

# A Multihop Routing With Energy Preservation for Network Stability Using Genetic Algorithm: A Research

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**Abstract**— Wireless sensor network consist of various sensor nodes that are used for the communication. These nodes are battery constraints. Energy utilization of the sensor nodes is the major challenge in the wireless sensor network. The main aim of this work is to examine the energy efficiency and the energy efficient protocols. Traditionally Q-LEACH protocol was considered as the best protocol but it too had some limitation. So in this paper a new technique is proposed for the improving the life time of the network. In this the Q-LEACH protocol is combined with the Genetic algorithm. By using the genetic algorithm the optimize route is obtained. By using the proposed algorithm the life time of the network is increased as the less amount of energy is consumed by the nodes. A comparison is done between the traditional Q-LEACH protocol and the proposed protocol. From the results obtained it is concluded that this method is better and efficient than the traditional method.

**Index Terms**— wireless sensor network; LEACH; Routing Genetic algorithm

## I. INTRODUCTION

The process of finding the data transmission route is termed as routing. In wireless sensor network large amount of nodes are present that are used for the sensing, transmitting, receiving of the data between the nodes present in the network. The efficiency of the network also depends on the selection of the path the as it effects network life time, energy consumption etc. Various routing algorithms have been designed for the efficient routing process. The wireless sensor networks are reliable, accurate, cost effective and easily deployed. The life time of the network is defined by the energy consumed by the sensor nodes. So various routing mechanism have been developed that will help in increasing the life time of the network by consuming less amount of energy. The network efficiency depends on the energy consumed for transmitting the data by the nodes.

This paper is organized as following sections. In section II the limitations of the traditional used LEACH protocol have been discussed. Sections III represent the proposed method. In section IV the flow diagram of the proposed methodology is defined. Section V represents the comparison results of the proposed and traditional methods. The conclusion of the work

done and the advancement can be done are described in the section VI.

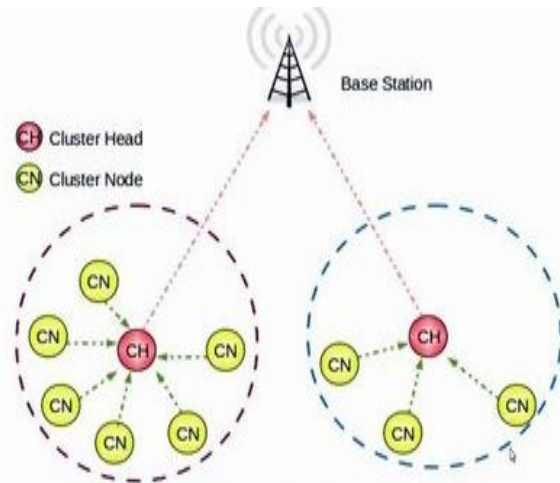


Fig 1. Clustering in Wireless sensor network

## II. LIMITATIONS OF LEACH

LEACH is considered to be an efficient protocol that is used for increasing the life time of the network. Though it is better than the traditional protocols still numbers of issues are still present there. The assumptions on which the protocol works that are that all the nodes can transmit the power to transmit the information to the base station if it is required. Also the selection of the cluster head is done on the basis of the probability so there are chances that the node having less energy can be selected as the cluster head .due to which the life time of the network will decrease as the node having less energy will die earlier and the cluster will become non-functional .in addition to this it is also assumed that the cluster heads that is used for sending the data should have long communication range due to which the data cannot reaches to the base station directly . So all these assumptions made are not always true as network is to be deployed in the large region. it is not always possible that all; nodes will communicate directly , so all the nodes should be located in the network. This is one of the major limitations of the LEACH protocol.

## III. PROPOSED METHOD

In the traditional approaches LEACH ,SEP etc were used they are single hop communication system and along with that the CH selection approach was dependent on probability equation but that approach is so old and can be further enhanced using some innovative approaches on which the performance of the system depends.

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So in this proposed method the fitness function will be dependent on below written conditions that are

1. Checking that the node has enough energy to become cluster head and also checked physical parameter name as bandwidth.
2. Node must have small distance among all the nodes that will involve in a single cluster that is the mean distance between the all nodes and Ch must be as small as small
3. The thirdly and the main dependency is the node which will be chosen as Ch must have least distance with the BS and high bandwidth.

This objective must be achieved by using genetic algorithm and along with this in proposed work the concept of multi-hopping is there to introduce a relay node between the Ch and the Bs. So by combining the Q-LEACH and the genetic algorithm the results obtained are efficient.

**• GENETIC ALGORITHM**

Genetic algorithm is the optimization algorithm that is used for obtaining the optimized results. It is based on the principle of the natural evolution. This is used for the generation of useful solution to the optimization and search problems .In genetic algorithm a population solution of an optimization problem is searched in order to find the better solution. Each populations set have candidates that have different properties. The solutions obtained are generally in the form of binary string's that are 0s and 1s.it comprise of two processes. In first process the candidate are selected to form the population and in second process the manipulation is done in which the candidate selection is done for the generation of next population by using crossover and mutation techniques. This selection procedure depicts which individual are selected for the reproduction and how children selected candidate produces. The better is the candidate; the higher are the chances of being parent.

**IV. METHODOLOGY**

In this paper the Q-LEACH protocol and the Genetic algorithm are combined. The network lifetime is significantly improved by applying the proposed protocol and the energy efficiency of the network is also improved. The methodology of the propose method is defined below:

1. The first step in this process is the initialization of the parameters of the network.
2. After the initialization of the parameters, the next step to be done is the round processing and hence, it will be done after the initialization of the energy parameters
3. In this step the residual energy of the each node present in the network is checked.
4. If the value of energy is negative i.e. it is lesser than zero the nodes energy has drained. This means the node is dead. Hence, the node will be declared dead.
5. If the energy of the node is positive i.e. it is greater than zero, then it will move to the next round. Then again the residual energy will be checked and the process will continue until the node dies.
6. In this step the calculation of the dead node's NCH energy will be done

7. Next step is to apply the genetic algorithm for optimizing the cluster heads selection process. The iterations of the intermediate nodes will be increased and the energy of the intermediate nodes will be calculated and checked
8. Finally the results are calculated. Various performance parameters like lifetime of nodes, and network life time etc are calculated.

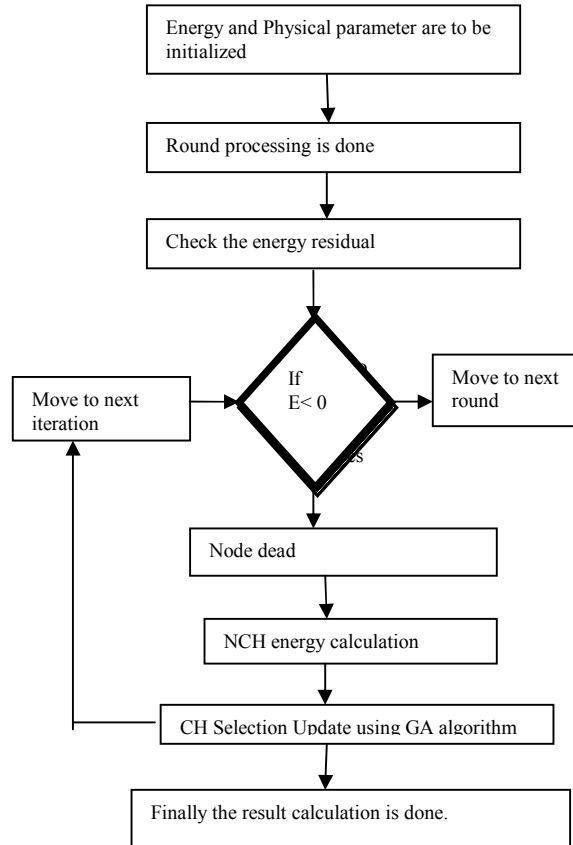


Fig 2 .Flow diagram of the proposed algorithm,

**V. RESULTS AND DISCUSSION**

In this section there is discussion about the results of proposed method of routing in the wireless sensor network. In this paper Q-LEACH protocol is used with Genetic algorithm. By using the genetic algorithm the optimize route is obtained. The graph given below depicts the comparisons between the proposed and the traditional algorithm. The proposed technique is considered to be efficient than the traditional as the energy utilization is less and the lifetime of the network is more.

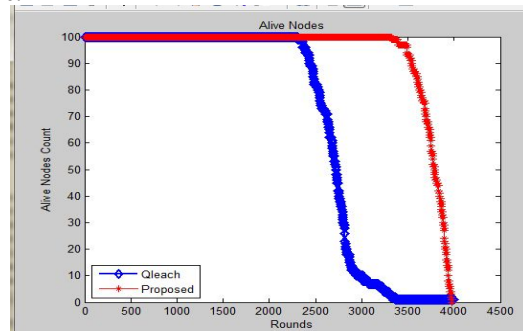


Fig 3.Comparison graph on the basis of the alive nodes in the network

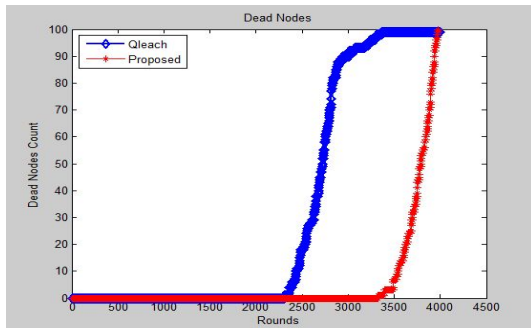


Fig 4. Comparison graph on the basis of the dead nodes in the network .

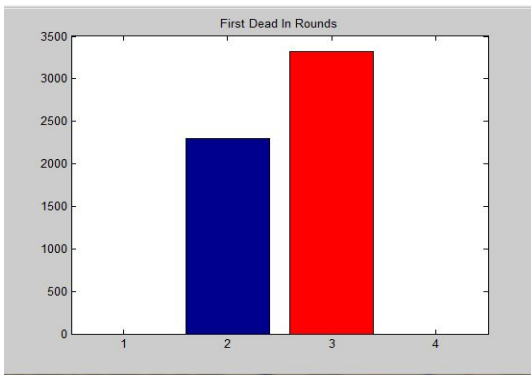


Fig 5. Comparison graph on the basis of the first dead nodes in the network

#### CONCLUSION AND FUTURE SCOPE

Energy utilization of the sensor nodes is the major challenge in the wireless sensor network. The main aim of this work is to examine the energy efficiency and the energy efficient protocols. In this proposed method the Q-LEACH protocol is combined with the genetic algorithm. Genetic Algorithm which optimizes the results and provides the best solution that is enough to obtain best results for improving network's lifetime. A comparison is performed that show this approach is better than the traditional Q-LEACH.

Form the result obtained it is concluded that proposed method is better the traditional method. By using optimization algorithm the results obtained are efficient thus the life time of the network is improved. In future this approach can be further enhanced by using some trending soft computing technique.

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