BIOGENETIC ALGORITHM FOR WIRELESS SENSOR NETWORKS: A REVIEW

Pooja Deswal [1], Dr. Neetu Sharma [2]
M.Tech (CSE) [1], Head of Dept. (CSE) [2]
Ganga institute of Technology and Management, Kablana, Haryana [1, 2]

Abstract: Wireless sensor networks (WSN) have become an important part of the many application environments used by military and civilian personnel. The sensor network consists of a large number of sensor nodes that are deployed intensively in or near this phenomenon. One of the most important functions in wireless sensor networks is a limited sensor node battery. When the battery-powered wireless sensor node is placed in a particular location, it is difficult to replace the battery or provide additional power. In addition, if the sensor node consumes its full capacity, it can separate a portion of the network. The algorithm includes communication between groups when using an evolutionary algorithm. This study begins by setting up the connection area node and calculating the range of all nodes in the WSN node setup area. When we apply RSSI (signal strength signal received) to form a block. RSSI facilitates the creation of location and positioning technologies in wireless sensor networks (WSN), and it becomes important to find mathematical models that accurately describe the relationship between RSSI values and distances. This technology is more specifically defined to activate network nodes that are not concentrated in previous technologies, and provide sets in each node to reduce power constraints. In addition, it must be set to modify the parameters based on the changes in the environment, even reducing errors.

Key Words: Biogenetic Algorithm, WSN, Clustering, Clique, Fitness Function

I. INTRODUCTION

The Wireless Sensor Network (WSN) is the basis for a wide range of applications related to national security, surveillance, military, healthcare and environmental monitoring. An important class of WSNs is a dedicated wireless sensor network characterized by random or random deployment where the location of the sensor is not known in advance. This feature is required when a single sensor mode is not available, such as a battlefield or disaster area. Typically, more sensors than required (compared to the best location) are deployed to perform the proposed task; this compensates for the lack of accurate positioning and improved fault tolerance. Sensor network features include limited resources, large networks, density and dynamic topologies. An important issue in sensor networks is the scarcity of energy, in part due to battery size and weight limitations. Mechanisms that improve sensor energy usage have a significant impact on network lifetime. Energy-saving technologies can generally be divided into two categories: sensor contract scheduling that switches between active and sleep modes, and transmission or sensor range in wireless nodes. In this article, we deal with two methods. We designed a scheduling mechanism in which some sensors are only active and all other sensors are in sleep mode. Furthermore, for each sensor in the group, the goal is to obtain the smallest range of sensors while meeting the application requirements. One of the main design considerations for cluster-based wireless sensor networks is the election of cluster leaders and the formation of quality. A cluster size with a large number of nodes causes members to have a small number of clusters in the network, improving the efficiency of communication between the clusters. On the other hand, the size of the cluster with a small number of contract members leads to an increase in the number of blocks in the backbone network between the groups that need to be used with a large number of quality and phrase headers (the component group connects the two clusters) [1]. Energy efficiency in a clustering protocol can be considered in two different ways: the number of problem groups or the number of members in a group (cluster size). In the context of a cluster-based topology, the size of a block is related to the number of neighbors connected to the cluster head, which is defined as the degree of the node and can be referred to as the number of nodes per block. Most existing methods use an acceptance or rejection strategy during cluster formation to control the quality, which can be based on the strongest receptor signal strength [2]. The proposed method is to control the number of members in each group by transmission power control algorithm [3]. This article discusses the basic issues of quality and minimum power consumption while maintaining network connectivity. The connection can be determined by the number of neighbors of the node (degree node) [4]. The Node class is a local property that can be verified by each node to implement global network properties, such as connection [5]. Communication is an important feature of wireless sensor networks that allows data to be redirected or exchanged between nodes in the network. If there is a path between any pair of nodes, the node can communicate between them to direct each other's data packets. The connection depends on the number of nodes per unit area and the transmission range. Properly setting the scope of contract delivery is an important consideration in the network age [6]. By adding node transfer capacity, more nodes can be accessed through direct links. Increasing the transmission range can improve communication, but on the other hand it can lead to greater interference, more data collisions and higher power consumption [7]. Reducing may reduce the transmission capacity of some nodes without establishing any connections with other nodes. The conductivity is studied by the degree of the [4, 8, 9] node. Node degrees are also one of the important and appropriate indicators for measuring wireless LAN connectivity [10, 11]. It has been shown that the average node degree of a random mesh is almost completely connected to the node and is randomly found using a uniform distribution between 6 and 10 [8].

1.1 INTRODUCTION TO LEACH & CBCR FOR WSN

The core idea of the LEACH protocol is to fully divide wireless sensor networks into several groups. The cluster header node is randomly selected, and the chance to select each node as a block head is equal, and the average power consumption for the entire network is calculated. LEACH can therefore lengthen the network lifecycle. LEACH algorithm is cyclical, they provide a

round concept. The LEACH protocol works with many tours. Each round contains two states: the cluster setup state and the static state. If the cluster is set up, it forms a block in self-adjusting mode. In a stable state, the data is transferred. The second case time is typically longer than the first case time to save the protocol load.

The choice of the cluster leader depends on the decision taken 0 and 1. If the number is less than the threshold, the node becomes the head of the current round. By using this threshold, each node will be a cluster header at some point during 1 / p rounds. The nodes that have been heads of mass block heads cannot become the second time 1 / p-1 rounds. After that, each node has a 1 / p probability to become a block head in each round. At the end of each round, each normal node is determined not to head the cluster closer to the cluster head and bind that block to the data transfer. The headers of the blocks combine the data and compress it and transmit it to the base station, thus extending the duration of the main contract. In this algorithm, power consumption will be allocated almost uniformly between all nodes and non-vertical nodes will be shut down as much as possible. LEACH assumes that all nodes fall within the wireless transmission band of the base station and this is not the case in many diffusion sensors. 5% of the total contract play as cluster heads in each round. TDMA is deployed to improve administration and scheduling. LEACH is one of the most common clustering algorithms used in WSNs to increase network life. The LACH system is an adaptable protocol, self-organization and assembly. It provides the concept of Rounds. LEACH BS is assumed to be static and far from sensors. Each sensor contract is homogenous and has a limited power source. Sensors can sense the environment at a constant rate and can communicate with each other. Sensors can communicate directly with BS. LEACH is the organization of nodes in clusters for the distribution of energy between sensor nodes in the network. In each cluster there is an elected node called the CH head. Due to the weak sensor capacity, the life of the network is a major concern. Thus, energy-efficient routing mechanisms and adaptive assembly schemes have been developed to extend the life of the network.

1.2 CLIQUE TECHNIQUE INWSN

Group-based algorithms use repetitions in interconnected node groups to optimize measurements. This greatly improves the accuracy of positioning compared to non-clustered algorithms. Another contribution was the development of a point-to-point positioning algorithm. The algorithm uses angle and distance measurements to deliver a three-dimensional reference system in a peer-to-peer mode between two nodes without any pre-calibration and without gravity. In this section, the technique gives a technical background that can be used as an angle measurement method and differs in the way Arabization of DV exchanges. This also defines the limitations of the Arabization method that is important for this work, and these methods are not mentioned in the introduction.

A. Spatial measurements

The DV mode depends on the distance and angle measurement between the sensors (nodes). The methods for obtaining these quantities in the peer-to-peer mode can be arrival time (ToA) and access angle (AoA). In this work, the technique assumes that the antenna matrix is used to obtain these quantities, but this technique is based on the assumption that we give angle values and distances and some errors without analyzing the performance of a given measurement technique.

B. Localization techniques

This positioning method effectively overcomes the problem of unknown propagation modes in the tunnel. The neural network is used to identify sensor response fingerprints located at a given location in the tunnel. However, a similar approach cannot be used for the self-regulating, minimal system of systems in this study. This is because the method is intended to position the motion sensor in a known environment. In contrast, the operating environment considered in this work is unknown in advance.

II. RELETED WORK

The WSN consists of small sensors with applications and constraints tailored to specific purposes. Applications are divided into military, commercial and medical applications. Military applications include communications, command and intelligence defense networks. For people with disabilities in remote areas, the elderly, doctors, communication networks and medical staff's intelligent environmental systems, and patient monitoring systems, some medical applications for health care. In addition, there is a wide range of commercial applications including safety systems and fire protection systems and environmental pollution control (chemical pollution, microbial and nuclear), vehicle, system monitoring and control tracking, control systems, transportation systems, and natural disaster research (Such as earthquakes and floods) [1]. A wide range of applications led to the development of various protocols including many flexible parameters. In any case, due to the wide range of uses, some parameters can be found in many applications (as a general parameter). Wireless sensor networks use portable power supplies and rechargeable batteries. Due to technical limitations, these batteries can save energy in a short period of time. Therefore, it is very important to use energy optimally in such networks [2]. Due to continuous and continuous communication support between sensors, the need for data integration in WNS networks makes age an important parameter in wireless sensor networks. This study reviews some of the parameters identified during each phase of the wireless sensor network. Typically, the operational phases of a classic WSN network are divided into node location, network coverage, aggregation, and data aggregation. In [2], the concept of distributed control algorithms is introduced into energy conservation. This paper introduces a distributed topology algorithm. Calculate the optimal transmit power for the active network connection. It reduces the transmission capacity of the node to cover the nearest neighbor. The node uses only locally available information to determine the node. Much of the work on fault tolerant topology algorithms has been done to reduce overall power consumption. Provides a k-vertex connection between two addresses. McLaren Cardei et al. [7] a new structure that achieves minimal energy consumption through the use of circular K, central greedy, distributed and local algorithms. It provides a reliable infrastructure for data collection from sensors to super nodes. Andrew Ka Ho Leung and Yu Kwang Kok [15] proposed an application-based topology control protocol. This solution is designed for wireless P2P file sharing networks. Their plan is based on improving the life cycle and effectiveness of peer-to-peer file sharing. The

authors attempted to achieve effective communication between mobile devices to provide

better service for file sharing. The protocol they configure consists of two components to create an Adjancy (ASC) 2 group (CAW). Waltenegu Dargie et al. (2010) proposed a topology control protocol [1]. Advanced protocols enable nodes to exhaust energy to some extent. This paper proposes an algorithm based on contract qualification and validity. In this paper, the author proposes the shortest path and energy-saving topology control algorithm [4]. The algorithm attempts to maintain the shortest path connecting itself to nearby nodes and lower energy paths. By reviewing [1, 6] the ignorant cost of the authors with energy and spectrum efficiency goals, the cognitive network topology is controlled to complete the research work. If the radio has global knowledge, they propose distributed algorithms that reduce the maximum transmission capacity and network spectrum signals. They have shown that although local knowledge has little impact on the maximum transmission capacity used by the network, it has a significant impact on spectrum performance. They provide a way to achieve end-to-end goals through learning and thinking. They provide better knowledge of spectrum performance for dynamic networks where radios join the network. Some ignorance in the network leads to better performance when the radio leaves the network. Damien, Wohwe et.al (2019) in this paper, they now have comprehensive reviews of the proposed optimization solution. In order to evaluate them, they looked at 10 parameters. Based on these parameters, we recommend that you compare these enhanced assembly methods. From the analysis, we found that the centralized clustering solution based on the intelligence model swarm is more suitable for applications with low power consumption, high data transfer rate or high scalability of algorithms based on other presentation models. In addition, solutions based on appropriate logic are appropriate when the application does not require a large number of nodes in the field. **[16]** Khan I. et.al (2016.) present an article is a WSN virtualization questionnaire. Provide a comprehensive review of the latest technologies and an in-depth discussion of research issues. We introduced the WSN Virtual Essentials and inspired its importance through carefully selected solutions. The current work is detailed and carefully evaluated using a set of requirements derived from the program. Related research projects were also reviewed. Several research questions were discussed and tips were provided on how to solve them. **[17]**

III. INTRODUCTION TO ALL TECHNIQUES AND ALGORITHMS

A. BIOGENETIC ALGORITHM

The Biogenetic algorithm (BA) is an evolutionary research technique that simulates the natural evolutionary process. This heuristic approach is often used to create useful solutions for optimization problems and search engines. Evolutionary algorithms belong to a larger class of biogenetic algorithms (BAs) that use techniques inspired by natural evolution to optimize problem solutions to produce inheritance, variation, selection, and intersection. This study looks at collecting data on expanded trees more efficiently in energy use. The proposed algorithm always tries to balance the data load on the network in an appropriate way. Increase the algorithm to ensure the remaining energy balance between the nodes of the network life cycle. It is also call the evolutionary theorem in general.

B. INTRODUCTION CLUSTERING

Assembly is one of the important ways to extend the life of a network in a wireless sensor network (WSN). It involves assembling sensor nodes into clusters and selecting cluster heads (CH) for all blocks. The CHs collects data from each group node and redirects the collected data to the base station. Figure 1 shows that the lifetime of a wireless sensor network can be improved by low power consumption based on the proposed technique.

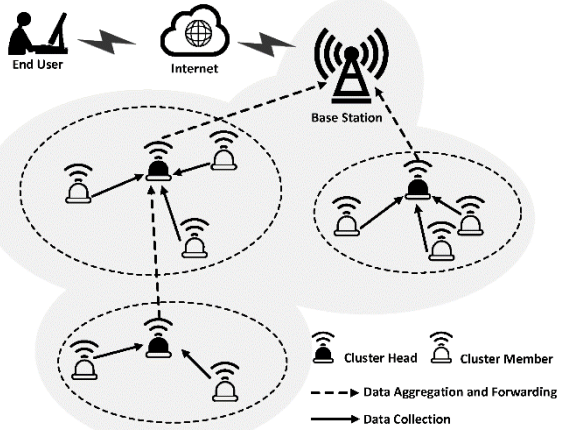

Fig 1: Clustering in WSN

Clustering technique reduces the complexity of communication with the help of maser node and slave node within the cluster. Now, now the Master node has solely responsibility to communicate the base station.

C. INTRODUCTION TO CBCR

This paper propose a CBCR (Clique Based Clustering and Routing) protocol to minimize the energy dissipation in sensor networks. It is a clustering based protocol that forms non-overlapping clusters of size where n is the maximum cluster size. By exchanging information of single-hop neighbors, all sensor nodes in the network are grouped into a number of disjoint cliques, in which all the nodes can directly communicate with each other. Among all the nodes in a cluster, the node with maximum energy becomes cluster head. The key features of CBCR are self-configuration and localized coordination, maximum energy cluster head, periodical rotation of cluster head, hierarchical forwarding, load balance, fault tolerance and scalability.

D.INTRODUCTION TO CLUQUE

The paper utilizes one of the conventions from to parcel system into groups (1s). The figure underneath delineates a system in which every club is a solitary jump sub system. Every inner circle is a solitary jump system. Every group head knows the

halfway interruption discovery frameworks of its single-bounce neighbors. There is a case of half breed grouping: the primary stage demonstrates a case of bunching in inner circles. The second stage demonstrates the various leveled bunching of G.

E. IMPLEMENTATION PROCESS

To ensure that the network is running at the highest possible performance, the nodes are placed in the campus network. With balanced power consumption across all nodes, the preferred node mode protocol should provide better network throughput and channel collisions under high load. To ensure that the network is running at the highest possible performance, the nodes are placed in the campus network. With balanced power consumption across all nodes, the preferred node mode protocol should provide better network throughput and channel collisions under high load.

IV. CONCLUSION AND FUTURE WORK

This research will shows, after applying the Biogenetic Algorithm, less energy dissipation in network appears after increasing number of rounds. Proposed work would Biogenetic Algorithm to improve the network lifetime (dead node) and energy dissipation value of the wireless sensor networks by finding the optimum number of cluster heads and their locations based on minimizing the energy consumption of the sensor nodes. MATLAB simulation results showed that the proposed work is less energy dissipation, less number of dead nodes. After comparing the existing work as LEACH and CBCR, this simulative result will show very good result. Moreover, it outperforms the previous protocols in terms of energy dissipation rate, network lifetime and stability period in both homogeneous and heterogeneous cases. Further we can compare it with TEEN, LEACH, SEP etc.

REFERENCES

[1] Waltenegus Dargiea, Rami Mochaourabb, Alexander Schilla and Lin Guanc. 2010. Topology Control Protocol based on eligibility and efficiency indicators. System and software magazine.

[2] F. O. Aron, T. O. Olwal, A. Kurien and M. O. Odhiambo. An energy-saving distributed topology control algorithm in heterogeneous wireless Mesh networks. World Institute of Science, Engineering and Technology. p. 40.

[3] Antonio-Javier Garcia-Sanchez, Felipe Garcia Sanchez and Joan Garcia-Haro. 2011. Wireless sensor network deployment for integrating video surveillance and data monitoring in precision agriculture onto distributed crops. Computers and electronics in agriculture. 75:288-303.

[4] Santi P. 2005. Topology control in wireless ad hoc and sensor networks. ACM computer. Monitoring network. 37(2): 164-194.

[5] Zheng Yi and Guohuan Building. Research and development of agricultural fine irrigation control systems. International Conference on Computer Engineering and Communication Technology in Agricultural Engineering.

[6] Raimo Nikkilä, Ilkka Seilonen and Kari Koskinen. 2010. Software Architecture for Precision Agriculture Farm Management Information System. Journal of Agricultural Computers and Electronics. 70:328-336.

[7] Mihaela Cardei, Shuhui Yang and Jie Wu. Year 2008. Algorithm for fault tolerant topology in heterogeneous wireless sensor networks. IEEE Parallel and Distributed System Transactions. 19(4).

[8] AzrinaAbd Aziz, Y. Ahmet S¸ekercio˘glu, Paul Fitzpatrick and Milosh Ivanovich. Distributed topology control technology extends the life of battery-powered wireless sensor networks. IEEE Communications Survey and Tutorial, accepted for publication.

[9] Rami Mochaourab and Waltenegus Dargie. A fair, energy-efficient wireless sensor network topology control protocol. Technical report: MISTTR-2005-012.

[10] Bara'a A. Attea and Enan A. Khalil. 2011. A new evolution-based routing protocol for cluster heterogeneous wireless sensor networks. Apply Soft Computing Magazine. 432-441, (2011).

[11] Wang Feng, Li Yingshu, Cheng Xiuzhen, Du Dingzhu. 2008. Fault Tolerant Topology Control for One-to-One and One-to-One Communication in Wireless Networks. IEEE Mobile Computing Transactions. 7(3).

[12] R. S. Komali, R. W. Thomas, L. A. DaSilva and A. B. Mackenzie. Ignorant price: Distributed topology control in cognitive networks. IEEE Wireless Communication Exchange. 9(4).

[13]Waltenegus Dargiea, Rami Mochaourabb, Alexander S chill a, Lin Guanc. 2010. Topology Control Protocol based on eligibility and efficiency indicators. System and software magazine.

[14] Andrew Ka-Ho Leung and Yu-Kwong Kwok. Year 2008.IEEE localized application-driven topology control for energy-efficient wireless peer-to-peer file sharing. IEEE mobile computing transaction. 7 (1).

[15] Liu Yunhuai, Zhang Qian and Lionel M. Ni. 2010. Opportunity-based wireless sensor network topology control. IEEE Parallel and Distributed System Transactions. 21(3).

[16] Damien, Wohwe & Yenke, Blaise & Förster, Anna & Dayang, Paul. (2019). Optimized Clustering Algorithms for Large Wireless Sensor Networks: A Review. Sensors. 19. 10.3390/s19020322.

[17] I. Khan, F. Belqasmi, R. Glitho, N. Crespi, M. Morrow and P. Polakos, "Wireless sensor network virtualization: A survey," in *IEEE Communications Surveys & Tutorials*, vol. 18, no. 1, pp. 553-576, First quarter 2016.