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Distributed Clustering Approach for Ad-Hoc Networks using EAR Protocol

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Abstract— : The Cluster creation in MANET has paying attention in recent times and clustering as defined in Mobile ad hoc network partitioning of mobile nodes into different groups, and each group contains ordinary node, cluster head and getaway .The basic need to create cluster is to save the energy consumption, simplicity of routing, extending capability and to improve the network efficiency .In MANET the energy consumption of each node is key element, when the energy of node is drained, the node become fails to sense the data or forward the data, if the cluster head energy drained then not only fails cluster head it will leads entire cluster is collapse ,So after we can reconstruct new cluster with remaining nodes, called as Re-clustering, but Re-clustering needs high energy consumption, but nodes have limited resource constraints, In order to overcome clustering problems we need design new energy clustering protocol, in this work we are proposing Intra-balanced LEACH (IBLEACH) protocol to achieve life span of WSN.

Keywords: ***MANET, cluster, Intra-balanced, LEACH.***

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I. INTRODUCTION

Wireless sensor networks usually are designed for harsh environment applications where human intervention is not possible such as forest fire, wild life monitoring, tunnels, bridges, coal mines etc. to name a few. Such data gathering applications require sensors to be deployed in large numbers and the data to be sensed from all locations. However, these sensor nodes are energy limited. In many applications the base station (BS) is usually placed far away from the sensing field and the data is gathered periodically by the BS. In order to address the energy constraint, large amount of research work has been carried out in the last decade. For such continuous monitoring networks, clustering with hierarchical topology is successful. It is exhibited that clustering the network offers greater lifespan with an increase of about 2-3 times than the network with direct data transmission. There are many other advantages of using clustering protocols in data-gathering networks. As dense networks involve large volume of traffic among the sensors, it leads to interference problems. In such scenarios, grouping the sensors is extremely beneficial. Further, it minimizes the number of long distance transmissions and results into saving of the energy. In clustering, cluster heads (CHs) coordinate the activities of its member nodes and the normal sensor nodes (cluster members) remain in sleep mode, which further leads to energy saving . This is possible because CHs execute TDMA scheduling for its member nodes. Also clustering facilitates data aggregation at cluster head. Thereby the number of data transmissions further minimizes, and the network lifetime prolongs. The data transmission in clustering protocols occurs in two steps, one is within the clusters i.e. intra-cluster and another is between the clusters and the BS i.e. inter-cluster. In addition, the communication in a wireless sensor network clustering protocol can be taken up either by employing direct transmission through single hop, or using multi-hop routing. For data transmissions within the cluster i.e. from member nodes to CH, most of the clustering protocols use single hop communication, as the transmission distance is relatively short e.g. LEACH , LEACH-DT , HEED etc. Multi-hop communication between the sensor nodes and the cluster head is promoted when the propagation loss exponent is high as in buildings, factories, or dense vegetation regions. Direct transmission also has its benefits in saving of energy as the radio dissipates energy in not only transmission but also in reception. But it is used only when the transmission distance is within certain threshold distance only. This is, because the energy expense increases according to the fourth power of the distance. There are number of clustering protocols developed which propose multi-hop communication for achieving more energy-efficient inter-cluster communication viz. Multi-hop LEACH , EARP-DC,EDUC.The energy consumption among all the network nodes must be balanced. In clustered networks, therefore, there is inevitable problem of energy imbalance among sensor nodes.

II. RELATED WORKS

In comparator circuits to reduce power consumption the Power gating technique is proposed. In this technique, circuit operates in sleep mode by switching off the current in circuit. Power gating has is presented. The proposed

comparator is designed by using power gating technique. Using this technique power and delay is reduced.

III. BACKGROUND OF STUDY

In wireless sensor networks, one of the primary concerns is maximization of network lifetime because after the network becomes dysfunctional, significant amount of energy should not remain in the nodes, otherwise it is wasted. In a clustering protocol, a Cluster heads (CH) is heavily burdened as it is responsible for execution of various tasks such as cluster formation, data aggregation, and data transmission and relaying. Cluster heads therefore consume more energy as compared to non-CH nodes. For single hop communication, cluster heads which are far away from BS drain out their energy primarily because of the long distance transmission.

IV. METHODOLOGY

In this section, the uniform clustering technique is used in this work. The relay node selection procedure for forwarding the data towards the BS is based directly in terms of energy estimate. Here I proposed to use intra-balanced LEACH (IBLEACH) protocol which extends LEACH protocol by balancing the energy consumption in the network .IBLEACH protocol performs some noticeable operations i.e. very high cluster stability, energy efficiency is very high and delivery delay is very small over ad hoc sensor network.. Another technique is used in this work i. e Load balancing technique; it 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. An energy-aware algorithm K medoid is presented for the optimum selection of cluster heads and sensor groups that are used for monitoring and sending messages from nodes in point coverage, using the energy comparison between the nodes. This algorithm used is useful in reducing the energy consumption of the network and increase its life-time. The clustering method used is similar in operation to EADC protocol. After deployment, the nodes first compute its distance from BS (base station). The signal broadcasted by BS is listened by all nodes. On the basis of the received signal strength, each node approximates its distance to BS. The performance of the protocol is tested in terms of number of rounds it can deliver the sensed data to the BS. Each round comprises of set-up phase in which cluster is formed and extended in order to improve the lifespan of WSN. The uniform clustering technique is used in this work. Steady state phases in which data transmission takes place.

V. CONCLUSION

As a conclusion of this research work will focus on Designing Energy-aware Routing Protocol with Distributed Clustering [EARP-DC] approach for ad hoc sensor network which has been extended in order to improve the lifespan of WSN. The uniform clustering technique is used in this work. The relay node selection procedure for forwarding the data to the base station directly in terms of energy estimate and network lifespan is extended effectively when compared to the EADC protocol. These enhancement indications the efficiency of the proposed EARP-DC in terms of balancing the energy and distributing the clusters in both uniform and non-uniform scenarios.

REFERENCES

[1]. P. Nirmala, T. Manimegalai, J. R. Arunkumar, S. Vimala, G. Vinoth Rajkumar, Raja Raju, "A Mechanism for Detecting the Intruder in the Network through a Stacking Dilated CNN Model", Wireless Communications and Mobile Computing, vol. 2022, Article ID 1955009, 13 pages, 2022. https://doi.org/10.1155/2022/1955009.

[2]. D. Sathyanarayanan, T. S. Reddy, A. Sathish, P. Geetha, J. R. Arunkumar and S. P. K. Deepak, "American Sign Language Recognition System for Numerical and Alphabets," 2023 International Conference on Research Methodologies in Knowledge Management, Artificial Intelligence and Telecommunication Engineering (RMKMATE), Chennai, India, 2023, pp. 1-6, doi: 10.1109/RMKMATE59243.2023.10369455.

[3]. J. R. Arunkumar, Tagele berihun Mengist, 2020" Developing Ethiopian Yirgacheffe Coffee Grading Model using a Deep Learning Classifier" International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-9 Issue-4, February 2020. DOI: 10.35940/ijitee.D1823.029420.

[4]. Ashwini, S., Arunkumar, J.R., Prabu, R.T. et al. Diagnosis and multi-classification of lung diseases in CXR images using optimized deep convolutional neural network. Soft Comput (2023). https://doi.org/10.1007/s00500-023-09480-3

[5]. J.R.Arunkumar, Dr.E.Muthukumar," A Novel Method to Improve AODV Protocol for WSN" in Journal of Engineering Sciences" ISSN NO: 0377-9254Volume 3, Issue 1, Jul 2012.

[6]. R. K, A. Shameem, P. Biswas, B. T. Geetha, J. R. Arunkumar and P. K. Lakineni, "Supply Chain Management Using Blockchain: Opportunities, Challenges, and Future Directions," 2023 Second International Conference on Informatics (ICI), Noida, India, 2023, pp. 1-6, doi: 10.1109/ICI60088.2023.10421633.

[7]. Arunkumar, J. R. "Study Analysis of Cloud Security Chanllenges and Issues in Cloud Computing Technologies." Journal of Science, Computing and Engineering Research 6.8 (2023): 06-10.

[8]. J. R. Arunkumar, R. Raman, S. Sivakumar and R. Pavithra, "Wearable Devices for Patient Monitoring System using IoT," 2023 8th International Conference on Communication and Electronics Systems (ICCES), Coimbatore, India, 2023, pp. 381-385, doi: 10.1109/ICCES57224.2023.10192741.

[9]. S. Sugumaran, C. Geetha, S. S, P. C. Bharath Kumar, T. D. Subha and J. R. Arunkumar, "Energy Efficient Routing Algorithm with Mobile Sink Assistance in Wireless Sensor Networks," 2023 International Conference on Advances in Computing, Communication and Applied Informatics

(ACCAI), Chennai, India, 2023, pp. 1-7, doi: 10.1109/ACCAI58221.2023.10201142.

[10]. R. S. Vignesh, V. Chinnammal, Gururaj.D, A. K. Kumar, K. V. Karthikeyan and J. R. Arunkumar, "Secured Data Access and Control Abilities Management over Cloud Environment using Novel Cryptographic Principles," 2023 International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI), Chennai, India, 2023, pp. 1-8, doi: 10.1109/ACCAI58221.2023.10199616.

[11]. Syamala, M., Anusuya, R., Sonkar, S.K. et al. Big data analytics for dynamic network slicing in 5G and beyond with dynamic user preferences. Opt Quant Electron 56, 61 (2024). https://doi.org/10.1007/s11082-023-05663-2

[12]. Krishna Veni, S. R., and R. Anusuya. "Design and Study Analysis Automated Recognition system of Fake Currency Notes." Journal of Science, Computing and Engineering Research 6.6 (2023): 16-20.

[13]. V. RamKumar, S. Shanthi, K. S. Kumar, S. Kanageswari, S. Mahalakshmi and R. Anusuya, "Internet of Things Assisted Remote Health and Safety Monitoring Scheme Using Intelligent Sensors," 2023 International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI), Chennai, India, 2023, pp. 1-8, doi: 10.1109/ACCAI58221.2023.10199766.

[14]. R. S. Vignesh, R. Sankar, A. Balaji, K. S. Kumar, V. Sharmila Bhargavi and R. Anusuya, "IoT Assisted Drunk and Drive People Identification to Avoid Accidents and Ensure Road Safety Measures," 2023 International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI), Chennai, India, 2023, pp. 1-7, doi: 10.1109/ACCAI58221.2023.10200809.

[15]. I. Chandra, G. Sowmiya, G. Charulatha, S. D, S. Gomathi and R. Anusuya, "An efficient Intelligent Systems for Low-Power Consumption Zigbee-Based Wearable Device for Voice Data Transmission," 2023 International Conference on Artificial Intelligence and Knowledge Discovery in Concurrent Engineering (ICECONF), Chennai, India, 2023, pp. 1-7, doi: 10.1109/ICECONF57129.2023.10083856.

[16]. G. Karthikeyan, D. T. G, R. Anusuya, K. K. G, J. T and R. T. Prabu, "Real-Time Sidewalk Crack Identification and Classification based on Convolutional Neural Network using Thermal Images," 2022 International Conference on Automation, Computing and Renewable Systems (ICACRS), Pudukkottai, India, 2022, pp. 1266-1274, doi: 10.1109/ICACRS55517.2022.10029202.

[17]. R. Meena, T. Kavitha, A. K. S, D. M. Mathew, R. Anusuya and G. Karthik, "Extracting Behavioral Characteristics of College Students Using Data Mining on Big Data," 2023 International Conference on Artificial Intelligence and Knowledge Discovery in Concurrent Engineering (ICECONF), Chennai, India, 2023, pp. 1-7, doi: 10.1109/ICECONF57129.2023.10084276.

[18]. S. Bharathi, A. Balaji, D. Irene. J, C. Kalaivanan and R. Anusuya, "An Efficient Liver Disease Prediction based on Deep Convolutional Neural Network using Biopsy Images," 2022 3rd International Conference on Smart Electronics and Communication (ICOSEC), Trichy, India, 2022, pp. 1141-1147, doi: 10.1109/ICOSEC54921.2022.9951870.

[19]. I. Chandra, G. Sowmiya, G. Charulatha, S. D, S. Gomathi and R. Anusuya, "An efficient Intelligent Systems for Low-Power Consumption Zigbee-Based Wearable Device for Voice Data Transmission," 2023 International Conference on Artificial Intelligence and Knowledge Discovery in Concurrent Engineering (ICECONF), Chennai, India, 2023, pp. 1-7, doi: 10.1109/ICECONF57129.2023.10083856.

[20]. Revathi, S., et al. "Developing an Infant Monitoring System using IoT (INMOS)." International Scientific Journal of Contemporary Research in Engineering Science and Management 6.1 (2021): 111-115.