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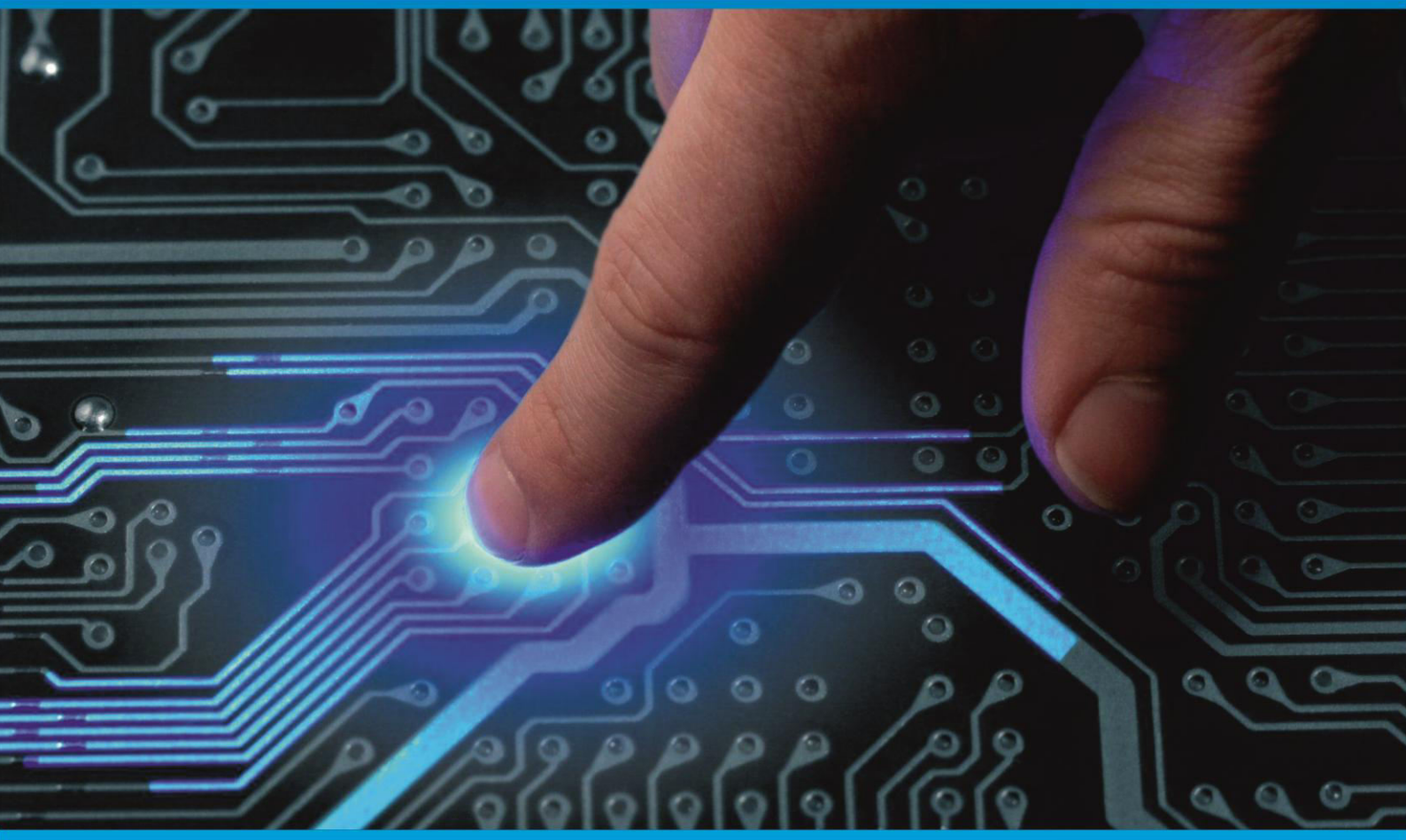

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Energy Efficient to Improve the Network Life Time for Single Approach Using LEACH Algorithm in WSN

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ABSTRACT: LEACH employs a randomization strategy to uniformly spread energy and load through each and every node in the sensor network. The sensor nodes in LEACH assemble into clusters known as local clusters. A cluster-head known as a central base station would be present in the local cluster. When the cluster head has made his or her decision, all other participant nodes or non-cluster-head nodes in the cluster may submit their data to the corresponding cluster-head. Due to battery drain, the sensor node chosen as a cluster-head in traditional clustering algorithms would die easily. As a result, network loss will occur both efficiently and rapidly. As a result, LEACH employs a unique approach for preserving the lifespan of cluster heads as well as the overall network. The LEACH algorithm employs randomized rotation of the high-energy cluster-head sorting technique. This algorithm would choose the cluster-head on a regular basis depending on the sensor nodes with the highest capacity.

KEYWORDS: Cluster Head, LEACH, Coverage, Network Life Time and WSN

I. INTRODUCTION

Wireless Sensor Networks are the primary source of big data. We use hundreds of thousands of sensor nodes in WSNs. Each sensor node monitors the atmosphere or a physical parameter and combines the information. Temperatures, pressure, humanity, and so on are some of the parameters. In Wireless Sensor Networks, the energy of sensor nodes plays a critical function. Security attacks and a loss of energy in sensor nodes are the most common causes of network failure. Sensor nodes have a finite lifespan. As a result, the WSN can make optimal use of the sensor nodes, as well as the power or resources, and the throughput. To minimise energy usage, a variety of algorithms and protocols have been suggested [1]-[5]. Any main algorithms are examined in this paper in order to gain a deeper understanding of energy-efficient algorithms in Wireless Sensor Networks for a limited period, the cluster-head would be a nearby base station. The cluster-head selection can then be repeated depending on the same energy parameter after a certain amount of time has passed. In addition, after gathering data from all other participant nodes, the LEACH can compress the data. It would then transmit it to the base station. This method would minimise energy demand while still extending the system's lifespan. In a Wireless Sensor Network, when a sensor node is elected as a cluster leader, the cluster head can transmit the status to all member nodes and non-cluster head nodes in the cluster [6]-[10].

Big data has been a popular subject in recent years. The method of collecting, sorting, and analyzing big data is extremely difficult. Big data sources are widely dispersed across the globe. Big data is created through p2p applications, real-time database retrieval, distributing contents, cloud storages, network contents, RFID, and sensors, and it is made up of audio, video, text, and image files. Big data is just "tiny data" that has been expanded. According to an IBM study from 2012, 90 percent of the world's data was generated in the previous two years. This will undoubtedly continue to rise. As a result, we both need Big Data, and is used to interpret, gather, and process data. Cloud computing, Web advertising (social media), cameras, and other sources of Big Data are the real sources. Industry, government, and academia are the primary sources of big data. Sensors are the most important contributors to big data. Wireless Sensor Networks, in particular, play an important function [11]-[15]. Wireless sensor networks are

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little more than a series of hundreds of thousands of tiny sensor nodes that detect physical and environmental conditions.

II. PROPOSED SYSTEM

A huge number of low-power sensor nodes make up the WSN. These nodes are dispersed and have minimal computing and sensing capabilities. It has fault resistance characteristics that are both flexible and low-cost. Wireless Sensor Networks are commonly used in environmental surveillance, industries, military, map, and vehicle technology, among other things, for these purposes. Temperature, pressure, civilization, and other parameters of sensor nodes are used in the above regions. The Low-Energy Adaptive Clustering Algorithm, or LEACH, is a self-organizing and adaptive clustering protocol, as the name suggests.

When a LEACH-based network is created or coordinated, the cluster head can create a schedule for their own cluster's corresponding nodes. As a result, each non-cluster-leader learns their time slot for sending data to the cluster head. The other radio components of the participant nodes would be switched off except for that time period. This main concept significantly lowers energy demand during idle period. The data from the cluster-participant head's nodes will be compressed and sent to the base station until the cluster-head has all of it. The cluster-head is sometimes far removed from the base station. It would be a transmission of a lot of capacity. As a result, the battery in the cluster head sensor nodes would soon be depleted. However, certain nodes may be impacted in this way, but as opposed to other traditional algorithms, it is more energy efficient.

As previously said, the LEACH protocol creates a cluster. The cluster head collects data from all nodes, compresses it, and sends it to the base station. In the LEACH algorithm, the energy usage is minimized using a randomized technique. However, there are several flaws in the LEACH algorithm. Remember this if the base station is located well removed from the cluster heads. Those cluster heads would need more resources to relay their data to the base station, causing the cluster head to die prematurely as a result of the heavy transmitting energy usage. This situation might result in network failure at any moment. While Leach is a more efficient algorithm, some nodes can die as a result of LEACH's illness. PEGASIS protocol (Power-Efficient Gathering in Sensor Information System) proves to be more effective in addressing LEACH problems. In PEGASIS, each node in the cluster establishes information transmission only to the node that is the nearest to it. As a result, the amount of resources used to relay data to the base station would be reduced. Fusion is essential in Wireless Sensor Networks because it reduces the amount of data transmitted between the sensor nodes and the base station. Data fusion is the process of combining one or more packets sensed from various sensor environments into a single packet.

The LEACH protocol is a solution for reducing energy usage in clustered data storage. Each cluster gathers and fuses information. Finally, one cluster head will report the outcome to the station. The randomized methodology would be used to create these features. Using the PEGASIS protocol, though, you can boost even further. In a Wireless Sensor Network, this enhancement is achieved if each node connects with its nearest node. The main concept behind PEGASIS is to build a chain with each sensor node, with each node transmitting and receiving data to the nearest neighbor nodes. Those data are always travelling from one node to the next. These nodes are often fused within each node before being forwarded to the base station. As a result, any node in the server network can expend energy to complete the task at some point. The challenge of forming a chain is close to that of the travelling salesman.

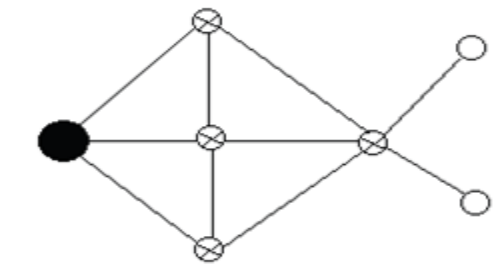

Figure.1. Simple Approach in Wireless Sensor Networks

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A greedy technique is used to execute the basic chain process. Figure 1 illustrates this method, in which each node communicates with its nearest neighbour nodes. It also demonstrates the token passing rule, which states that if a node is in the middle of two nodes, the node will wait for data from both neighboring nodes. It will compact the data and transfer it to the base station or the next closest node after receiving it from all nodes. If any node in the PEGASIS network is out of contact range with another, multi-hop propagation paths may be used. No node can be left out while gathering data; otherwise, the data for that node may be missing or skipped for sequence data. The LEACH protocol is strong enough to access the base station within a contact radius, but PEGASIS overcomes LEACH's weakness in that it cannot reach the cluster head if the base station is far away. Finally, the PEGASIS protocol outperforms the LEACH protocol in two respects.

The direct method can be applied to basic flooding-type routing protocols. It is an easy protocol to follow, but it is not energy effective. The positioning of location-based nodes is used to discuss them. The location of nodes is determined by their signal intensity or by GPS (Global Positioning System) receivers in the network. In this strategy, certain nodes should go into sleep mode if they are not in use in the current task, saving resources and extending the existence of the sensor network.

Instead of collecting data from all nodes in a WSN, the programme only requires data from the nodes that satisfy its needs, and this data collection strategy is known as the data centric method or attribute dependent routing. The strongest examples of attribute driven routing or data centric approach are direct diffusion and rumour routing. Data-centric or attribute-driven protocols are those that label the data and ask the nodes based on any of the data's attributes. Many researchers use this paradigm to avoid the overhead of creating clusters, using specialised nodes, and so on. However, for complicated queries, naming schemes such as attribute-value pairs might not be necessary, and they are typically application-dependent. One of the most intriguing future study directions in this category is efficient common naming schemes.

III. RESULTS AND DISCUSSION

Sensor network routing is a very appealing step of wireless networking. To address the downside of the LEACH protocol, which is the random selection of cluster heads CH, HEED was created, which selects the CHs based on both residual energy level and connectivity expense. In the worst case, it can randomly select only a single node as CH, which will deplete its energy and network lifetime. Emax can vary for various nodes depending on their functionality and capability since HEED supports heterogeneous sensor nodes. Each node shares its energy level and communication cost with the sink/base station through the Emax level, and CHs with high Emax and low communication cost are chosen. Each node interacts with its neighbours and transmits to the base station in exchange, saving energy per round. In this method, the chain is sustained either by greedy algos from the source node to the base station or by the base station broadcasting the chain to all nodes is shown in figure 2. Each node receives data from its immediate neighbour, fuses it into its own packet, and transfers it to the next node. At different times, this procedure conserves resources. First, as opposed to transmitting to a cluster-head in LEACH, most nodes transmit over far shorter distances in local gathering. Second, instead of receiving 20 calls, the leader would receive no more than two (20 nodes per cluster in LEACH for a 100-node network). Finally, in each round of contact, only one node transmits to the BS. However, since data is aggregated at each node, certain programmes do not relay the appropriate amount of detail to the base station.

It's a huge move forward in terms of energy-efficient routing. The surplus of energy/battery nodes, i.e. nodes with adequate energy, may be used to process data and send information, while the low energy nodes are mostly used for sensing, i.e. to prolong the network's life period. Scalability, communication bandwidth conservation within clusters, avoidance of redundant message transmission between sensor nodes, and effective communication are all advantages. For this function, the network is split into sub-units, with a cluster head allocated to each device (a node with sufficient energy). Any other node in the unit sends data to the cluster head after sensing, and the cluster head transmits to the sink/base station is shown in figure 3. LEACH, HEED, DECA, and other energy-efficient routing protocols focused on clustering are examples.

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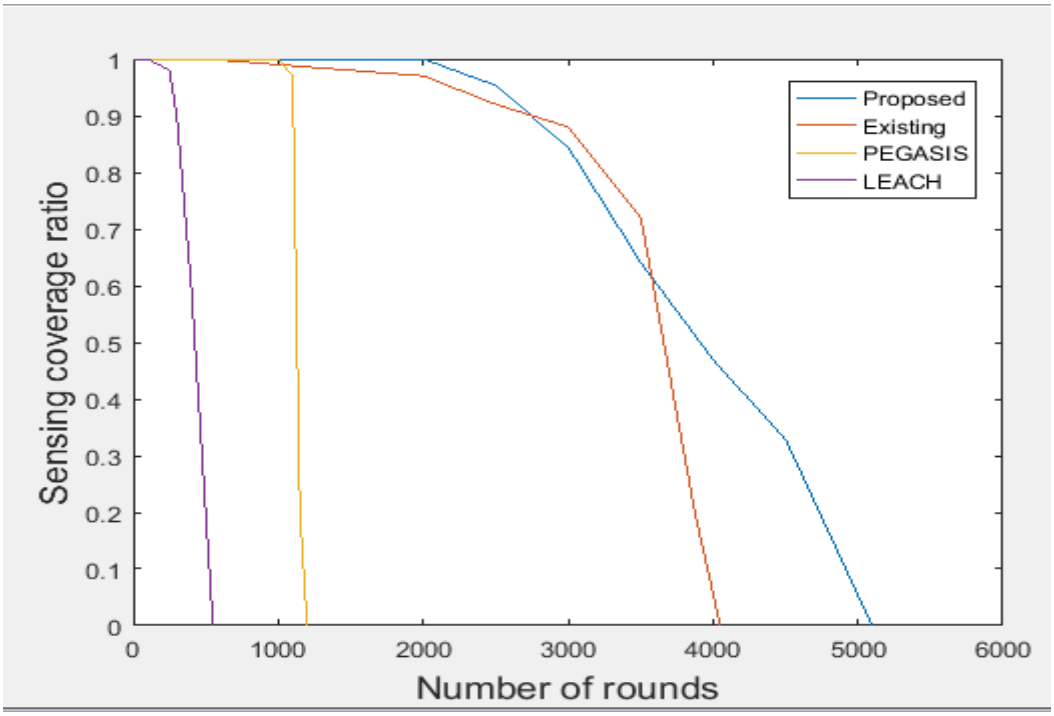

Figure.2. Number of Rounds Using Various Techniques

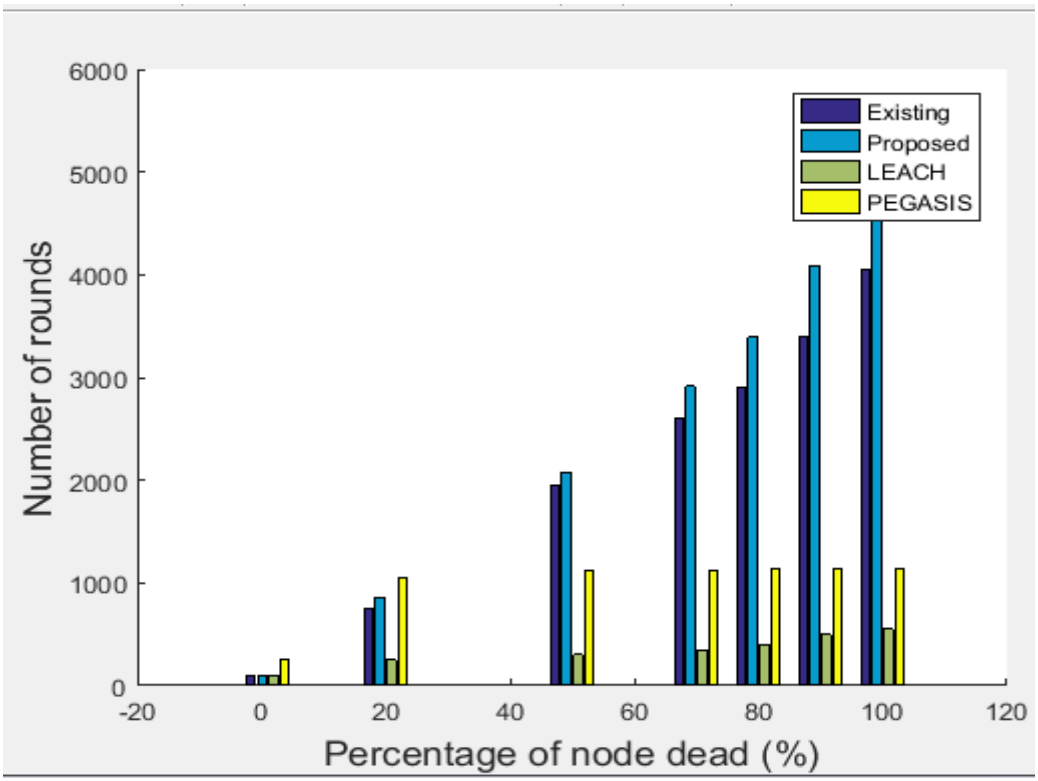

Figure.3. Dead Node Using Various Techniques

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IV. CONCLUSION

WSNs are built for harsh environments where humans are unable to collect knowledge, but they gather more and more data for the least amount of energy use possible, as energy is the central operating factor of WSNs. As a result, every day, more study is conducted in order to render WSN more energy effective. We have made an attempt in this direction to propose a novel optimization algorithm for growing energy performance in WSNs by combining hybrid LEACH and PEGASIS.

REFERENCES

1. G. Arumugam, T. Ponnuchamy, (2015), "EE-LEACH: development of energy-efficient LEACH Protocol for data gathering in WSN", EURASIP Journal on Wireless Communications and Networking 2015:76, DOI 10.1186/s13638-015-0306-5.
2. Hassan Oudani, Salahddine Krit, Lahoucine Elmaimouni and Jalal Laassiri, (2016, September)"Comparative Study and Simulation of Flat and Hierarchical Routing Protocols for Wireless Sensor Network", International Conference In Engineering & MIS (ICEMIS), IEEE, (pp. 1-9).
3. J. Jia, J. Chen, G. Chang, Y. Wen and J. Song, "Multi-objective optimization for coverage control in wireless sensor network with adjustable sensing radius", Elsevier, Computers and Mathematics with Applications, vol. 57, (2009), pp. 1767-1775.
4. T. Qiu, F. Xia, L. Feng, G. Wu and B. Jin, "Queueing theory based path delay analysis of wireless sensor networks", Advances in Electrical and Computer Engineering (AECE), vol. 11, no. 2, (2011).
5. X. Zhang, X. Ding, S. Lu and G. Chen, "Principles for Energy-Efficient Topology Control in Wireless Sensor Networks", WiCom '09. 5th International Conference on Wireless Communications, Networking and Mobile Computing, IEEE, (2009) September 24-26.
6. Murat Dener, "Security Analysis in Wireless Sensor Networks", Hindawi Publishing Corporation, International Journal of Distributed Sensor Networks, Vol.10, No.10, pp.303501, 2014
7. David Martins and Herve Guyennet, "Wireless Sensor Network Attacks and Security Mechanisms: A Short Survey", pp. 313-320, 2010
8. C. Dhivya Devi and B.Santhi, "Study on Security Protocols in Wireless Sensor Networks", International Journal of Engineering and Technology, Vol.5, No.5, pp.200-207, 2013
9. M. Revathi and Dr. B. Amutha, "A Survey on Security Protocols in Wireless Sensor Network", International Journal of Pure and Applied Mathematics, 2017
10. R. Sharma, Y. Chaba and Y. Singh, "Analysis of Security Protocols in Wireless Sensor Network", IJANA 2010
11. Cui, J., Wu, Zhang, J., Xu, Y., & Zhong, H. (2019). An Efficient Authentication Scheme Based on Semi-Trusted Authority in VANETs. IEEE Transaction on Vehicular Technology, 68(3), pp. 2972-2986.
12. S.Kannadhasan, G.Karthikeyan and V.Sethupathi, A Graph Theory Based Energy Efficient Clustering Techniques in Wireless Sensor Networks. Information and Communication Technologies Organized by Noorul Islam University (ICT 2013) Nagercoil on 11-12 April 2013, Published for Conference Proceedings by IEEE Explore Digital Library 978-1-4673-5758-6/13 @2013 IEEE.
13. Erskine, S. K., & Elleithy, K. M. (2019). Real Time Detection of DoS Attacks in IEEE 802.11 p Using Fog Commuting for a Secure Intelligent vehicular network, Electronics, 8(7), 776 MDPI.
14. Limbasiya, T., & Das, D. (2019). ESCBV: energy-efficient and secure communication using batch verification scheme for vehicle users, Wireless Networks, 25(7), pp. 4403-4414, https://doi.org/10.1007/s11276-019-02104-5
15. Hasrouny, H., Samhat, A. E., Bassil, C., & Laouiti, A. (2019, April). A Trusted Group-Based Revocation Process for Intelligent Transportation System., International Conference on Digital Economy, pp. 133-146. Springer, Cham.

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