

# Dynamic Clustering in Wireless Sensor Network using Neural Network

Amaninder Singh Grewal , Manjot Singh Pandhe , Simrat Pal Kaur

*Adesh Institute of Engineering and Technology  
Sadik road, Faridkot, Punjab, India*

**Abstract:** The wireless sensor network is the type of ad-hoc network. Wireless sensor network is self configuring network. Any sensor node can join or leave the network when they want. Wireless sensor network is used to monitor the environmental condition like pressure, temperature etc. In wireless sensor network number of sensor nodes are deployed. Wireless sensor network is deployed in far places like deserts, forests etc. Sensor nodes are very small in size and have limited resources. It is very difficult to recharge or replace the battery of sensor nodes at far places. Because of this our main focus is to reduce the battery consumption of sensor nodes. In our proposed work, we used a new technique to reduce battery consumption. Our proposed work is based on the dynamic clustering using neural network. Here in this work before the data transmission sensor nodes form the cluster dynamically using neural network. we are implementing an advanced rebuilding grid algorithm which re clusters the sensors after every round of communication. Till yet researchers research on various grid rebuilding algorithms which shows by it enhances network lifetime of an wireless sensors networks and even very much helpful in increasing the rate of dead sensors and avoiding the probability of pits, which results in increase of packet delivery time and decrease in packet loss rate. Here in this work we are going to implement rebuilding of grid for WSN networks using neural network approach.

**keywords:** Dynamic Clustering, Neural Network, Energy, Clustering.

## I. INTRODUCTION

Wireless sensor network (WSN) is a network of small light weighted wireless nodes which are highly distributed and deployed in large numbers. Wireless sensor networks monitor the system or environment by measuring physical parameters such as humidity, pressure and temperature [1]. Wireless sensor networks provide an economic approach for the deployment of the control devices and distributed monitors and avoid the expensive wired system. WSN is a self healing and self organizing. Self-healing networks allow nodes to reconfigure their link associations and find other pathways around powered-down nodes or failed nodes. Self organizing allows a network automatically join new node without the need for manual interference. In other words, wireless sensor is a computer network which is composed of a large number of sensor nodes. Sensor nodes are those which are capable of sensing environment around them. Sensor nodes are devices which are capable of gathering, storing, sensing and transmitting information. Sensor nodes can be deployed anywhere without install it. The gathered information can be retrieved. WSNs are decentralized systems and peer-to-peer communication is takes place between two nodes. Already established

infrastructure is not required to deploy the wireless sensor networks. In WSN, nodes can be easily add and removed as required. By doing this, there can be changes in network topology, network tree and updating path may occur. The sink may be connected to the outside world through internet where the information can be utilized within time constraints [2]. Sensors nodes are based upon a battery with limited lifetime [3]. Due to physical constraints replacement is not possible. Moreover the architecture and protocol of sensor networks must be able to scale up any number of sensor nodes. Since the battery lifetime can be extended if we manage to reduce the amount of communication, caching the useful data for each sensor either in its local store or in the neighborhood nodes can prolong the network lifetime. Artificial neural network is composed of interconnecting of artificial neurons. Artificial neural networks may either be used to gain understanding of biological neuron or to solve artificially intelligence problems without creating any model [4]. Biological neural networks are made up of real biological neurons that are connected or functionally related in nervous system [wiki].neural network has been motivated from human brain. The brain is highly complex, parallel computer and nonlinear. It has capability to organize its constituent's structure known as neurons to perform complex computations. It is faster than digital computer exit in today's world [5]. It is an adaptive in nature that changes its structure based on internal and external information that flows through the networks. In our work, we are using neural network technique for dynamic clustering; network topology can be changed or configuring according to the network conditions

In this paper, Literature Review will be written in section 2. Dynamic clustering will be written in the section 3 .Neural network will be presented in the section 4 .New proposed technique will be presented in section 5.In the last section 6 we have written future work and conclusion .

## II. LITERATURE REVIEW

Kiran Maraiya *et.al*(2011),”Application based Study on Wireless Sensor Network” have described overview of wireless sensor network and how it is different from traditional network. They also discussed about the design challenges and key features of the protocol used in this network. What is the different network topologies used in the network, what are the different types of its applications, types of its constrain and protocol stack architecture all are studied in this paper [6].

Amir Akhavan Kharazian *et.al* (2012),”Adaptive clustering in Wireless Sensor network has discussed in this paper how

to increase network life time with low energy nodes. This paper presents an algorithm, first it has consider to the nodes with low energy and these nodes determines which nodes become cluster-head, The cluster head selection based on the weighting of the neighboring nodes that the weights were calculated based on the energy residual and distance between nodes. Then it shows Simulation for 100 nodes had showed better performance than two well-known protocols, LEACH and LEACH-C. In all cases, the proposed algorithm show better performance than LEACH and it has result almost like LEACH-C. LEACH-C is a centralized algorithm and the proposed algorithm is distributed algorithm without need any global information [7].

Narottam Chand (2012),”Cooperative Data Caching in WSN” has presented cooperative caching scheme ZCS to improve performance the performance of wireless sensor networks. In this scheme, in a zone nodes share their data which shows limited nodes problems and limited query latency at a node to prolong lifetime of wireless sensor networks. a cache discovery process, distance based admission control, consistency check and utility based cache replacement policy is include by ZCS scheme. To improve hit ratio replacement policy is also used [8].

Xu Li *et.al* (2007),” Sink Mobility in Wireless Sensor Networks” have explained in this paper about to collect information from sensor field for analyzing and processing at pre-defined field. They also exploited mobility in sink to reduce and balance energy consumption. They also discussed about energy hole problem and models and its assumptions [9].

Chee-Yee Chong *et.al*(2003),”Sensor Networks” has presented MEMS technology and low-cost manufacturing, more reliable communication, wireless have resulted in small, inexpensive, and powerful sensors with embedded processing and wireless networking capability. These wireless sensor networks are used in many applications from home appliances to environmental monitoring. Concept of DNS was also introduced in this paper [10].

**III. DYNAMIC CLUSTERING**

Dynamic clustering is an energy efficient algorithm. Energy dissipation of the network can be reduced by using clustering algorithms. The energy consumption of wireless nodes is depends upon the transmission distance, optimal routing protocols and amount of data to be transmitted. In cluster based wireless sensor networks, cluster heads (CH) meets these requirements 1) same adjacent sensors are grouped into a cluster. 2) High energy resources 3) Network should be distributed. Low Energy Adaptive Clustering Hierarchy (LEACH) gives a simple distributed clustering scheme for evenly distributing energy dissipation[15].Probability function is used to rotate the position of the CHs.Optimal energy dissipation is not considered by LEACH at each round. CHs are never distributed in LEACH [15]. Cluster member nodes leads low level hierarchal, CH leads high level and cluster formation leads two level hierarchies. The sensor nodes transmit its data to CH nodes periodically.Ch nodes aggregate that data and send to base station either directly, through intermediate or through some other CH nodes.CH

nodes spend a lot of energy at higher rates to send data to higher distance or same distance. A periodically re-elect new CH is the solution to balance the energy consumption among the nodes in each cluster. Single hop intra-cluster and multi-hop.Intercluster is its example. Base station received data from sensor nodes and which is further accessed by end users.CH is the sink for cluster nodes and BS is sinking for CH [14]. Clustering of nodes shows that network is more stable and efficient. Clustering of nodes is based upon least distance and higher energy by knowing location. Clustering reduces traffic network and increase performance. Through other cluster heads CH forward data to sensor nodes [14].

**IV. NEURAL NETWORK**

Artificial neural network is composed of interconnecting of artificial neurons. Artificial neural networks may either be used to gain understanding of biological neuron or to solve artificially intelligence problems without creating any model [4]. Biological neural networks are made up of real biological neurons that are connected or functionally related in nervous system [wiki].neural network has been motivated from human brain. The brain is highly complex, parallel computer and nonlinear. It has capability to organize its constituent’s structure known as neurons to perform complex computations. It is faster than digital computer exit in today’s world [5]. It is an adaptive in nature that changes its structure based on internal and external information that flows through the networks.

It resembles with brain in two respects:

1. By the network knowledge is acquired from environment.
2. Synaptic weights are used to store the acquired knowledge.

Neural network basic architecture is shown in the figure 1.

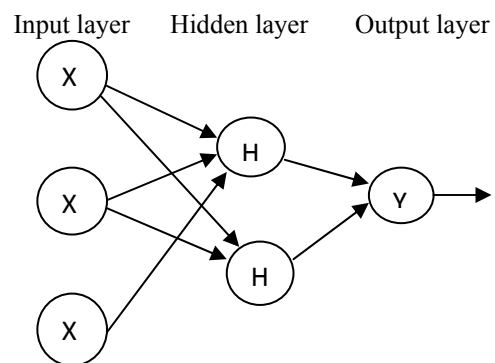


Fig 1: Neural Network

**V. RESULTS AND DISCUSSION**

The size of the sensor node is very small and resource, battery power is also limited. Wireless sensor network is deployed in the far places like forest, deserts, oceans etc .In such places it is very difficult to recharge or replace the battery of the sensor nodes. Our main focus is to save the battery life. In this paper, we are proposing a new technique to save the battery life through dynamic clustering approach. The nodes in the sensor network can arrange themselves in the clusters dynamically using neural network. The neural network is the type of network which

will learn from the past experiences and respond according to the situation. In our technique when any node wants to transmit data to the other node secure and reliable route will be established between the sender and receiver. The intermediate nodes will arrange them themselves into a clusters in such a way that minimum energy will consumed while routing the data from sender to the receiver

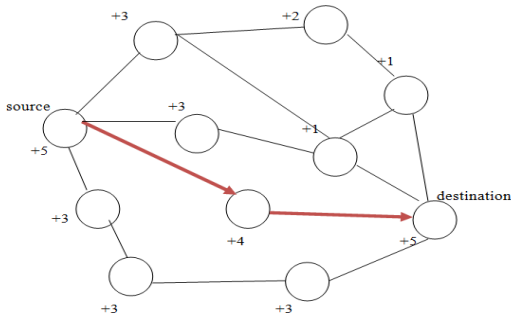


Fig 2: Higher battery nodes are participated for routing

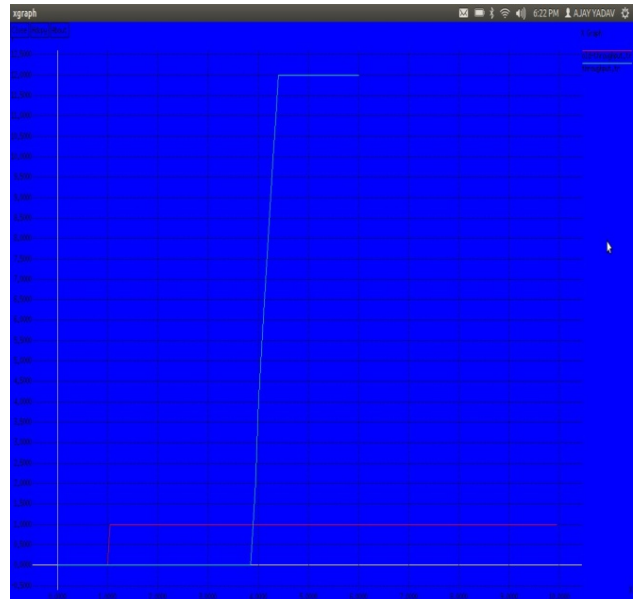


Fig 5: Comparison graph of Throughput

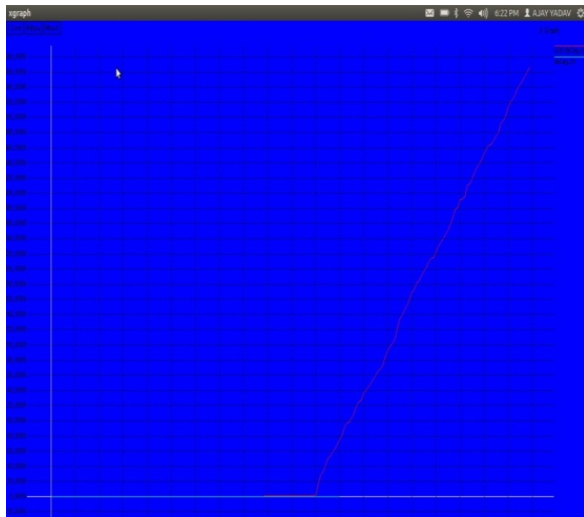


Fig 3: Comparison Delay Graph

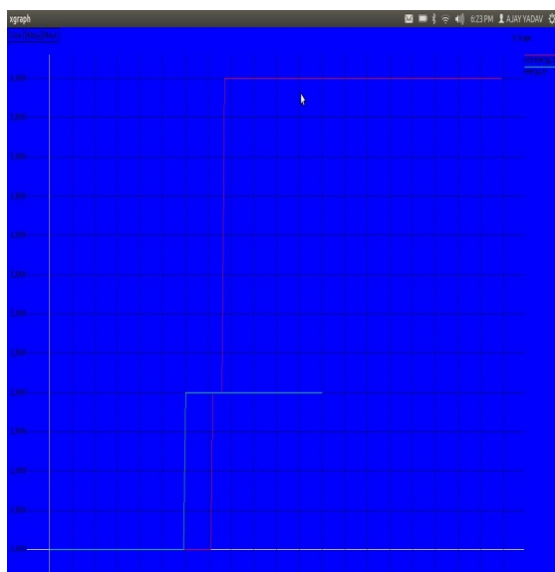


Fig 4: Comparison Energy Graph

## VI. FUTURE WORK AND CONCLUSION

In this paper, we conclude that limited battery life of the sensor node is major challenge of the sensor network. The new technique proposed in this paper will use the concept of neural network for dynamic clustering. The simulation results show that dynamic clustering is the efficient approach to reduce the battery consumption. In our future work, we implement this technique and compare the results of the new proposed technique with the previous once.

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