Enhance Sensor Energy of WSN for Large Agriculture Area

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Abstract **-** Remote Sensor Networks (WSNs) are turning into a fundamental piece of numerous application conditions that are utilized in military and regular citizens. A sensor arrange is made out of countless hubs, which are thickly conveyed either inside the wonder or near it. A standout amongst the most vital highlights in WSNs has a place with the constrained battery of sensor hubs. At the point when battery-controlled remote sensor hubs are set in a particular field, it is hard to supplant their batteries or supply extra vitality. Besides, in the event that one sensor hub expends totally its vitality, some portion of the system may disconnect.This calculation incorporates the entomb bunch correspondence when utilizing advancement calculation. This exploration begins from readiness of hubs in correspondence space and figure the scope of faction of all hub present in planning space of hubs in WSN.When we applies RSSI (Received Signal Strength Indication) for the development of groups. RSSI encourages the occasion of extending and situating advancements in remote sensor systems (WSN), it turns out to be increasingly fundamental to search out a scientific model which may precisely portray the connection between the RSSI esteems and distance.This procedure is more indicated for initiating the hub of system which was not focusedin before techinue and acquainting the inner circle with every hub forminimizing the vitality constraints.Further it should beready to alter parameters with regards to the adjustment of condition independent from anyone else, and even have the capacity to lessen blunder most remote. Any development calculation for applying to enact the group head as an advancement system to upgrade the execution of the bunch head race methodology. Particularly, Evolution Algorithm (EA) is characterized as inquiry calculations that utilization the mechanics of regular process and advancements, for example, propagation, quality hybrid, and change as their critical thinking technique. The outcomes aren't ensured to return up with an age that contains a higher wellness esteem however by performing entirely unexpected advancement activities, the probability of accomplishing the required outcomes is expanded.

Keywords **-** Genetic Algorithm, WSN, Clustering,Clique, Fitness Function.

I. INTRODUCTION

Wireless sensor networks (WSN) form the basis for a wide range of applications related to national security, surveillance, military, health care and environmental monitoring. One of the two important categories in WSN networks is dedicated wireless sensor networks, which are characterized by a dedicated or randomized deployment method, where the location of the sensor is not known in advance. This feature is required when the individual sensor position is not applicable, such as the battlefield or disaster areas. In general, more sensors are deployed than required (compared to optimal position) to perform the proposed task; this compensates for inaccurate positioning and improves fault tolerance. The characteristics of the sensor network include limited resources, large and dense networks, and dynamic topology.

An important problem in sensor networks is the scarcity of energy, partly driven by battery size and weight limitations. Mechanisms that improve the use of sensor energy have a significant impact on the longevity of the network. Energy saving technologies can usually be classified into two categories: sensor contract scheduling to switch between active and sleep mode, and adjust the transmission range or sensor of the wireless nodes. In this paper we deal with both methods. We design a scheduling mechanism where only some sensors are active, while all other sensors are in sleep mode. Also, for each sensor in the group, the objective is to obtain a lower sensor range while meeting application requirements.

One of the main design considerations in cluster-based wireless sensor networks is the head of the cluster and cluster configuration. Cluster size with a large number of member nodes leads to a few groups in the network improving intercluster communication efficiency. On the other hand, the size of the mass with a small number of member nodes leads to an increase in the number of clusters in the network that require the backbone with a large number of group heads and gates (cluster member that connects the two different cluster heads) to guide the communication packet between the cluster. Energy efficiency in assembly protocols can be seen in two different approaches: the number of clusters formed or the number of members in each cluster (cluster size). In the context of cluster-based topology, cluster size is related to the number of neighbors connected to a cluster head, defined as the degree of node, and can be referred to as the number of nodes in each group. Most current methods control mass size with acceptance or rejection policies during mass formation, which can depend on the strength of the strongest receiving signal [2]. Our proposed method of controlling the number of members in each group is through the transmission control algorithm [3]. This paper is the

basic question about the mass size that gives minimum power dissipation while maintaining network connectivity. The connection can be determined by the number of neighbors who have node (node degree) [4]. Node class is a local verifiable property of each node to achieve a global network property such as connection [5]. Communication is an important feature of wireless sensor networks that enable data reorientation or exchange between nodes in the network. The nodes can communicate among themselves to guide each other's data packets if there is a path between any couple of nodes. The connection depends on the number of nodes per unit and its transmission range. The correct setting of the contract delivery domain is an important consideration for the network lifetime [6]. By increasing node transmission strength, more nodes can be accessed via a direct link. Increased transmission range can improve communication but on the other hand can lead to higher interference, greater data collisions and higher energy consumption [7]. Lowering the low transport power may isolate some nodes without any link to the other nodes. Communication was studied in terms of degree of node by [4, 8, 9]. Node degree is also considered to be one of the important and appropriate measurement metrics for wireless LAN connection [10, 11]. It has been shown that the average node degree for a semi-fully connected random grid is randomly located using a uniform distribution of 6 to 10 [8].

A. Introduction To TECH-1 &TECH-2 FOR WSN - The core idea of the TECH-1 protocol is to divide the entire wireless sensor network into several groups. The vertical nodes are randomly selected, with the chances of selecting each node as an equal block head, and calculating the average power consumption for the entire network. Therefore, TECH-1 can extend the network lifecycle. The TECH-1 algorithm is circular, which provides a circuit concept. The TECH-1 protocol runs on several rounds. Each round contains two states: the status of the cluster setting and the steady state. If the cluster is set up, it is a block in the AC mode; in the case of stability, it transmits the data. The second case is usually longer than the first case in which the protocol load is saved.

The group header selection depends on resolutions 0 and 1. If the number is less than the limit, the node becomes the group header for the current rotation. With this threshold, each node will become a block header at some point within round 1 / p. The node can not become a header block head block again at 1 / p-1 rounds. After that, each node has a 1 / p probability in each round to become the cluster head. At the end of each round, each normal node is not a block header by specifying the nearest block head and cluster input for data transfer. Collects the group header, compresss the data and redirects it to the base station, leading to an extension of the life of the primary node.

In this algorithm, power consumption will be evenly distributed between all nodes, and non-vertical nodes will be shut down as much as possible. TECH-1 assumes that all nodes fall within the scope of the base station's wireless transmission, which is not the case with many sensor deployments. 5% of nodes in each node are used as cluster heads.

Spread TDMA to improve management and scheduling. TECH-1 is one of the most common clustering algorithms used in WSN to increase network lifecycle. TECH-1 is a protocol of adaptation, self-organization and assembly. It assumes the concept of Round. TECH-1 It is assumed that the fixed station is stationary and far from the sensor, and that all sensor units are homogeneous and have a limited power source, and the sensor can sense the environment. Fixed rate, can communicate with each other, the sensor can communicate directly with BS. The TECH-1 idea is to organize the nodes into power distribution groups between the sensor points in the network, and there is a specific node called the CH head in each group. Network life is a major issue because of the limited power of the sensor; it is particularly suitable for applications of wireless sensor networks in harsh environments. Therefore, energy-efficient routing and adaptive assembly schemes have been developed to extend the life of the network.

B. Clique Technique IN WSN - A clique-based algorithm that refines the measurements using the redundancy in groups of interconnected nodes. This greatly improves the accuracy of localization comparing to algorithms not using cliques. The other contribution is elaborating the peer-to-peer localization algorithm that is self-organizing. This algorithm uses the angle and range measurements in order to pass a 3-D reference system in the peer-to-peer mode, between two nodes, without any precalibration and without using earth-gravity.

In this section, this technique gives the background for the techniques that can be used as angular and ranging measurement methods in the DV-exchange localization method. This also specify limitations of the localization methods of significant importance to this work which were not mentioned in the introduction.

i). Spatial measurements - DV-exchange method is based on the measurements of distance and angle between sensors (nodes). The methods for obtaining these quantities in the peer-to-peer mode can be Time of Arrival (ToA) and Angle of Arrival (AoA). In this work, the technique assume using antenna arrays for obtaining these quantities, but technique base on the assumption that we are given the values of angles and distance with some error without analyzing the performance of a particular measurement technique.

ii). Localization techniques - Positioning method efficiently overcoming the problem of an unknown propagation model in tunnels. It uses a neural network to learn the response fingerprint of a sensor being in a certain location in the tunnel. Nevertheless, similar methods cannot be used in the self organized, training-less system like the one under consideration in this work. This is so because the method aims at localizing mobile sensors in the known environment. In contrast, the operating environment considered in this work is not known in advance.

II. RELETED WORK

Wireless sensor networks are made up of small sensors with applications and limitations that are tailored to specific purposes. These applications are divided into military, commercial and medical applications. Military applications include communications, command and intelligence defense networks. Health care systems for banned remote areas, smart environments for older people, communication networks for doctors and medical staff, and patient monitoring systems are some medical applications. In addition, there are a wide range of commercial applications including safety systems, fire safety systems, environmental pollution monitoring systems (chemical, microbiological and nuclear pollution), vehicle tracking, monitoring and control systems, traffic control systems and natural disaster research (eg earthquakes and Flood) [1]. A wide range of applications have led to the development of various protocols, including a large number of flexible parameters. In any case, due to its wide range of uses, some parameters can be found in several applications (as common parameters) and are very important. Wireless sensor networks use mobile energy and rechargeable batteries, and due to technical limitations, these batteries can supply energy in a short period of time. Therefore, it is very important to make the best use of energy in such networks [2].

The need for data integrity in WNS makes lifecycles another important parameter in WSNs due to the support for continuous and permanent communication between sensors. This study investigated some specific parameters of different operating phases of wireless sensor networks. In general, the operational phases of classic WSN are divided into node layout, network coverage, clustering, and data aggregation.

In [2], the concept of a distributed topology control algorithm is introduced. This paper proposes a local distributed topology control algorithm. It calculates the optimal transmission power for active network connections. It reduces the node transmission power to cover the nearest neighbor. The node uses only locally available information to determine the node. Much work has been done on the fault tolerant topology control algorithm to minimize total power consumption. It provides a k-vertex join between two vertices. Michaela Cardei et al. [7] proposed a new architecture for achieving minimum energy consumption by using k-approximation, focusing on greedy, distributed and localized algorithms. It provides a reliable data collection infrastructure from sensors to super nodes. Andrew Ka-Ho Leung and Yu Kwong Kwok [15] proposed a new localized application-driven topology control protocol. The solution is designed for wireless P2P file sharing networks. Their proposed approach is based on enhancing the life cycle and effectiveness of file sharing between peers. The authors attempt to achieve efficient connections between mobile devices to better serve file sharing applications. The protocol they designed consisted of two components: 1) Adjancy set construction (ASC) 2) Community community Asynchronous wakeup (CAW). Waltenegu Dargie et al. (2010) proposed a topology control protocol [1]. The developed protocol enables nodes to deplete their energy fairly. This paper proposes an algorithm based on node qualification and efficiency. In this paper, the author proposes a shortest path and energy-saving topology control algorithm [4]. The algorithm attempts to preserve the shortest path connecting itself to nearby nodes and the smallest energy path. The research work performed by the author of [16] examined the ignorant price in topological control in cognitive networks with power and spectral efficiency goals. They proposed a distributed algorithm that minimizes the maximum transmit power and spectral footprint of the network if the radio has global knowledge. They show that although local knowledge has little effect on the maximum transmission power used by the network, it has a significant impact on spectrum performance. They proposed ways to achieve end-to-end goals through learning and reasoning. For dynamic networks, more knowledge provides better spectrum performance as the radio joins the network. Some ignorance in the network leads to better performance when the radio leaves the network.

III. INTRODUCTION TO ALL TECHNIQUES AND ALGORITHMS

Genetic Algorithm - Genetic Algorithm EA) is a heuristic search technique that mimics the process of natural Genetic . This heuristic is routinely used to generate useful solutions to optimization problems and search engines. Genetic algorithms belong to the larger class of Genetic ary algorithms (EA), the solutions to optimization problems using techniques inspired by natural Genetic to generate as inheritance, mutation, selection and crossover. This research investigates the data collecting spanning trees with higher energy efficiency.The proposed algorithm always tries to achieve a proper route that balances the data load over the network. An algorithm that ensures a balance of residual energy among the nodes increases lifetime of the network.

Introduction To Clustering - Clustering is one of the important methods for prolonging the network lifetime in wireless sensor networks (WSNs). It involves grouping of sensor nodes into clusters and electing cluster heads (CHs) for all the clusters. CHs collect the data from respective cluster's nodes and forward the aggregated data to base station. Figure 1 shows on the basis of proposed technique the life time of the Wireless sensor network can be enhanced due to the low energy consumption

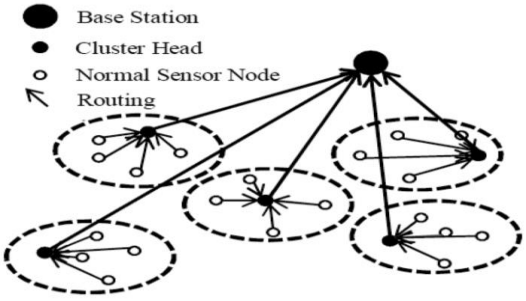


Figure 1:Clustering in WSN

Clusterting 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 reponsblity to communicate the base station.

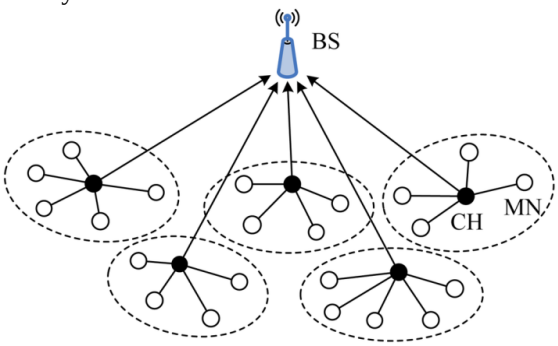


Figure 2: A sample of cluster based WSN.

A. Introduction To CBCR - We propose a TECH-2 (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 TECH-2 are: self-configuration and localized coordination, maximum energy cluster head, periodical rotation of cluster head, hierarchical forwarding, load balance, fault tolerance and scalability.

B. Introduction To Cluque - Our detailing 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'.

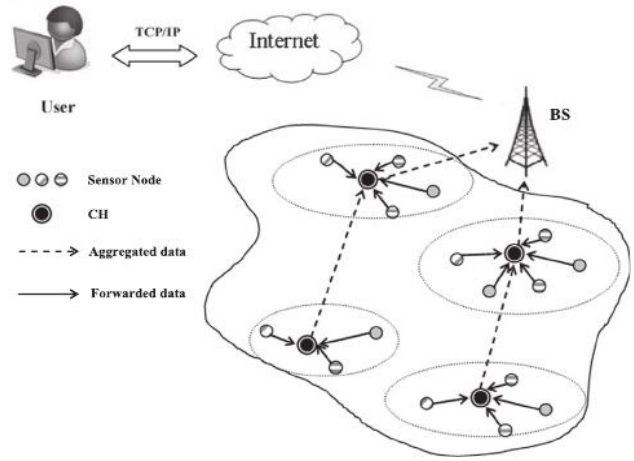


Figure 3: Single Hop Sub Network in Clique

C. Clustering Procedure in Cliques - The sensors run one of the protocols in to create cliques like clusters. We assume that this phase yields k cliques (clusters), hence k cluster heads named $CH_{clique-I}$, $1 \le i \le k$, for the cluster head of clique i.

Analysis of the Energy Consumption - The energy model used here is similar to that used by most existing energy-efficient clusteing model

$$E = ET + ER = a \times (e_t + e_{amp} \times d^n) + a \times a_r$$

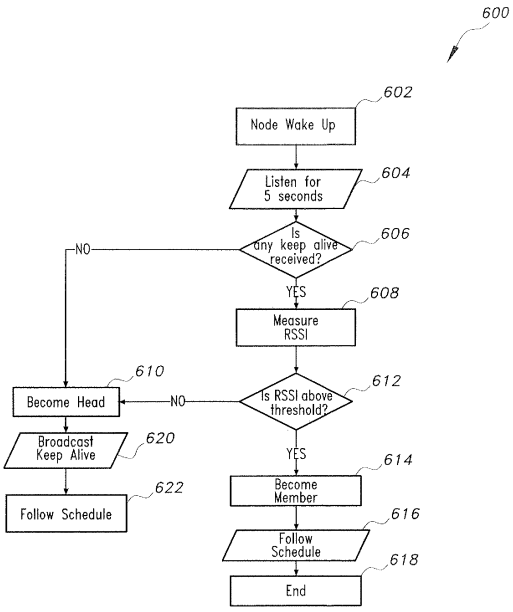
Where, ET and ER are the energy consumptions of transmitting and receiving data items respectively. The energy dissipated in operating the transmitter radio, transmitter amplifier and receiver radio are expressed by e_t, e_{amp} and r_e respectively. And d is the distance between nodes and n is the parameter of the power attenuation with $2 \le n \le 4$.

Reducing Power Consumption during Clustering in Cliques - Our approach is based on energy-efficient clustering algorithm in which the cluster head is located in the central area of the cluster. Here, since each cluster is a clique, each sensor is at one hop to the cluster head. This contributes to use less energy for transmission to and from the cluster head, comparatively to multi hop clustering.

D. Simulation Parameters

Parameter	Value
Network Size	[100 100];
Number Of Sensor Nodes	100
Sensor Node Deployment	Uniform Random
Percentage Of Cluster Head	5
Data_Packet_Size	=128
Energy_Th	10e-3
Eelec	=50e-9
Efs	=10e-12
Eda	=5e-9
Mobility Model	Random Way Point Model
Data_Packet_Size	=128
Broadcast_Packet_Size	=24
Transimission_Range	=20
Zoom	=10
Communication Radius	d0=87.71

E. Implementation Process - To make sure that network runs with the highest feasible performance, the nodes are positioned on the campus network. Along with balanced energy consumption of all nodes, a preferred node placement protocol is supposed to supply a better network throughput through attenuating contention of channel and collision of packet under high load.



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3 Pseudo Code for EA

For j=1 to c
Pj=rs[ss]
End for
For j=1 to j=c
Pfj=fitness[pj]
End for
For i=1 to i=g
For j=1 to c
Cj=rs[ss]+pj
End for
For j=1 to c
Cfj=fitness[cj]
End for j=1 to c
If pfj<cfj
Pj=cj
Pfj=cfj
End if
End if
End if
Where
C represent the number of taken chromosomes
Where g denotes the number of generation
Pj denotes the j_{th}paresnts chromosome
Rs[ss] is the random fn to generate random value with search limit ss
$\mathbf{C_j}$ denotes the jth child chromosome
C fj represent fitness value for child chromosome
Fitness values equation

Fitness val= (Ei/Emax)*w1 + (Cqi/Cqmax)*w2
Where, Ei and Cqi denotes energy & cliques for ith nodes
W1 & w2 are the respective weights.

IV. SIMULATION RESULTS IN GRAPH

We have various no. of experimental graphs which came out after the simulation these simulations basically based on proposed parameters as described earlier in table 1. On applying the proposed Genetic algorithm this technique gives the result in various types of ratios as shown below.

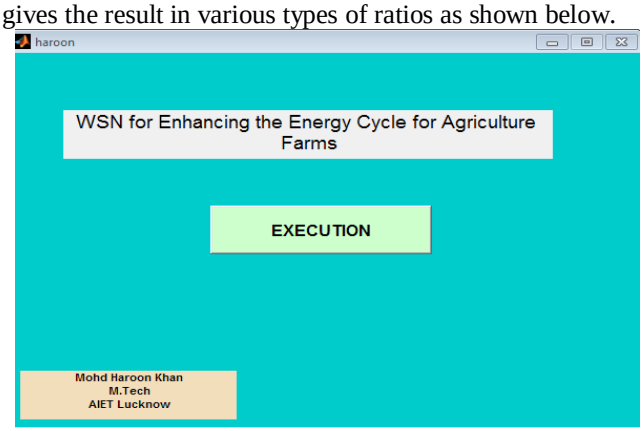

Figure 4: GUI Basic

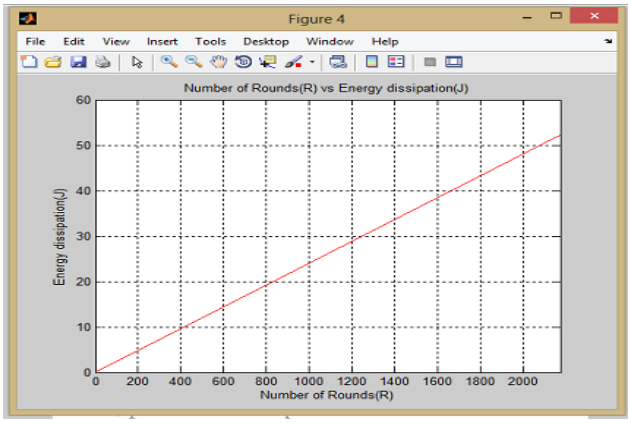

Figure 5: Energy Dissipation vs. Number of Round.

Above fig 5 shows the no. of energy dissipation increases with the implement of no. of rounds. The relation Between Energy Dissipation vs. Number of Round is linear.

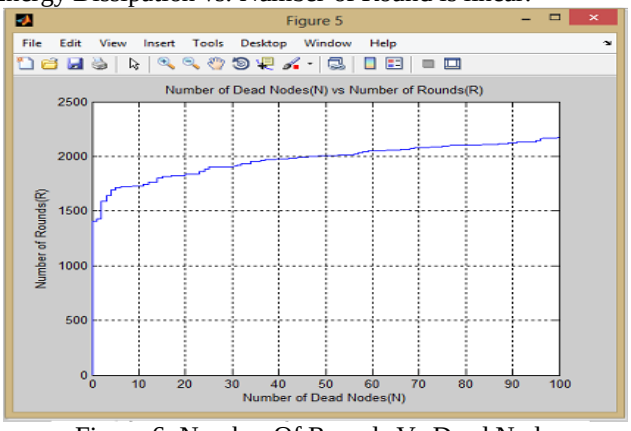

Figure 6: Number Of Rounds Vs Dead Node

Here above figure shows the occurrence of dead node vs no. of rounds, we found no. of dead nodes occurs after 1400 rounds of communication. Thereafter continuous in slight increment of dead nodes. Finally, we observed all nodes turned into the dead node near about the round of 2200 approx.

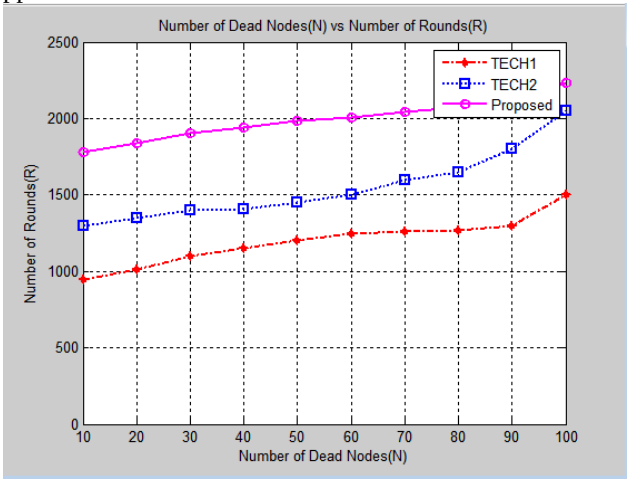

Figure 7: Number of Rounds Vs Number of Dead Node

This above figure comparative result of TECH-1, CBCR and Proposed work (Based on EA). Tech-1 shows with Red line, TECH-2 shows with blue line and proposed work shows with black line. Instead of higher no. of rounds dead node occurs in proposed work is less as compared with the TECH-1 and CBCR. It will be enhance the lifetime of WSN through proposed technique.

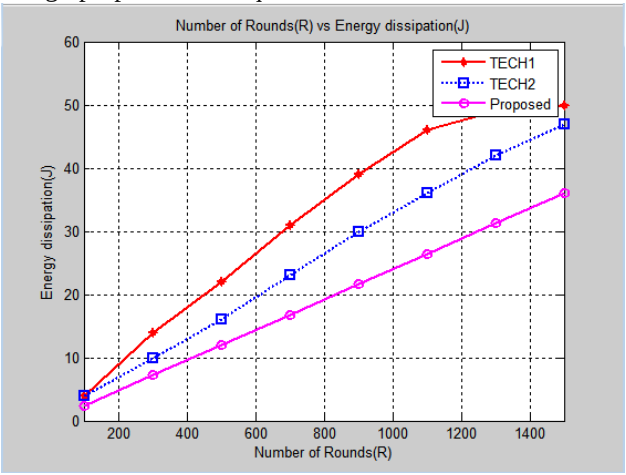

Figure 8: Energy dissipation vs. number of rounds

Fig 8 shows the no. of energy vs no. of rounds this above is the comparative result of TECH-1, TECH-2 and Proposed work (Based on EA). Proposed work which is in black line clearly shows the less energy dissipations with TECH-2 and TECH-1. This will also facilitate the WSN for enhancing the lifetime of the network.

As increasing the round of communication, Dead node occurs in TECH-1 & TECH-2 earlier than proposed work. Ultimately, same situations carries for higher occurrence of dead node.

V. RESULTS AND DISCUSSIONS

This research shows after applying the Genetic algorithm, less energy dissipation in network appears after increasing number of rounds. Proposed work uses Genetic 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 TECH-1 and CBCR, this simulative result found very good result. This will ultimately can implement in Large agriculture Area.

VI. CONCLUSION AND FUTURE WORK

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, SEP, E-SEP, Adv-TECH-1, and ADV-TEEN

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