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# IN WSN AND IOT, A DETAILED ANALYSIS OF CURRENT ROUTING, CLUSTERING TRENDS, AND OVERLOOKED QOS ASPECTS IS PRESENTED.

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**Abstract**
WSNs are currently serving as the IoT devices' skeleton. due to the small sensors and tiny batteries used in the Internet of Things. As a result, research into energy conservation and the life of N/w is ongoing. These are unquestionably crucial components, but there are a great number of other related QOS characteristics that could also have an impact on how well WSN algorithms designed for IoT devices work. All of these elements, including load, communication requirements for a single CH, fault tolerance, and consistent sensor placement, can be taken into mind when building an effective set of parameters to enhance the efficiency of IoT routing and clustering algorithms.
Keywords: Clustering, Routing, clustering, IoT , QOS factors etc

## Introduction

In plain English, any average person is aware of the WSN truth that it is practically impossible to change the batteries in such small sensors after deployment. As a result, WSN researchers are continually discussing the importance of energy saving and effective utilisation. As the foundation for IoT devices, the WSN industry has now been interwoven in daily social life. The only reason IOT devices exist is because of smart sensors, which provide them sensing capabilities. Following a thorough review of the current WSN, it has been determined that three factors must be targeted in order to create an effective and efficient energy-aware network: node distribution, cluster head selection optimization, and advancements in routing methods. –

## Related work

The main areas of concentration in the current WSN and IoT research race include enhancing clustering and routing by concentrating on two main quality factors: energy and N/w lifespan. This viewpoint analysis has been divided into two major groups depending on the targeted areas as a result of continuing with it. The following are a few instances:

**Table 1: Analysis of latest WSN techniques for IOT**

| Sr. No | Author Name/ | | | |
|---|---|---|---|---|
| Source | Implementation | Targeted Area | Proposed Algorithm | |
| 1. | V. Pal, et al., (2012)/Scientific Research | This study proposes Smart CH Selection (SCHS), a simple and effective selection technique for CHs. This might be used with any clustering system that is distributed. | Cluster Head Selection | SCHS |
| 2. | T. Kaur and D. Kumar, (2018)/ IEEE Sensors | This study proposes Smart CH Selection (SCHS), a simple and effective selection technique for CHs. This might be used with any clustering system that is distributed. | Cluster Head Selection | Particle swarm optimization (PSO) and UFC |

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|---|---|---|---|---|
| 3. | Behera, et al. (2019)/IEEE Journal | Developed a method for selecting cluster heads that involved rotating the cluster head location between nodes with greater energy levels than others. | Cluster Head Selection | R-Leach |
| 4. | Murugaanandam and Ganapathy (2019)/ IEEE Access | The author proposed a strategy dubbed the 'Reliability Enhanced Preference Ordering Technique (RE-TOPSIS)' that combines fuzzy logic with a Multi-Criteria Decision-Making (MCDM) approach to pick CHs effectively and reliably. | Cluster Head Selection | 'Reliability Enhanced Preference Ordering Technique (RE-TOPSIS) |
| 5. | Hamidouche, et al. (2019)/ /IEEE Journal | The most recent heterogeneous network approach WOA and GWO are two algorithms that have been merged with the ICA. | Cluster Head Selection | GWO/WOA |
| 6. | Battar and Kumar (2019)/ IEEE Conference | The PSO and firefly algorithms were offered as a way to maximise energy. This hybrid method may be able to preserve network strength, extending network life. | Cluster Head Selection | PSO/FireFly |
| 7. | S. Anthony Jesudurai and A.Senthilkumar, (2019)/Elesiver | Cluster Selection that is More Energy Efficient The Head Selection Mechanism (IEECHS-WSN) was developed as a way to transfer data using a low-energy routing protocol. This approach is defined as the clustering of dual CHs and is employed in the data fusion system for data entropy. | Cluster Head Selection | IEECHS |
| 8. | Nageswara Rao Malisetti and Vinay Kumar-Pamula (2020)/ Elesiver | A protocol for CH selection based on the quasi-opposition algorithm of butterfly optimization (QOBOA) was proposed, and it was compared to the original butterfly optimization as well as other contemporary methods in terms of network lifespan and energy efficiency. | Cluster Head Selection | QOBOA |
| 9. | Pawan Singh Mehra, et al.(2020)/ Elesiver | With an FBECS, the distance from the sink and the density of the node adjacent were recommended. By considering each sensor node, the system ensured load balance by selecting the best candidate to act as cluster coordinator. | Cluster Head Selection | Fuzzy Balanced Cost Selection Algorithm (FBECS) |
| 10. | Richa Sharma, et al. (2020)/ Springer | The eeTMFO / GA clustering technique was introduced in this paper as a safe and energy-conscious clustering approach. Five essential factors comprising direct fiduciary measures were used to assess this method. | | |
| | Cluster Head Selection | Energy efficient, trusted moth flame optimization and genetic algorithm (eeTMFO / GA). | | |

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| 11. | Baradaran and Navi, (2020)/ Elesiver | The author of this paper presented a method for producing high-quality clusters termed the HQCA. The cluster quality was assessed using the HQCA technique. | Clustering algorithms | High-Quality Clustering Algorithm (HQCA) |
| 12. | M. T. Nguyen, et al. (2014)/IEEE Conference | Inter cluster multi-hop routing, or ICCS, was presented as an alternative to clustering in WSNs utilizing CS to reduce energy consumption even further. A greedy method is used to establish a routing tree between the CHs and the base station. | Routing In Clustered Networks | |
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| | ICCS | | | |
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| 13. | Milica D. Jovanovic, et al. (2016)/ Elesiver | A simple intra-cluster MAC protocol known as STAR – TONE was suggested, which contained the proposed BM– BCD and provided an analytical model to quantify important protocol parameters. | Routing In Clustered Networks | Bitmap – Binary Countdown (BM-BCD) |
| 14. | A. W. Ali, et al., (2016)/ International conference | In this study, the GCSTR approach was introduced as a way to extend the lifespan of the WSN. | Routing In Clustered Networks | Grid-Based Clustering with Spanning Tree Routing (GCSTR) |
| 15. | Mukherjee, et al., (2017)/IEEE Access | The proposed approach displays the protocol for intra-cluster communication in the SEP-Vector Quantization mutual communications network (SEP-V). | Routing In Clustered Networks | |
| | SEP-V | | | |
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| 16. | S. K. Singh, et al. (2017)/IEEE Conference | To address communication issues with hot spots and intra-cluster, the author proposed an intra-cluster multi-hop approach in uneven clusters. The BS separates the network into three different types of fixed grids. | Routing In Clustered Networks | EUCA/EEUC |
| | | | | |
| 17. | Mukherjee, et al. (2019)/IEEE Access | To address the challenge of resource allocation in these sorts of networks, an ADAI methodology with a hierarchical resource allocation approach was devised. The APSO for intra-cluster resource allocation was also described by the author. | Routing In Clustered Networks | Adaptive Particle Swarm Optimization (APSO) |

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| 18. | Sixu, et al. (2020)/IEEE Conference | The fluffy-based multi-hop standard cluster routing was suggested in this work. During the cluster head elections, relative inter-cluster costs and relative intra-cluster costs were presented in a novel way. | Routing In Clustered Networks | NA |
| 19. | Kalaivanan Karunanithy and Bhanumathi Velusamy (2020)/ Elesiver | A CTEEDG protocol was developed to improve the life and performance of WSNs. Based on the information gathered locally, the CTEEDG employed fuzzy logic to choose the CH. | Routing In Clustered Networks | Cluster-Tree Energy Efficient Data Recovery (CTEEDG) |
| 20. | Khalid A. Darabkh, et al. (2020)/ Elesiver | To address the difficulty posed by IoT networks when incorporating energy-constrained devices, the author developed a novel protocol called Existence-Times optimizing based on Analytical Hierarchical Method and Genetic Clustering (LiM-AHP-G-C). | Routing In Clustered Networks | LiM-AHP-G-C |

**Conclusion**

Researchers working in this subject now have more options thanks to the fusion of the IoT and WSN fields. The whole research shows that if we need more intelligent IoT devices, we also need more intelligent and energy-efficient sensors, as well as more effective N/W and routing algorithms. However, the data shows that while creating new algorithms, only energy, CH selection, and network longevity are taken into account. The study uncovers numerous factors that could be exploited in QOS to enhance the overall effectiveness of algorithms. Many issues that are much more important for IoT and WSN are still not getting enough attention. The domains of N/W security, data delivery rate, load balancing, delay due to traffic, and repeated information filtering concerns are all taken into consideration during the algorithm design in WSN for IOT. These background features can considerably boost the network's overall performance , therefore we now need to control research by taking them into account. Following are the three significant aspects of WSN that need to be consider with the above mentioned neglected QOS factors:

Node Distribution: The area covered under the sensing range is directly impacted by node distribution. It has been determined that there is a significant potential for communication gaps to be created when nodes are distributed randomly in the target field. The locations that are not covered by any sensor's sensing range are known as communication holes. Therefore, in order to maximize useful life, a smart node installation technique is always required.

Optimization Technique there are certain nodes in the sensing field that have more residual energy than the other nodes that are present in the field. The CH (Cluster Head) position is contested by these nodes with larger residual energies. In order to achieve the best throughput, it is crucial to choose the ideal node as a CH. The optimization technique must be developed carefully in order to provide the best solution for CH selection.

Routing Technique: A network needs effective routing strategies for the efficient data transfer rate to deliver the best communication in the network at a lower cost of energy after node deployment and the optimal CH selection. It can further increase the network's performance and life.

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