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Litrature Reivew on Energy Optimization Approaches in Wireless Sensor Network Systems

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***Abstract*— The main problem in day to day life remains that sensor nodes are deployed in remote areas. Due to the deployment of sensor nodes in remote areas, it is powered by a battery which reduces the lifetime of the sensor nodes. The major factors affecting the lifetime of sensor nodes are continuous monitoring, periodic control messages and frequency of events. Wireless Sensor Networks (WSNs) are prone to highly constrained resources, as a result ensuring the proper functioning of the network is a requirement. Therefore, an effective WSN management system has to be integrated for the network efficiency This paper discusses a literature review of energy efficiency used in existing papers to extend the lifetime of wireless sensor networks.**

Keywords—Wireless Sensor Networks, Energy, Clustering

I. INTRODUCTION

The internet play an important role in most of the devices. In the modern world, most of the devices are connected to the internet. A tiny device or sensor which is connected to the internet is called an IoT device. IoT devices like sensor are connected to the base station through the internet and send the data frequently. IoT devices mainly consist of a microcontroller, power source, and a memory unit. However, nowadays the availability of low cost/power and high-performance transceivers, microcontroller for the modern wireless technologies and to the operational capability of wide area Wireless Sensor Networks (WSNs) is higher. The environmental physical parameters can be effectively collected and monitored. Thus, a mechanism is needed to sense the data and send the data to sink or gateway. The physical setup of sending the data from the sensor to sink or gateway through the internet already exists. But in most of the cases, the sensors used in IoT Devices are battery powered because of deployment of sensors in remote areas like plantation area, smart agriculture field, smart buildings, smart inventory system, smart city waste management system, noise detection and management for smart city, smart surveying device for resource optimization and street quality identification, where the sensors are used to sense the temperature, humidity, wind speed, quality check, level check, quantity check, and noise detection. Since wireless sensors are battery powered, it requires frequent maintenance to change the battery. If frequent maintenance for battery change is not performed on the wireless sensor, it will fail to send the data to the control station or server.

Nowadays, the wireless sensor networks are rapidly increasing because of the deployment of sensors in a remote area with a large quantity in number and also to communicate with microcontroller frequently. In order to communicate from sensor to microcontroller frequently, the wireless sensor network is used..The sensor nodes offer a most powerful combination of distributed sensing, processing and communication. The capabilities of these sensor nodes are increasing day by day which includes sensing, processing, and communicating the data that enables the realization of Wireless Sensor Networks based on the overall effort of a number of other sensor nodes. The sensor nodes are usually deployed in a sensor field where each one of them has the capability to collect and send the data back to the sink or gateway and the end-users by a multi-hop functionality which involves less architecture through the sink. The sensor nodes use their processing capabilities in order to carry out the simplest process and transmit only the partial or fully processed data. Internet or any type of wireless sensor network like Wi-Fi, mesh networks, cellular systems, etc., is used to send the data from the sensor node to SINK and from the SINK node to a user indirectly by using a third-party software. But in many cases, the sink can be directly connected to users or consumers.

So, in order to maximize or improve the lifetime of the sensor, this paper provides a literature review of the existing works.

II. LITERATURE SURVEY

Energy constraints are a challenging feature for WSNs. Normally, sensor nodes Consume energy when sensing, processing, transmitting or receiving data. This may happen Defined as useful power consumption. As shown in [1] more than 50% of the energy is Dedicated to the radio part. Growing demand for computing and memory, maintenance Connectivity, meeting design constraints, low power consumption, low cost and real-time Constraints on WSNs applications leading to development of innovative approaches For efficient hardware architecture. A significant challenge is to design applications with High computing capacity with limited resources. To enable end-to-end performance, Processing complexity is raised at the end

nodes, leading to excessive power consumption Which hinders their large-scale deployment.

In [2] the authors describe a cooperative optimization technique that applies DVS and Dynamic Modulation Scaling to reduce power consumption. this technique The processor uses a prediction mechanism to estimate the load and radio communications Device based on log data for a good collaboration. However, it does not depend on Variability of CPU load parameters that induce temporary irregularities a wrong result. Therefore, this solution proved to be ineffective to confirm Specific performance criteria for WSNs.

The EA-DVFS [3] algorithm delays performance when sufficient energy is not available. If not then the system runs at a high speed. However, the energy value can be calculated is done on per job basis. until the remaining running time of the system exceeds the maximum speed Relative to the time limit of the work, the system takes in enough energy. If the system has one About 1% of the energy it will operate at maximum speed, dissipating energy more quickly. When voltage is selected and tasks are set, EA-DVFS The algorithm considers instead of just one task in the queue of ready jobs All. As a result, sluggish times or periods of inactivity are not fully utilized to conserve energy. It should be noted that our contribution includes all those works that are ready to choose a executed and based on multiple pairs of voltage/frequency and not only max and the lowest price.

Geeta et al. [4] The proposed clustering technique - due to the constraints of the network and the nature of radio communication - makes it very difficult to imagine that each sensor node may be able to directly access a gateway or sync node. To solve the above issue, Hop by Hop communication technology is included in WSN. In the hop by hop mode of communication technologies as shown in Figure, this increases the overhead on routing table management across all sensor nodes around the gateway and quickly brings down the lifetime of nodes that are connected to the gateway. are nearby because they will be frequently used as relay nodes.

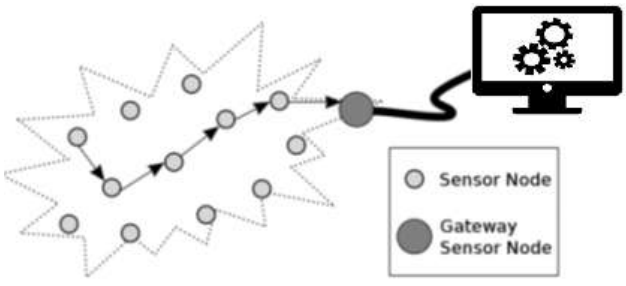

Figure 2 – Hop Mode of communication in WSN

This makes the network almost unstable. Several routing protocols have been discussed and proposed to overcome the above issues. Of these existing algorithms, clustering algorithms have been of great interest because they will concurrently balance several key factors of WSN operations. This can also be discussed as choosing an arbitrary node to act as a servicing node for multiple sensor nodes compared to each one trying to reach the gateway node, thereby increasing the lifetime of the network and simultaneously Energy use may decrease.

Radio adaptation mechanisms - as proposed by Rault et al. [5] In the WSN, the radio module in the sensor node is the main component that drains the sensor node's battery very quickly. In order to reduce energy consumption, existing researchers have proposed new optimized parameters such as coding and modulation schemes and antenna direction which have been taken into account. Several data reduction techniques are discussed in the existing work.

In that some of the major methods are Transmission power control technique and Energy efficient cognitive radio technique

Energy aware scheduling techniques – as discussed by Bidoki et al [6], send sensor data via WSN to the central node collector. The problem with this task is to find the path of the sensed data so that the value of the message information passed to the sink is at a high level while keeping the power consumption as low as possible. Sleep scheduling technology is widely used in the MAC layer to reduce unnecessary communication between the central node and the sensor node. Also, when this is done regardless of network layer routing, it affects the sensitive data value of the information. Therefore a linear programming has been developed to establish the pattern of cross-layer formulation to capture the interplay between scheduling and routing. In addition, a bi-objective model with the value of information maximization and power consumption minimization has been developed in WSN. Also, give more realistic information that it works efficiently for different types of signal interference that can affect wireless transmission.

Energy Efficient Routing Mechanisms – As discussed by Singh, Kumar et, al. [7], routing is another issue that can greatly reduce the lifetime of WSNs. By using this routing mechanism, the energy efficiency can be further enhanced as compared to the charging solution mechanism. So, to increase the energy, energy efficient routing algorithm is developed. Existing work uses a number of energy efficient routing techniques that can increase energy efficiency in WSNs. In that some of the major methods are –

- Multi-hop clustering method
- Stable election protocol enhancement
- Energy aware neighbor-oriented clustering
- Grid based energy efficient routing algorithm
- Zigbee transceiver protocol technique

Lakshmanan, Annamalai et. Al [8] proposed a cluster head election mechanism with an additional mechanism using the same method as presented in this research. This paper only mainly focuses on communication overhead and energy efficiency. Thus, the proposed EES algorithm lacks

the prevention of DDoS attacks that would enable intruders to easily perform DDoS attacks. Thus, it is essential to build a system with DDoS attacks prevention. Artificial intelligence and optimization technology can be used to determine the best way to achieve better results.

Low-energy adaptive clustering was proposed by L.K. Suresh Kumar et al. [9] It is a distributed clustering algorithm. Any node can choose itself as the cluster head, without being dependent on other nodes. The cluster heads are randomly selected by the nodes themselves, based on the average range of the battery level. It is not certain that cluster heads will be created with a fixed number of heads each time nor with even distribution of cluster heads in the network. It consists of a setup step in which cluster heads are randomly selected, such that each node becomes a cluster node at least once in an overall process. The network, start-up energy dissipation and life of the data signal received at the base station will be shorter compared to low-energy adaptive clustering (centralised). But the total energy dissipation will be much higher compared to low energy adaptive clustering (centralised).

Dvinodha [10] Network data aggregation is a process of aggregation/grouping of multiple response data from different IoT devices, which are combined into a single payload and sent to the server/gateway in a single packet/message in a single transmission. This will be useful in remote areas where WSNs are constructed to connect the sensors to increase the lifetime. Grouping multiple response data from different IoT devices or sensors into a central node that can store the data and send it in a single payload in the form of JavaScript Object Notation (JSON) format or any other format called gateway or server data can be accepted and processed.

III. Conclusion

A review of the literature on existing papers on energy efficient scheduling algorithms for wireless sensor networks, with a full description of how it works and its functional properties such as performance, energy efficiency and accuracy. Nowadays wireless sensor network is developing rapidly and it is fully powered by battery power which can last for a particular period of time. In most cases, the sensor node is powered by a battery and due to frequent transmissions, wake ups and sleeps quickly deplete battery life. The lack of this energy issue causes the system to go down. Therefore, due to this energy issue, the system cannot operate when needed. Enhanced Energy Efficiency Scheduling Algorithms for Wireless Sensor Networks have higher performance, energy efficiency and accuracy.

References

[1] Abdelmalik, B.; Dohler, M.;Watteyne, T.; Leung, K.K. MAC essentials for wireless sensor networks. IEEE Commun. Surv. Tutor. 2010, 12, 222– 248.

[2] Hamachiyo, T.; Yokota, Y.; Okubo, E. A Cooperative Power-Saving Technique Using DVS and DMS Based on Load Prediction in Sensor Networks. In Proceedings of the 4th International Conference on Sensor Technologies and Applications (SENSORCOMM), Venice, Italy, 18– 25 July 2010; pp. 7– 12.

[3] Liu, S.; Qiu, Q.; Wu, Q. Energy aware dynamic voltage and frequency selection for real-time systems with energy harvesting. In Proceedings of the Design, Automation and Test in Europe, Munich, Germany, 10– 14 March 2008; pp. 236– 241.

[4] Geetha, V., Kallapur, P., & Tellajeera, S. Clustering in Wireless Sensor Networks: Performance Comparison of LEACH & LEACH-C Protocols Using NS2. *Procedia Technology*, *4*, 163– 170 2012.

[5] Guntupalli, L., Martinez-Bauset, J., Li, F. Y., & Weitnauer, M. A. Aggregated packet transmission in duty-cycled WSNs: Modeling and performance evaluation. *IEEE Transactions on Vehicular Technology*, *66*(1), 563– 579. doi: 10.1109/TVT .2016.2536686,2017.

[6] Bidoki, N. H., Baghdadabad, M. B., Sukthankar, G., & Turgut, D. Joint value of information and energy aware sleep scheduling in wireless sensor networks: A linear programming approach. IEEE International Conference on Communications, 2018-May, 1– 6. doi: 10.1109/ICC.2018.8422392

[7] Singh, S. K., Kumar, P., Singh, J. P., & Alryalat, M. A. A. An energy efficient routing using multi-hop intra clustering technique in WSNs. IEEE Region 10 Annual International Conference, 2017 December 381– 386. doi: 10.1109/TENCON.2017.8227894.

[8] Lakshmanan, Annamalai & Karuppayah, Shankar. Enhanced Energy Efficient Scheduling Algorithm for Wireless Sensor Networks. https://www.researchgate.net/publication/333809291_Enhanced_Energy_Efficient_Scheduling_Algorithm_for_Wireless_Sensor_Networks DOI: 10.13140/ RG.2.2.18968.44808. 2019

[9] L.K. Suresh Kumar, Afreen, Harika Gumudavally, S. K. S. (2017). Comparative Study of LEACH and EECDA Protocols. (IEEE International Conference on Power, Control, Signals and Instrumentation Engineering (ICPCSI-2017)), 1024– 1029.

[10] DVinodha. " A Survey on Privacy Preserving Data Aggregation In Wireless Sensor Networks" Tech. Rep. 2017.