

# Comparative Study of Genetic Algorithm and Q-Leach

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**ABSTRACT:** In this paper, we look at a hereditary calculation based technique (GABEEC) and Q-LEACH strategy to improve the lifetime of remote sensor systems. GABEEC approach the proposed strategy is a group based approach like LEACH. Hereditary calculation is utilized to amplify the lifetime of the system by methods for rounds. The strategy has 2 stages which are Set-up and Steady-state stage. In the set-up stage, the bunches are made and are not changed all through the system. In each round, there are static groups with powerfully changing bunch heads. In the reproduction, 100 hubs are haphazardly conveyed in 50x50 square meters range. The outcomes demonstrate that the proposed strategy is observed to be more productive than LEACH. In Q-LEACH approach Wireless Sensor Networks (WSNs) with their dynamic applications picked up a gigantic consideration of analysts. Consistent checking of basic circumstances pulled in scientists to use WSNs at huge stages. Diverse methodologies in view of bunching are proposed for ideal usefulness. In this work, we propose Quadrature-LEACH (Q-LEACH) for homogenous systems which upgrades strength period, organize life-time and throughput calm fundamentally.

**KEYWORDS:** sensor networks, genetic algorithm, energy-efficient, WSNs, Homogenous; Networks, Routing, Energy; Throughput, Network; Life-time

## I. INTRODUCTION

Wireless Sensor Network (WSN) is utilized as a part of numerous application conditions. Most known applications are target following, living space checking, observation and security [1][3]. A WSN contains sensor hubs that are little, battery compelled, and minimal effort. One of the real issues for a WSN is vitality utilization amid correspondence between sensor hubs.

The utilization of bunches for sensor systems decreases correspondence remove for most sensor hubs, requesting just couple of hubs to transmit long separations, e.g., Base Station (BS). A bunch based convention isolates the system into various groups. Each group has a bunch head (CH) that gathers information from all part hubs in its group. Toward the finish of each cycle a part hub, called relate, progresses toward becoming CH relying upon the remaining vitality of the current CH and the normal vitality measure of the part hubs in the group. Furthermore, we utilize hereditary calculation (GA) to limit the correspondence remove in the system and amplify the lifetime of the system. For ideal appropriation of vitality among sensor hubs, so as to upgrade arrange life time, reasonable conventions and applications ought to be created. It is seen that limited plans perform well when contrasted and brought together calculation in bunching based methodologies.

## II. RELATED WORK

In [4], Heinzelman et al. depict LEACH (Low-Energy Adaptive Clustering Hierarchy), which is a bunch based vitality productive steering convention. The application field is partitioned into a few bunch in an irregular mold, where the quantity of CHs are pre-decided. The convention is divided into two stages. The stage one is "Set-up Phase". Here bunches are framed and group heads are chosen in view of a specific likelihood. Stage two is "Consistent state Phase", where hubs transmit their information to the CHs in light of a TDMA plan.

Hussain and Matin [6] depict a various leveled group based steering convention (HCR) where hubs self sort out into bunches and each group is overseen by an arrangement of partners called head-set. Each partner capacities as a CH by utilizing round robin procedure.

After partner CHs are chosen, all the present bunches are annihilated and another set-up stage is performed. In recreation comes about they demonstrate that this CH determination technique is more vitality productive than LEACH and LEACH-C. Additionally, idea of hierarchal and multi-jump grouping appropriates vitality stack all the more

equally. It is seen that confined plans perform well when contrasted and brought together calculation in grouping based methodologies.

## II. GENETIC ALGORITHM BASED ENERGY EFFICIENT CLUSTERS (GABEEC) AND Q-LEACH APPROACH

### A. GABEEC-

Here in paper, we proposed a Genetic Algorithm based method to increase the lifetime of WSN. The method is cluster-based approach like LEACH. This method introduces 2 phases in the proposed method. The first one is set-up phase and other one is steady-state phase.

#### 1. Set-up Phase:

The first phase of this algorithm is the set up phase which is executed once. In this phase, previously defined Number of sensor nodes are selected as cluster heads. The CHs numbers states the clusters numbers in the network. The nodes which are not CH nodes are transferred to the clusters depend on the distance between clusters to the CHs. Other nodes join into the clusters.

#### 2. Steady-state Phase:

At this stage, all hubs begin to speak with their CHs. Every hub utilizes a Time Division Multiple Access (TDMA) calendar to deal with their CH. TDMA is an innovation which enables different access to share same radio channel and partitions each channel into schedule vacancies to empower information transmissions. After the CH gets from all part hubs, it combines the information bundles into one parcel and moves to the BS. At the point when all CHs send their information to BS, a round is finished. Toward the finish of each round the BS checks the energies of CHs. On the off chance that the vitality of a CH is under the normal vitality of the part hubs of its group, a partner CH is chosen from the part hubs of the bunch. The part hub which has the most noteworthy vitality is chosen as the new CH and the old CH turns into a part hub. The groups are not reproduced as is done in [4] and [8]. The individuals from each bunch remains same and they are situated in a similar group. In this strategy, the groups that are made in the set-up stage remains same throughout the system. The determination of the new CH depends on the lingering vitality of the existing CH and its part hubs. The groups are not reproduced for each round. So in each round, there are static groups with powerfully changed CHs.

### B. Q-LEACH-

In this algorithm, we are discussing our proposed work named as Q-LEACH. For energy efficient performance of network we discuss the network characteristics and working principle of proposed method. This algorithm presents concept of proposed network. As per the approach sensor nodes are established in an enclave. While taking possession of better clustering network forms four quadrants. Due to this, spreading of the whole network is accomplished. Network is split up into four quadrants and transmit the information to nodes. Depending on the threshold level nodes are chosen as CH in each division. Other nodes choose their CHs within their own quadrant depend on RSSI. For joining nodes send their requests to CHs. TDMA slots are appointed to each node for proper communication without obstruction. Each node communicates in its granted slot with its predefined CH.

## IV. EXPERIMENTAL SET UP

In this paper, we compare a genetic algorithm based method (GABEEC) and Q-LEACH method to optimize the lifetime of wireless sensor networks. GABEEC approach is a cluster based approach like LEACH. Genetic algorithm is used to maximize the lifetime of the network by means of rounds. In the first phase, the clusters are generated and are not changed until the end of the network. The clusters are not regenerated for each round. In each round, there are consistent clusters with effectively changing cluster heads. In the simulation, 100 nodes are randomly scattered in 50x50 square meters area. The results show that the proposed method is found to be more efficient than LEACH.

1. Throughput: Following graph shows throughput for packet transmission after polynomial authentication and check polynomials over encrypted data.

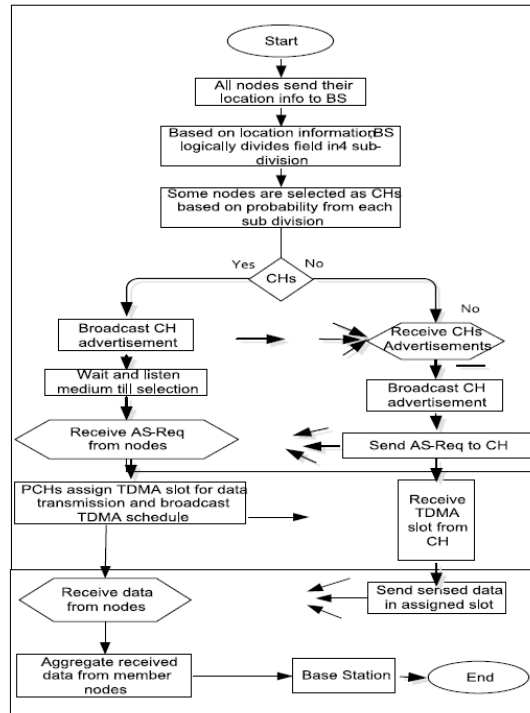
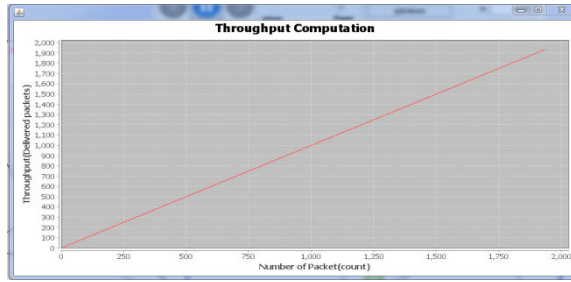
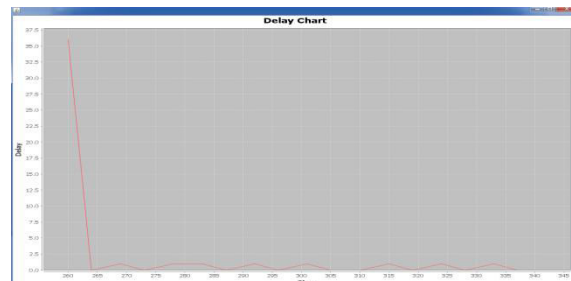


Fig. 1. Working Principle of Q-LEACH

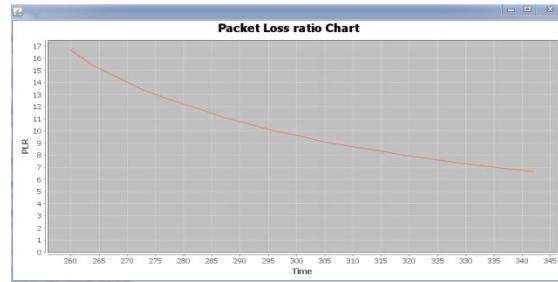
2.Delay Ratio

This graph shows packet transmission delay ratio. This delay is reduced due to energy efficient packet data transmission using spatial available routing.



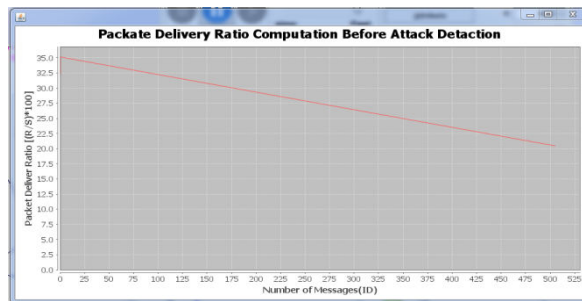
3.Loss Ratio

This graph shows that packet loss during data collection in wireless sensor network. Improved novel enrouting transmission with polynomial authentication and check polynomial reduces packet loss ratio.



4.PDR Ratio

This graph shows that packet delivery before false data injection attack in wireless network.



Comparison Table

Here, performance metrics are used to assess execution of Q-Leach and Genetic routing protocols and data scattering protocols scheme when not in networking processing is executed and not accumulation is used.

Simulation Parameter:

Parameter	Value
Simulation Time	500ms
Terrain Area	600*500
Time Arrival	32ms
Protocol	DSR
No of Node	25,45,100

Comparison with similar System

Goals	Existing System%	Proposed System%
Throughput	80	90
Network	Unicast- Hop by Hop	Clustering based
Security	Authentication Polynomial and Check Polynomial	PCREF + Digital Signature based authentication and authorization
Methodology	Hop to Hop data collection	Cluster wise data collection
Routing	DSR	Radio Resource Control
Algorithm	Q-Leach	Q-Leach and Genetic

V.CONCLUSION

We compare a genetic algorithm based method (GABEEC) and Q-LEACH method to amplify the lifetime of wireless sensor networks in First part. The proposed method (GABEEC) raise the lifetime. The simulation observationsuggest that GA based method elevate the lifetime of the network. The method appearwith randomly created nodes in a network to be cluster-heads. Simulation results show that the proposed method is an energy efficient way to expand the lifetime of the network. In both homogenous and heterogeneous networks, the best distribution is achieved from

protocol design. The main intension of this work is to magnify existing protocol such that more vigorous and optimized results can be achieved. Q-LEACH, exceptionally improved network parameters and appear to be an appealing choice for WSNs by widening and magnifying overall network excellence parameters.

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