

# A New Fuzzy Clustering Approach to Increase the Efficiency of Wireless Sensor Network

Vinutha H<sup>1</sup>, Keerthi Bhat<sup>2</sup>, Srinidhi Gowda V<sup>3</sup>, Tanushree V C<sup>4</sup>

Asst. Professor, Department of ISE, Rajarajeshwari College of Engineering, Bangalore, Karnataka, India<sup>1</sup>.

U.G. Students, Department of Information Science and Engineering, Rajarajeshwari College of Engineering ,  
Bangalore, Karnataka, India<sup>2</sup>

U.G. Students, Department of Information Science and Engineering, Rajarajeshwari College of Engineering ,  
Bangalore, Karnataka, India<sup>3</sup>

U.G. Students, Department of Information Science and Engineering, Rajarajeshwari College of Engineering ,  
Bangalore, Karnataka, India<sup>4</sup>

**ABSTRACT:** A wireless network has a small sensor in a large amount of distributed network and dynamically in a large geographical area with limited power. The energy utilization is a major consideration in designing the wireless sensor network. The reason is the wireless sensor network lifetime is limited by the certain battery lifetime. AODV is one of the protocol that is commonly used for clustering and it selects the cluster head based on model of probability which will possibly leads to increase in the lifetime of the network . By selecting the appropriate node as a cluster head we can decrease the consumption of energy that in turn increases the lifetime of the battery. The main challenge is to overcome the disadvantage like limited lifetime of the battery, low processing power and make wireless sensor network efficient. Here we mainly focus on the low availability of the power. The fuzzy algorithm have ability to form cluster in sensor network which uses clustering of nodes of sensors and fault tolerance existing all over the network that is used to reduce consumption of energy.

**KEYWORDS:**Wirless sensor network, , Energy prediction, AODV protocol, Fuzzy logic.

## I. INTRODUCTION

Wireless sensor networks are scattered in re-mote area and promiscuous locations where physical monitoring is almost impossible. The wireless network consists of randomly distributed devices to monitor the environmental and physical parameters. A WSN system consists of a gateway to wired world and distributed nodes to provide wireless communication. The routing information aggregation is enabled by the clustering and support routing algorithm scalability. The node heterogeneity and routing overhead issues are solved by cluster based routing. In specific, the process of hierarchical routing are activated by clustering. Where the routes are noted between clusters results in increase of nodes lifetime and control overhead is decreased. The node with the high connectivity, average distance and node with low energy consumption are selected as the cluster head by the fuzzy based algorithm. The number of hops between sensor node and cluster head are reduced by reducing the energy can be achieved by selecting high connectivity cluster head. Effective utilization of sensors resources are achieved by selecting reduced energy consumption cluster head. The number of hops in data transmission can be reduced by selection of cluster head closer to the destination. When the present cluster head runs out of energy, the new cluster head is selected again to provide the required energy consumption between the sensors in the network. Energy prediction can improve performance as well as network life time.

**Energy Prediction:** Wireless sensor network are having restricted battery life. The restricted power of energy limits the application and services.. We can improve performance as well as network life of the battery by predicting the nodes energy. Wifi Radio energy model is provided by NS2 simulator which gives the energy level in node. The path stability in mobile wireless network are estimated by the help of energy prediction. The consumption of energy for each transmission and delivery of packets by the node is reduced from the initial energy, which allocate the node energy at the starting of the simulation.

Energy forecast gives every nodes reaming energy which picks high residual energy nodes for routing. The node which has low energy are not choose as cluster head because it has limited battery life and node which has high energy are elected as a cluster head because it helps to increase the lifetime of the battery. Accordingly, way breakage because of vitality deplete is dodged which limits parcel drop rate and decreases the control overhead.

## II. RELATED WORKS

**Energy efficiency**[1]Er Parminder kaur and Er vinod Kumar have shown that the wireless network has a small sensors in the large amount with the less power transceiver which is an effective tool that gathers data in a different type of environment[1]. The WSN plays an important role in industrial and personal applications too. As the IOT is growing widely now a days, there is a huge development and research of WSN. The characteristics of WSN nodes are the battery lifetime is limited, the processing power is low and there is no constant in the mobility. The main challenge is to overcome the above disadvantages and make the WSN more efficient. Here we mainly focus on the low availability of power. In this paper a Fuzzy approach have been proposed for making efficiency of the energy low WSN and choosing a right cluster head. From this the result is to reduce the energy have been consumed totally when sensor data reported to the base station from the cluster head.

The WSN nodes are distributed over a large geographical area and each node has three components in its sensor, processor and a receiver. The temporary storage of data takes place in the processor. The discussion is mainly on a fuzzy approach based on novel, that has efficient energy to achieve energy optimization technique. The 2 important techniques used here is Throughput and WSN's lifetime. During Clustering a cluster head is formed in each of the cluster. For the next round the cluster head are replaced simultaneously and the process continues. If existing cluster head have energy even after its first round, the same cluster head continues for the next or it changes the cluster head.

In this paper the discussion of the origin of the cluster routing based in WSN. The novel approach is also proposed that can be utilized in clustering protocol for good efficiency. From this approach we can reduce the more energy consumed by using efficient cluster head, using fuzzy approach. The cluster head is replaced if the energy get finishes or it continues with the same cluster head to collect information inside the cluster and finally it sends it to the base station.

**Fuzzy logic control**[2] proposed by Indranil Gupta and Denis Riordan explains that wireless sensor networks contains more expensive portable wireless sensor nodes with limited battery life. This kind of the energy supply will be the main constraint in the network architecture. By providing the nodes to communicate with the base station the energy consumption can be decreased. The node which communicate with the base station are called as cluster-heads, these cluster heads collects the information from the neighboring nodes in cluster, and it compresses the data and sends the aggregated data to base station.

Here the fuzzy logic approach is utilized for the cluster head selection on the basis of nodes energy, nodes mobility and distance between the nodes. Hence the fuzzy logic approach is used to decrease the energy consumption and to maximise the life time of the sensor networks. The increase in the lifetime of battery can be done by choosing suitable network configuration rather than selecting the cluster head only on the basis of information that obtained locally. In this protocol the fuzzy approach will select the cluster head on the basis of energy, movement of nodes and distance between nodes. The nodes with high energy , less mobility speed and nearest distance have the high chances of selecting a cluster head. The networks life of battery time can be increased and battery consumption can be decreased by using the following fuzzy descriptors- concentration of nodes, energy of node and node centrality.

When we compare the fuzzy approach with previously used LEACH, in the LEACH process the nodes selects among themselves as cluster head without any constraints and the neighbour nodes joins the nearest cluster to them. But in fuzzy logic the cluster head is selected by considering the nodes energy ,moment and distance so this can be more accurate compared to other protocols. The cluster-head selection process is divided as two parts each which consists

of a setup and steady state similar to the LEACH concept. In setup state the CH is find using fuzzy logic processing and then the similar nodes are will form a group of cluster. In steady state the cluster head will collects a data that is nothing but an aggregated data and performs some important function to compress or minimize the data into single signal. The produced signal that is compressed data is again to the base station. The fuzzy logic model contains a fuzzifier, defuzzifier, some fuzzy logic rules and also a engine of fuzzy inference.

**AODV (Ad-Hoc on Demand Distance Vector) Protocol[3]** Z.W.siew and A. kiring describes condition checking bunch based various levels of directing convention as the most well-known convention being selected because of the nodes adjustment among each of the sensors. Sensors are scattered in a particular region to gather valuable data intermittently for some long duration. Consequently, here the battery consumption will be the main problem. It not good for the system lifetime to change the battery at regular intervals. LEACH is one of the regular bunching conditions which choose the group head according to frequent display which will perhaps prompt a less in network lifetime because of decision to choose a group head with a minimum wanted area in the system. For remote sensor organizes, the dispersion of group head determination specifically impacts the system's lifetime. Here we present a point that will influence the lifetime of the system and apply fluffy rationale based cluster head determination in base station. Here two main considerations, the vitality level and also separation level to the base station for selecting the cluster head which will increase the first node die (FND) time, data stream is considered for every round and also increase the throughput obtained by the base station.

The WSN contains numerous of sensor hubs characterized by detecting, processing and correspondence capacities. When the sensor hubs sense components of the encompassing conditions, the preparing things in the sensor hubs will change over the simple flag to computerized information by utilizing the simple to advanced converter module and sends for handling the information. The sensor hubs also conveys the information to its neighbors. Remote sensor hubs are highlighted because of the reason for cost sparing and the span of the remote sensor hubs must be reduced for comfort reason. The hubs vitality is the most imperative issue on the grounds that the hubs are little in and it might be conveyed in risky territories, accordingly makes battery substitution unconventional and inconceivable. In this way, it is more functional to spare vitality and draw out the system lifetime by enhancing the steering calculation. Bunch based various leveled directing convention is a vitality productive steering convention. In the bunch directing, the sensor hubs will be separated into a couple of gatherings with one group set out chose toward each gathering. The bunch head gathers information from part hubs in a similar group and totals, the gathers information with a goal that it can be transmits to base station. Actualizing convention is essentially lesser than general vitality utilized and diminish system clog to just permitting the group make a beeline for speak with the base station. The extra information is needed for the selection of cluster head. For the data transmission between every nodes in the cluster a extra 24 bit energy and distance information are required. The cluster head to the base station transmission requires 480 bits as extra energy and cluster members and the cluster head requires the distance information. This process uses MATLAB.

**Fault Tolerance[4]** Each cluster in the wireless sensor network consists of the tolerance for sending the information to the base station in order to get the best performance in increased battery life and also to maintain tolerance with respect to the other protocols. So far the existing protocols consists of neighbouring clustering formation as the parameter, but here we are using a new clustering protocol and fault tolerance along with the fuzzy approach which enables the formation of cluster in wireless sensor networks. To reduce the energy consumption this protocol uses nodes clustering and also fault tolerance, the errors are covered using neighbouring nodes and also allows to work to prevent neighbour nodes from dangerous sensors. The distance from the fault sensors to the neighbour sensors and neighbours to the central base station are carried out. We see the best network tolerance and also the greater performance in this protocol when compared to previously used protocol like LEACH.

The base station is placed at the square of the previous protocol. The data transmission between the base station and nodes consumes more energy and this can be the main reason for the reduction in the life time of the wireless sensor network. The fuzzy logical error coverage method is used to increase the life time of the wsn. Here each and every sensor nodes are made on the basis of priority and the nodes with highest priority are supposed to move first. For selecting the neighbour on the basis of fuzzy fault tolerance algorithm the following three conditions are required, the amount of energy in the neighbour with respect to broken sensor, the distance from the neighbour to the broken sensor and distance from base station to the neighbour.

### III. CONCLUSION

The proposed paper that we mainly discusses on the efficiency of the energy .We make use of fuzzy to select the appropriate cluster head for better efficiency. By using the AODV protocol we can prolong the wireless sensor network lifetime. The novel approach has discussed for selecting the cluster head for wireless sensor network .The base station elects the cluster head. The proposed protocol send NS2 version 2.29 simulation. The nodes are comprise in each series. Using the above we can increase the battery power and also it increases the lifetime of wireless sensor network.

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