for better results.

Babaie et al. [2010] This paper uses a novel method to select a cluster Head. LEACH protocol has set threshold value to 0 for next 1/p rounds when a node has been selected as a cluster head. This technique optimized LEACH method, by adjusting threshold considering some factors. Proposed algorithm has settled the threshold of each node correspondingly to the number of live and dead nodes in each round, so the probability for more nodes has been established to become cluster head. Energy factor has been taken into consideration, during Cluster Head selection phase and no-cluster-head selecting node as its cluster head, while data transmitting procedure is the same as in LEACH. Probability of choosing the cluster-head has been increasing after rounds. Consideration of number of live and dead nodes in each round has been used to calculate the Threshold. It concluded that the proposed method can reduce the low energy level sensor nodes to be selected as cluster heads, and set up the energy Balance of network load. Moreover, Results have been achieved better network lifetime in WSN. Therefore, the method to modify the threshold might be an effective way to resolve the problem of network energy consumption.

Liu et al.[2010] This paper have explained a new methodology in which reduction of energy load among all the nodes has been presented as an improved algorithm LEACH-D based on LEACH. The combined ideas of adjusting the threshold function about the nodes, a fixed radius of the clustering and a multi-hop communication mechanism among the cluster heads to share system lifetime energy load among all the nodes has been discussed. An improvement has been done mainly on following aspects, Connectivity density in the value of threshold which has taken the density of distribution of

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node into account, so that it increases the probability of a node which have a high connectivity density to be a head node. Second, in the clustering stage, the cluster head node decides its cluster radius according to their distance from the base station and the degree of connectivity. With this method head node's energy consumption have reduced. Non-Cluster Head nodes have chosen to join a cluster according to the energy of head node and the distance to the cluster head node; in the communication phase, cluster head node uses a multi-hop steady-state transmitting data to the base station. Reduction in the entire network energy consumption has been observed, and found suited for the small wireless sensor network effectively.

Parul Saini et al.[2010] This paper analysis for achieving the energy efficiency, lifetime, deployment of nodes, fault tolerance, latency, in short high reliability and robustness have become the main research goals of wireless sensor network. They propose EDEEC for three types of nodes in prolonging the lifetime and stability of the network. Hence, it increases the heterogeneity and energy level of the network. EDEEC performs better than SEP with more stability and effective messages. The result shows that E-DEEC has better performance as compared to SEP in terms of parameters used. It extends the lifetime and stability of the network.

Ying Huang et al. [2010] In this study they considered cluster head that consumes more energy than other member nodes, because it gathers data from its member nodes, processes it (e.g. data fusion), and transfers data to the sink node or to the base station that maybe located remotely. Therefore, the cluster head should be elected periodically within the cluster to avoid the quick death of the head node and make all node loads distribute evenly. Based on the extensive analyzing of those algorithms such as LEACH, a cluster algorithm for electing cluster heads based on threshold energy is presented. The lifetime is suggested to be expressed as to both the maximum last node dying time and the minimum time difference between the last node dying and the first node dying. In order to obtain the effect, threshold energy was obtained and evaluated. The main purpose is to obtain the maximum network lifetime. When the optimal Dynamic threshold energy is adapted in the algorithm, the lifetime can be prolonged while the performance of network can maintain unabated. Results demonstrate that this algorithm which is more effective routing protocol prolongs the network lifetime when cluster heads are elected with the optimal threshold energy.

III. PROPOSED METHODOLOGY

Step 1: Initialize network

Step 2: Deploy network randomly in predefined sensor field.

Step 3: Apply GSTEB to evaluate levels.

Step 4: Apply clustering to develop cluster heads.

Step 5: Associate nodes with CHs.

Step 6: Evaluate and update energy consumption.

Step 7: Check whether all nodes become dead, if yes then show network life time and Return else continue to step 3.

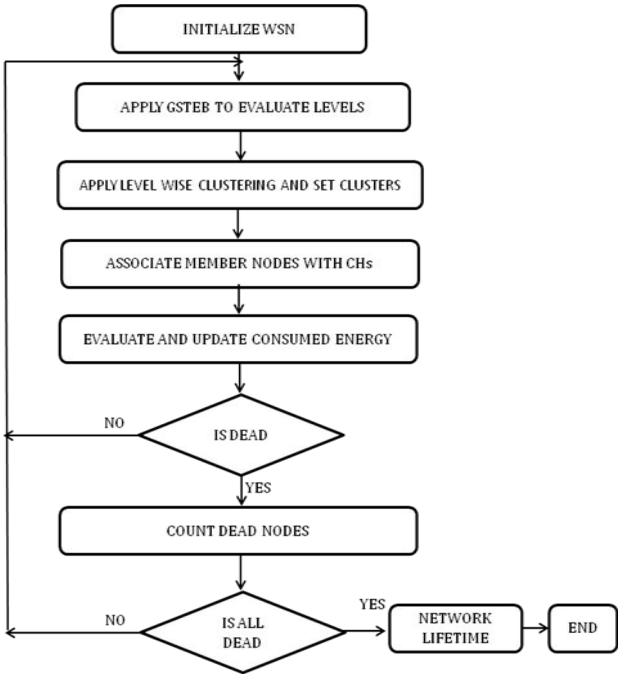

Fig 1: Proposed Methodology

IV. RESULTS AND DISCUSSIONS

As shown in the given figures below, we are comparing the result of parameters. As a result it shows that our proposed approach results are much better than existing approach.

EXPERIMENTAL SET-UP

In order to implement the proposed algorithm, design and implementation has been done. Table 1 has shown various constants and variables required to simulate this work. These parameters are standard values used as benchmark for WSNs.

Table 1: Experimental Setup

Parameter	Value
Area(x,y)	100,100
Base station(x,y)	50,150
Nodes(n)	100
Probability(p)	0.1
Initial Energy(Eo)	0.1
transmiter_energy	50nJ/bit
receiver_energy	50nJ/bit
Free space(amplifier)	10nj/bit/m2

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Multipath(amplifier)	0.0013pJ/bit/m4
Maximum lifetime	5000
Message size	4000 bits
Effective Data aggregation	5nJ/bit/signal

EXPERIMENT RESULTS

Experimental Results of GSTEB Protocol

On applying GSTEB protocol, following results will be achieved.

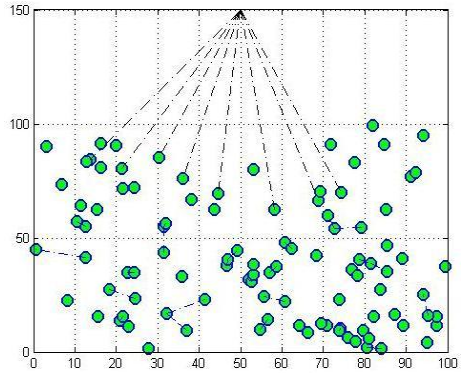

Fig 2: Initial Energy

Fig. 2 is showing the initial environment of the GSTEB protocol

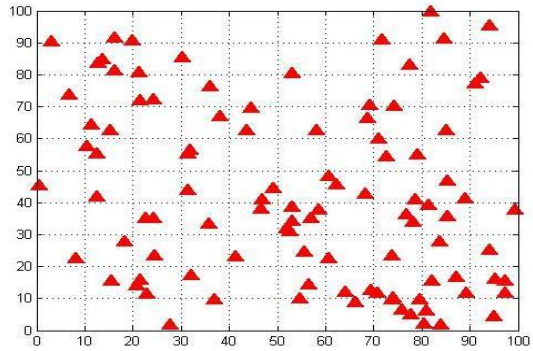

Fig 3: when some of the sensor nodes are dead

Fig 3 is showing the environment of GSTEB protocol in which some of the nodes are dead. Dead nodes are representing by red dot.

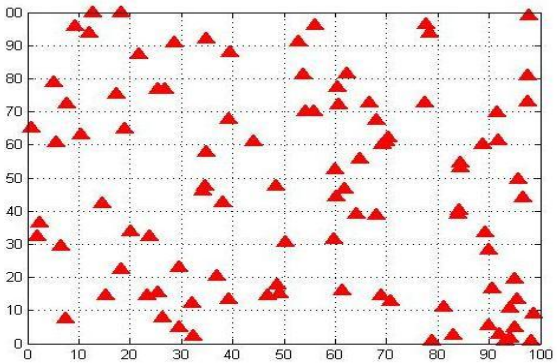

Fig 4: when all of the sensor nodes are dead

Fig 4 is showing the environment of GSTEB protocol in which all the nodes are dead.

Experimental Results of Proposed Technique

On applying Proposed Technique, following results will be achieved.

Fig.5 is showing the initial environment of the Proposed Technique.

Fig.6 is showing the environment of Proposed Technique in which some of the nodes are dead.

Fig.7 is showing the environment of Proposed Technique in which all the nodes are dead.

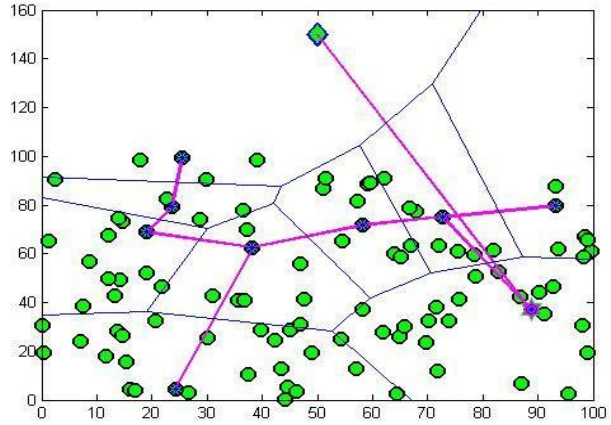

Fig 5: Initial Energy

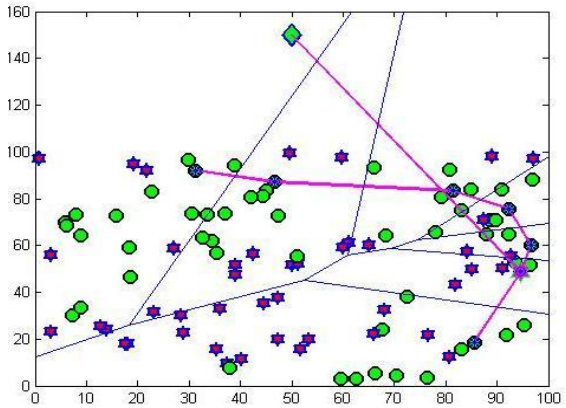

Fig 6: when some of the sensor nodes are dead

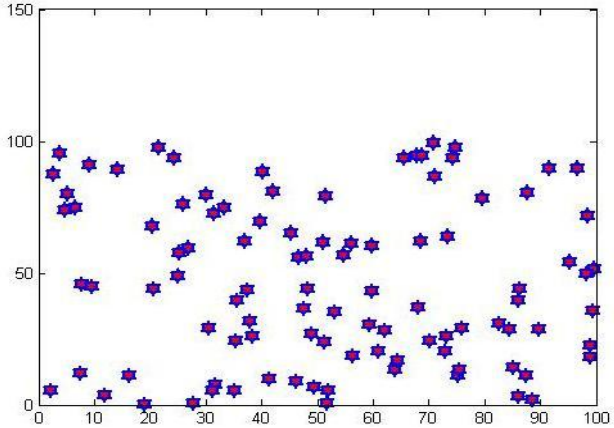

Fig 7: when all of the sensor nodes are dead

PERFORMANCE EVALUATION

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PERFORMANCE EVALUATION OF GSTEB PROTOCOL

a) Dead Nodes

Fig.8 is showing total number of dead nodes. X-axis is representing dead nodes. Y-axis is representing the number of rounds.

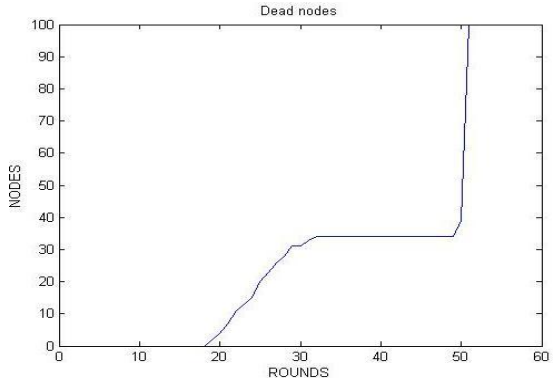

Fig 8: Total number of dead nodes

b) Remaining Energy

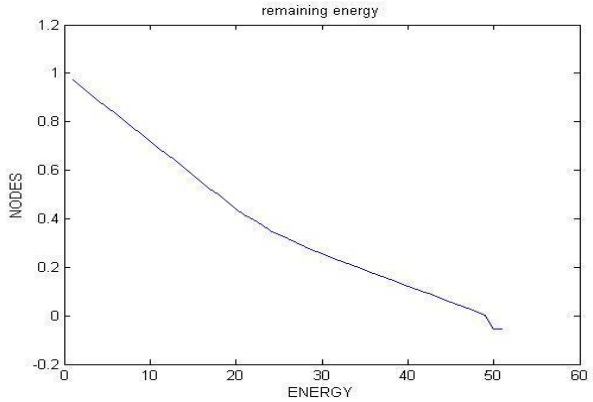

Fig 9: Remaining energy

Fig 9 is showing the remaining energy. X-axis is representing the energy in joules. Y-axis is representing the number of rounds.

PERFORMANCE EVALUATION OF PROPOSED PROTOCOL

a) Dead Nodes

Fig. 10 is showing total number of dead nodes. X-axis is representing dead nodes. Y-axis is representing the number of rounds. Fig. 11 is showing the remaining energy. X-axis is representing the energy in joules. Y-axis is representing the number of rounds.

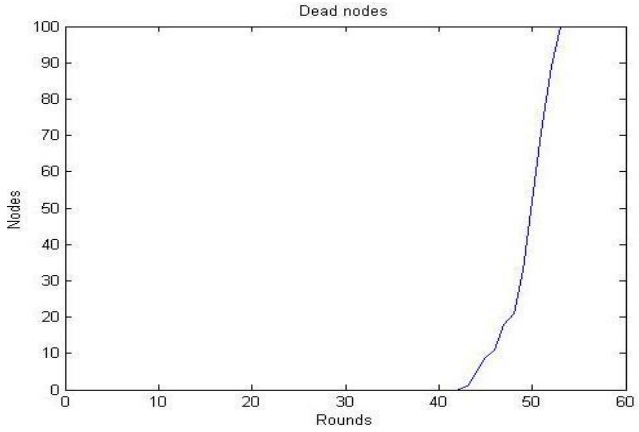

Fig 10: Total number of dead nodes

b) Remaining Energy

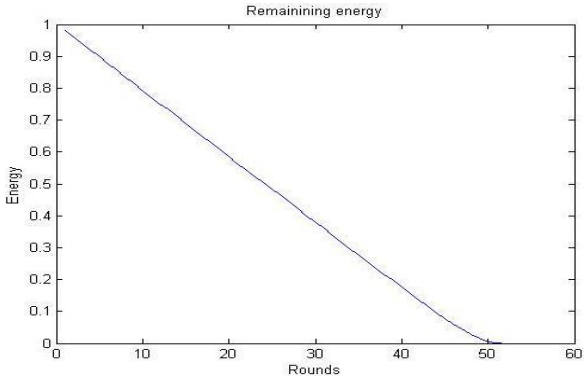

Fig 11: Remaining energy

COMPARISON TABLE

Table 2: Comparison analysis for First node dead

Initial Energy	Base Station Position	GSTEB first node dead results	Proposed Technique first node dead results
0.01	50,150	18	35
0.02	50,150	38	86
0.03	50,150	55	134
0.04	50,150	72	179
0.05	50,150	103	224
0.01	150,150	18	22
0.02	150,150	40	68
0.03	150,150	62	105
0.04	150,150	96	148
0.05	150,150	97	210

Table 3: Comparison analysis for Last node dead

Initial Energy	Base Station Position	GSTEB last node dead results	Proposed Technique last node dead results
0.01	50,150	50	53
0.02	50,150	100	103
0.03	50,150	150	159
0.04	50,150	200	202

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0.05	50,150	250	252
0.01	150,150	50	55
0.02	150,150	100	102
0.03	150,150	150	150
0.04	150,150	200	210
0.05	150,150	250	239

V. CONCLUSION AND FUTURE SCOPE

In this paper, from the survey it has been found that GSTEB has shown quite significant results over the available WSNs protocols. But it has neglected the use of the three things: The use of clustering has also been ignored in GSTEB routing protocol, so clustering is required to reduce the redundant data. GSTEB has only applied on the small networks; the effect of dense network has been ignored in the GSTEB protocol. Therefore, to overcome these issues, a novel technique has been proposed in this paper. The proposed technique has been designed and implemented in the MATLAB tool. Various metrics proves the efficiency of the proposed technique over GSTEB.

REFERENCES

[1] Ahmed Salim , Walid Osamy , Ahmed M. Khedr,`` IBLEACH: intra-balanced LEACH protocol for wireless sensor Networks", Wireless Networks, Springer Science + Business Media, Volume 20, no.6, pp 1515-1525, 2014.

[2] N. Amjad, M. M. Sandhu, S. H. Ahmed, M. J. Ashraf, A. A. Awan, U. Qasim, Z. A. Khan, M. A. Raza, N. Javaid, "DREEM-ME: Distributed Regional Energy Efficient Multi-hop Routing Protocol based on Maximum Energy with Mobile Sink in WSNs", Journal of Basic and Applied Scientific Research , vol. 4, no. 1, pp: 289-306, 2014.

[3] Ahlawat, A. and Malik, V. "An Extended Vice-Cluster Selection Approach To Improve V LEACH Protocol In WSN" Third IEEE International Conference on Advanced Computing & Communication Technologies, pp.236-240, 2013.

[4] Beiranvand, Z., Patooghy, A. and Fazeli M., "I-LEACH: An Efficient Routing Algorithm to Improve Performance & to Reduce Energy Consumption in Wireless Sensor Networks", 5th IEEE International Conference on Information and Knowledge Technology, pp. 13-18, 2013.

[5] G.Jayaseelan and S.K.Rajalaxmi," Hard network lifetime wireless sensor networks with high energy first clustering", International Journal of Engineering Science and Technology, vol. 5, no.03, 2013.

[6] Khalid Hussain, Abdul Hanan Abdullah, Khalid M. Awan, Faraz Ahsan and Akhtab Hussain," Cluster Head Election Schemes for WSN and MANET: A Survey", World Applied Sciences Journal, vol.23, no. 5, pp: 611-620, 2013.

[7] Chen, G., Zhang, X., Yu, J. and Wang, M. "An improved LEACH algorithm based on heterogeneous energy of nodes in wireless sensor networks", IEEE International Conference on Computing, Measurement, Control and Sensor Network, pp. 101-104, 2013.

[8] Yektaparast, A., Nabavi, F. H. and Sarmast, A. "An Improvement on LEACH Protocol (Cell-LEACH)", 14th IEEE International Conference on Advanced Communication Technology, pp. 992-996, 2012.

[9] Kashaf, A., Javaid, N., Khan, Z. and Khan, I, "TSEP: Threshold-Sensitive Stable Election Protocol for WSNs" 10th IEEE International Conference on Frontiers of Information Technology, pp.164-168, 2012.

[10] Meenakshi Sharma and Anil Kumar Shaw "Transmission Time and Throughput analysis of EEE LEACH, LEACH and Direct Transmission Protocol: A Simulation Based Approach", Advanced Computing: An International Journal, vol.3, no.5, 2012.

[11] Shuo Shi, Xinning Liu and Xuemai Gu "An Energy-Efficiency Optimized LEACH-C for Wireless Sensor Networks", 7th International ICST Conference on Communications and Networking, pp. 487-492, 2012.

[12] Singhal, S., Gankotiya, A., Kumar, A., Shikha, V. "An Investigation of Wireless Sensor Network: A Distributed Approach in Smart Environment" Second IEEE International Conference on Advanced Computing & Communication Technologies, pp.522-529, 2012.

[13] Bakr, B. A. and Leszek, L., "Extending Wireless Sensor Network Lifetime in the LEACH-SM Protocol by Spare Selection", 5th IEEE Conference on Innovative Mobile and Internet Services in Ubiquitous Computing, pp. 277-282, 2011.

[14] Peng, J., Chengdong, W., Yunzhou, Z. and Fei, C., "A Low-Energy Adaptive Clustering Routing Protocol of Wireless Sensor Networks", IEEE International Conference on Wireless Communications, Networking and Mobile Computing, pp. 1-4, 2011.

[15] Shilpa Mahajan, Dr. Jyoteesh Malhotra,"Energy Efficient Control Strategies in Heterogeneous Wireless Sensor Networks: A Survey ", International Journal of Computer Applications, vol.14, no.6, 2011.

[16] Md. Golam Rashed, M. Hasnat Kabir, Shaikh Enayet Ullah," Wep: An Energy Efficient Protocol For Cluster Based Heterogeneous Wireless Sensor Network," International Journal of Distributed and Parallel Systems, vol.2, no.2, 2011.

[17] Babaie, S., Agaalizadeh, S. and Golsorkhtabar, M. "The Novel Threshold Based Hierarchical Clustering Method for Wireless Sensor Network", IEEE International Conference on Electronics and Information Engineering, pp. 191 – 195, 2010.

[18] Liu, Y., Luo, Z., Xu, K. and Chen, L., "A Reliable Clustering Algorithm base on LEACH Protocol in Wireless Mobile Sensor Networks" International Conference on Mechanical and Electrical Technology, pp. 692-696, 2010.

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