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# An Optimized Algorithm for Cluster Head Selection in Wireless Sensor Networks with Efficient Routing Protocol

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**ABSTRACT:-** In Wireless Sensor Network, sensing element nodes life time is that the most crucial parameter. Development of economical routing algorithmic rule could be an important facet for reducing energy consumption and enhancing network period. Cluster could be a key technique accustomed enhance network period. the thought of cluster is to use the knowledge aggregation mechanism within the extremely fascinating Parameterized Cluster Head (CH) choice to cut back -the quantity of knowledge transmission, thereby, cut back the energy dissipation in communication. it's most significant to develop energy economical cluster head (CH) choice theme to extend the network period of WSNs. it's most vital to save lots of the energy of those sensing element nodes to avoid fast battery drain. Cluster could be a key technique accustomed enhance network period. This corresponding implementation model preserves the energy of all sensing element nodes through sustaining distance moreover as delay, and conjointly it will balance the IoT devices temperature and cargo to realize the choice of the optimum head of the cluster in WSN-IoT network.

**KEYWORDS:** Cluster head choice, cluster primarily based protocols, LEACH protocols, wireless sensing element networks.

## I.INTRODUCTION

A Wireless sensor network is outlined as a network of devices which will communicate the knowledge gathered from a monitored field through wireless links. The info is forwarded through multiple nodes, and with an entry, the info is connected to different networks like wireless LAN. WSN could be a wireless network that consists of base stations and numbers of nodes (wireless sensors). These networks square measure accustomed monitor physical or environmental conditions like sound, pressure, temperature and co-operatively pass information through the network to a main location.

## II. OBJECTIVE

The main objective of optimized algorithm for wireless sensor networks with efficient routing protocol is to extending the battery lifetime and reducing the power consumption. It Prevent the network to die out too early thereby enhancing the network lifetime.

## III.LITERATURE REVIEW

1. Rupti Mayee Behera; Umesh Chandra Samal; Sushanta Kumar Mohapatra, 2018 in their journal discussed on "Energy-efficient modified LEACH protocol for IoT application".

The LEACH algorithm and can be adopted in sensor networks used for IoT applications which require extra power to process huge data. The protocol also succeeds in enhancing network lifetime by reducing energy consumption in a distributed manner.

2. Ahmad Ali, Yu Ming, Tapas Si, Saima Iram and Sagnik Chakraborty, 2018 in their journal discussed on "Enhancement of RWSN Lifetime via Firework Clustering Algorithm Validated by ANN".



An energy efficient firework algorithm has proposed for the wireless charging vehicle. The charging scenario in this study is similar to multi-hop provisioning, and the dynamic charger is replaced by wireless charging vehicles (WCV) which consist of Ni-MH batteries.

3. Suresh Kallam, Rajasekhara Babu Madda, Chi-Yuan Chen, Rizwan Patan, Dhanraj Cheelu, 2017 in their journal discussed on “Low energy aware communication process in IoT using the green computing approach”.

The energy consumption of a smart node at processing energy is compared with receiving and computing, communicating or transmitting the energy is more. When data transmit the bits from the node to another device is comparatively more while transmitting

4. Xinlu Li, Brian Keegan, Fredrick Mtenzi, Thomas Weise, And Ming Tan, 2019 in their journal discussed on “Energy-Efficient Load Balancing Ant Based Routing Algorithm for Wireless Sensor Networks”.

An effective heuristic strategy based on the greedy expected energy cost, which further speeds up the initial route establishment. Finally, in order to reduce the impact of control overhead on the overall performance, an energy-based opportunistic broadcast scheme is adopted.

#### IV. EXISTING SYSTEM

1. Power Efficient Gathering in Sensor Information Systems (PEGASIS) protocol is one such hierarchical routing protocol which follows a chain based approach and a greedy algorithm.

2. Threshold –sensitive Energy Efficient Network (TEEN) protocol discussed and implemented and then graph is drawn with respect Number of dead nodes Vs. Number of rounds, where in every round, head nodes are getting change after some interval of time (Cluster Period).

3. Adaptive Threshold sensitive Energy Efficient Network Protocol (APTEEN) protocol is a single-cluster head-based protocol with nodes of the same initial energy.

4. Hybrid Energy Efficient Distributed clustering Protocol (HEED) is consider two parameters for deciding the cluster heads. The residual energy and node density has been designed for homogeneous

#### V. METHODOLOGY

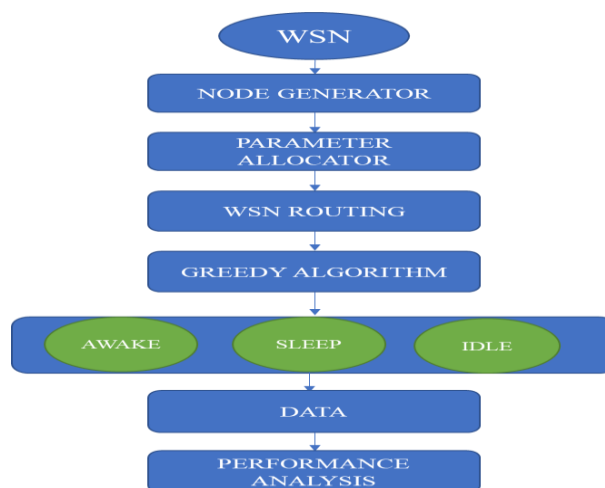


Figure 1: Flow diagram for WSN.

#### 1. WSN GUI

In this module we developed Graphical User Interface (GUI) for simulator which is dedicated for WSN, especially in routing and data link protocols evaluation.

#### 2. NODE GENERATOR

In this module, node generator establish node, generation is the design of representation of the network node characteristics and connectivity which are important basic research task to be accomplished in the development and/or analysis of networks and protocols.



### 3. PARAMETER ALLOCATOR

In this module, we develop the parameter allocator, VA allocates the parameters for each node. These are energy, load balancing, hop count, per hop round trip time (RTT), per-hop packet pair delay (PktPair), expected transmission count (ETX), modified ETX (mETX), effective number of transmission (ENT), expected transmission time (ETT), weighted cumulative expected transmission time (WCETT), and metric of interference and channel switching (MIC).

### 4.WSN ROUTING

This module implements the routing technique in WSN which takes into account the dynamic behavior of traffic demands. We formulate optimal path routing problem as Cluster-based problem. Energy metric is the foundation of a routing protocol.

### 5.LEACH PROTOCOL

In this module we propose the novel Energy-Efficient Load Balancing Greedy Algorithm (EBGA) for WSNs. EBGA adopts a pseudo-random route discovery algorithm and to achieve load balancing, GA schedules triggering of the clustering-task only at the required times, scheme to balance the energy consumption of the sensor nodes.

### 6.PACKET TRANSMISSION

This module enables the sensor node to transmit only the values that surpasses a predefined error threshold and the data packets. Once each sensor node receives this signal, it calculates its approximate distance to the Sink node according to the received signal strength.

### 7.PERFORMANCE ANALYSIS

Here in this block we use the following performance metrics to evaluate the results obtained from our simulations: The Energy Consumption is the sum of the consumed energy of all the sensor nodes in the network during the period of the experiment in Joules (J).

## VI.EXPERIMENTAL RESULTS.

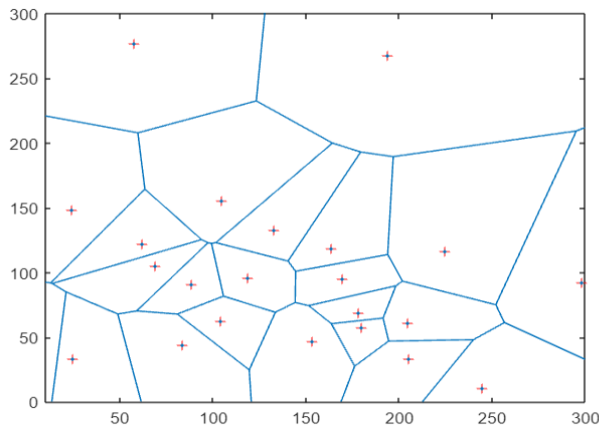


Figure 2: Cluster formation

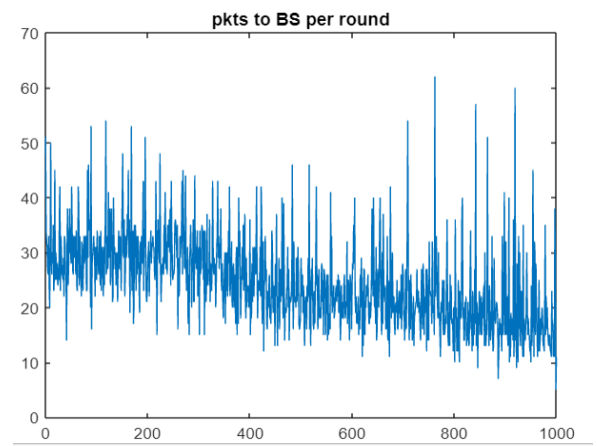


Figure 3:PKTS and Per round



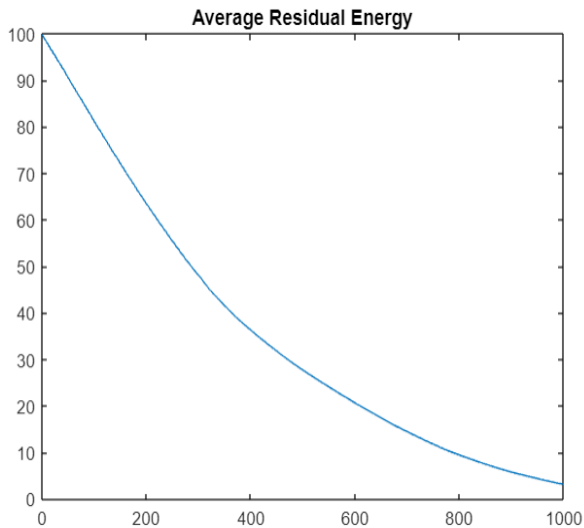


Figure 4: Average residual energy

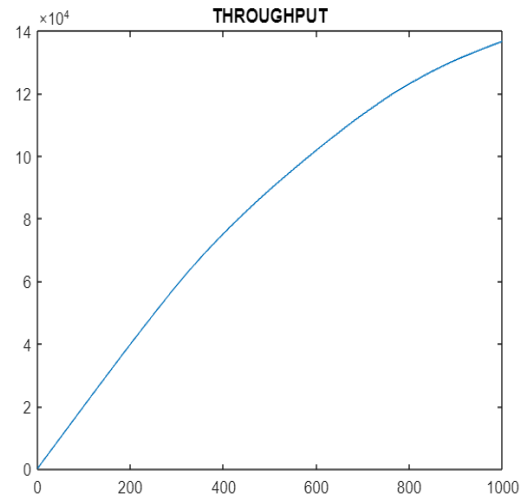


Figure 5: Throughput

## VII. CONCLUSION

Clustering is a good technique which will participate to entire system life, quantifiability, and energy potency in WSNs. Low energy accommodative clump hierarchy protocol could be a terribly effective protocol that enhances the network life time. A clustering-based protocol balances the energy usage by giving equal likelihood to all or any nodes to become a cluster head. This paper planned a replacement version of LEACH protocol known as Node Ranked-LEACH (NR-LEACH) that's increased to boost the overall network life supported node rank (NR) formula. Node rank formula depends on path price between nodes and range of links between nodes to elect cluster head. This improvement reflects the \$64000 weight of specific node to success and may be diagrammatical as cluster head. The planned formula overcomes the random method choice, which results in sudden failure for a few cluster heads in different LEACH versions, and it provides an honest performance within the network life and energy consumption. Our planned protocol will increase each sensing element life time, throughput, and also the delivery packet magnitude relation and reduces each the packet delay and also the sensors power consumption. The results show that our planned formula is a lot of economical than previous algorithms.

## REFERENCES

- [1] Trupti Mayee Behera; Umesh Chandra Samal; Sushanta Kumar Mohapatra. "Energy-efficient modified LEACH protocol for IoT application" Year: 2018
- [2] C. S. Abella, S. Bonina, A. Cucuccio, S. D'Angelo, G. Giustolisi, A. D. Grasso, A. Imbruglia, G. S. Mauro, G. A. M. Nastasi, G. Palumbo, S. Pennisi, G. Sorbello, A. Scuderi, "Autonomous energy-efficient wireless sensor network platform for home/office automation," *IEEE Sensors J.*, vol. 19, no. 9, pp. 3501\_3512, May 2019.
- [3] M. Faheem and V. C. Gungor, "Energy efficient and QoS-aware routing protocol for wireless sensor network-based smart grid applications in the context of industry 4.0," *Appl. Soft Compute.*, vol. 68, pp. 910\_922, Jul. 2018.
- [4] X. Cui, X. Huang, Y. Ma, and Q. Meng, "A load balancing routing mechanism based on SDWSN in smart city," *Electronics*, vol. 8, no. 3, p. 273, 2019.
- [5] S. R. Barkunan and V. Bhanumathi, "an efficient deployment of sensor nodes in wireless sensor networks for agricultural \_eld," *J. Inf. Sci. Eng.*, vol. 34, no. 4, pp. 903\_918, 2018.
- [6] M. Al-Shalabi, M. Anbar, T. C. Wan, and A. Khasawneh, "Variants of the low-energy adaptive clustering hierarchy protocol: Survey, issues and challenges," *Electronics*, vol. 7, no. 8, p. 136, 2018.
- [7] R. E. Mohamed, A. I. Saleh, M. Abdelrazzak, and A. S. Samra, "Survey on wireless sensor network applications and energy efficient routing protocols," *Wireless Pers. Commun.*, vol. 101, no. 2, pp. 1019\_1055, 2018.
- [8] S. Dutt, S. Agrawal, and R. Vig, "Cluster-head restricted energy efficient protocol (CREEP) for routing in heterogeneous wireless sensor networks," *Wireless Pers. Commun.*, vol. 100, no. 4, pp. 1477\_1497, 2018.
- [9] M. J. Handy, M. Haase, and D. Timmermann, "Low energy adaptive clustering hierarchy with deterministic cluster-head selection," in *Proc. 4th Int. Workshop Mobile Wireless Commun. Netw.* Sep. 2002, pp. 368\_372.



[10] R. Thapa, H. Singh, A. Sharma, ``A comparative analysis of LEACH and SEP using NS2," in Proc. 8th Int. Conf. Comput., Commun. Netw. Technol. (ICCCNT), Delhi, India, Jul. 2017, pp. 1\_4.

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