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INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 **Issue:** V **Month of publication:** May 2017

DOI:

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Volume 5 Issue V, May 2017
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

An Enhanced Event Based Data Transmission Approach with Updated Clustering in Wireless Communication Network

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Abstract: ***Wireless Sensor Network is a field which is growing rapidly for the purpose of communication. It includes the sensors distributed physically in order to sense the surrounding environment and collected data is transferred to the sink node as these sensors are able to communicate to each other. The communication is done by applying the process routing which implies the selection of nodes as a victim of data delivery to the end node. The selection of node is done on the basis of various parameters; Energy and cluster head selection are the most important parameter of this list, as the sensors are allotted with a fix amount of energy at the initialization of network. After having a review it was founded that there are large number of protocols that are available to implement the routing and cluster head selection in wireless network such as LEACH, DEEC etc.***
This paper proposed an advanced event driven protocol for routing and cluster head selection. The parameters like energy and distance are considered for cluster head selection. The simulation give the output that is portrays in the result section, shows the proficiency of the proposed work over traditional works with respect to various performance parameters.
Keywords-Wireless Sensor Network, Cluster Head, Event Driven Energy Efficient Protocol

I. INTRODUCTION

The use of wireless sensor networks is increased in last decades and at the same time the problem of energy constraints in terms of limited battery lifetime is arrived [1]. Since all the operations of the nodes depends upon the energy so it is very difficult to replace or recharge battery once a sensor node is installed. Failure of single node can affect the working of whole system. To save energy caused by communication follow the following steps [2]:

A. To schedule the state of the nodes (i.e. transmitting, receiving, idle or sleep).
B. By using suitable clustering algorithm for network formation
C. By using optimal routing methods.

Energy consumption can only be minimized by having minimal activation of sleeping nodes. Every sensing node can be in active, idle and sleep modes for receiving and transmitting activities [3].

D. In active mode , energy is consume while receiving and transmitting of data takes place,
E. In idle mode , energy consumption rate is similar as active mode,
F. In sleep mode, the radios of the nodes are closed in order to save energy, so this mode is totally energy saving mode.

The small amount of energy in a sensor node restricts the abilities of nodes such as processing, memory, storage, and communication; it may cause to limited lifetime of network. Clustering algorithms are more energy efficient than direct routing algorithm so it is another way of saving energy by using clustering algorithms instead of direct routing algorithms [4]. In clustering algorithms the clusters of nodes are created and each of the cluster is assigned with a cluster head (CH). In this topology, first of all sensor node sends the data to their respective Cluster Head and then these Cluster Heads forwards the data to the server of base station. Sensor nodes can communicate within their respective cluster only i.e. nodes can send or receives data within the limited range(within cluster only) therefore minimum amount of energy is consumed but when the data is transmitted from cluster heads to base station then energy consumption is high [5].
This study propose the event driven EEP for the purpose of implementing the cluster head selection and routing in order to deliver the data efficiently and securely along with saving the energy of the sensors. As the cluster head selection is one of the major issues

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in WSN. The event driven energy protocols are used for saving the energy and node selection to implement the cluster head formation.

II. PROBLEM FORMULATION

Leach is a clustering routing protocol using probabilistic method to elect channel head of a node using energy and threshold conditions. Here selection of a node is not done based on amount of energy, which could cause problem in selection process to give priority to a low power node. If low power node is not used efficiently, more number of nodes has to be taken to form a cluster. Leach uses single hop clustering routing and cannot be used for larger networks. Different amounts of initial energy cannot be considered in LEACH since CH rotation is performed at each round. Nodes with low energy, elected as CH could cause energy holes and coverage problems. To overcome these difficulties, energy considerations were done in the previous work. But we focus on main requirement the need of system is to enhance the energy that not only dependent on the energy only. So it can be further extended with improving the CH selection approach for proposed work.

III. PROPOSED SYSTEM

As in problem it was discussed that the CH selection was the major issue in the network due to which the energy was introduced in the present work, but only energy factor is not a point to add on to the performance of the network other parameter as distance can also be considered because the main effect of this will be the energy modal that is used in the EEP are directly proportional to distance also. So there will be major effect of considering the distance in CH selection.

Only this concept will be not a major change in present work considering this the proposed work will also have some other changes that are the communication rounds will be reduced by only communicating during the event occurrence which will lead to save the energy by the nodes in the network which is major concern of the study.

IV. METHODOLOGY

A. The algorithm of the proposed work is as follows

1) First step is to initialize the parameters or values for network configuration. The parameters are as follows:

a) Area of the network

b) Number of nodes in the network

c) Location for the node deployment

2) In this step user have to initialize the energy parameter and deployment of nodes will take place over initializing the energy parameters.

3) Next step is to perform clustering and cluster head selection. The cluster heads will be selected on the basis of following basis;

a) Amount of energy with respect to individual node.

b) Distance

4) If there is a data available for transferring purposes

Then Transfer the data to the destination node Apply energy dissipation model.

Perform the comparison on the basis of observed results with respect to the list of the following parameters:

Lifetime

Number of dead nodes

Else

Move to the step 3.

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Volume 5 Issue V, May 2017
ISSN: 2321-9653
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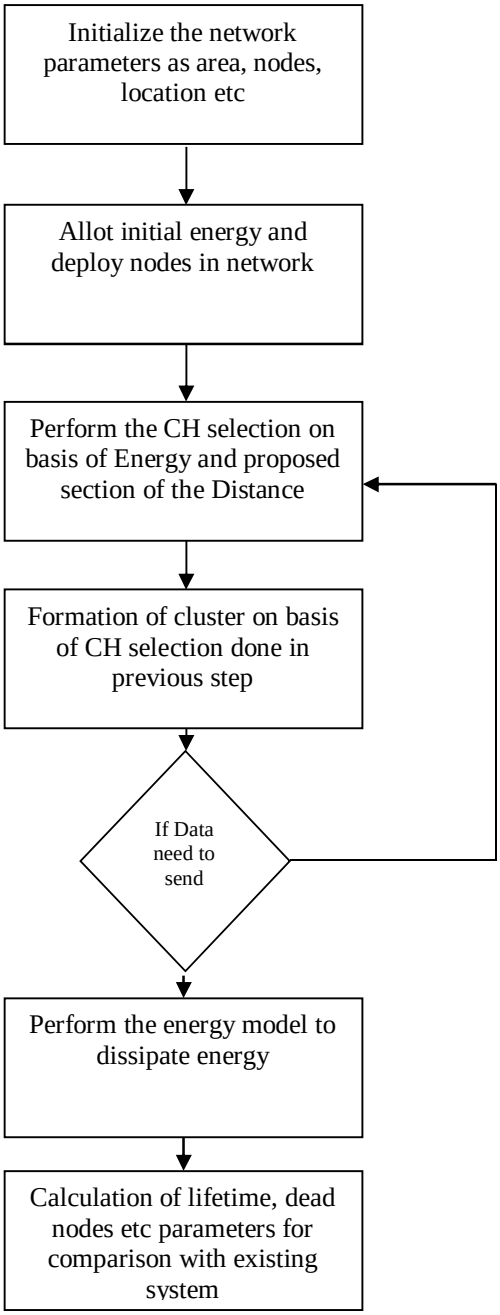


Figure1. Block Diagram of proposed work

V. RESULTS AND DISCUSSIONS

This section represents the results that are obtained after implementing the proposed work. The implementation is done in MATLAB. There are some graphs in this section which proves the efficiency of proposed technique with respect to various aspects such as number of dead nodes, number of alive nodes etc.

Initial step for the proposed technique is to setup a network. Below figure 2 represents the number of nodes in the network where number of nodes are 300 and area is of 300 by 300.

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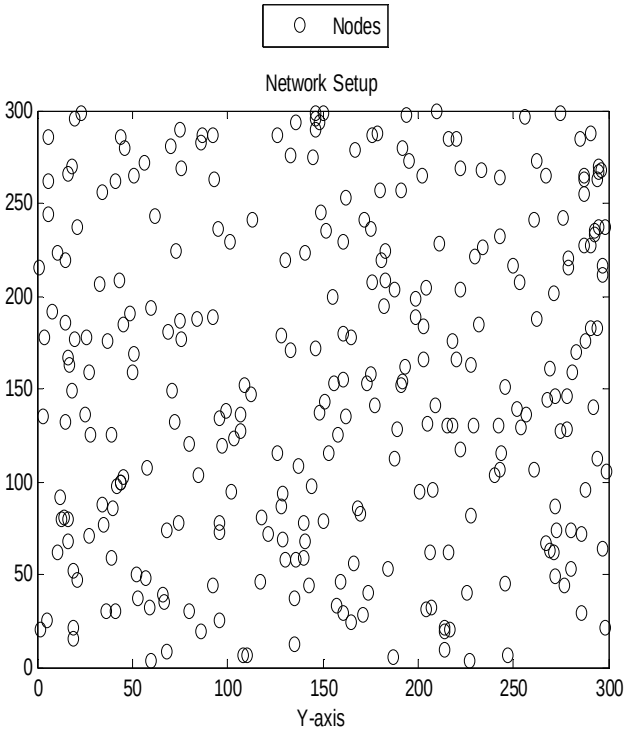


Figure 2 Network setup

Next step is to select a sink for the network which shows in the figure 3 below where node with the green symbol represents the corresponding sink for the proposed technique.

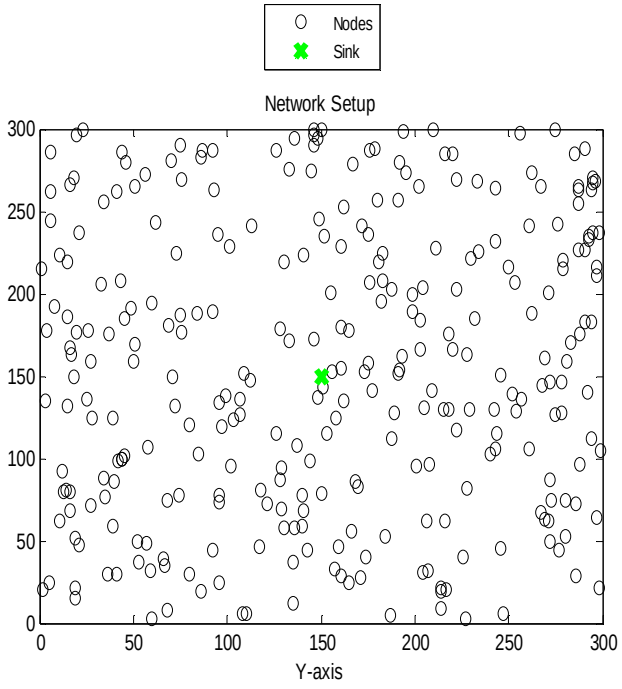


Figure 3 allocation of sink in the network

In the below figure 4, cluster head has chosen on the basis of distance and energy. Thus in each cluster, a cluster head is selected.

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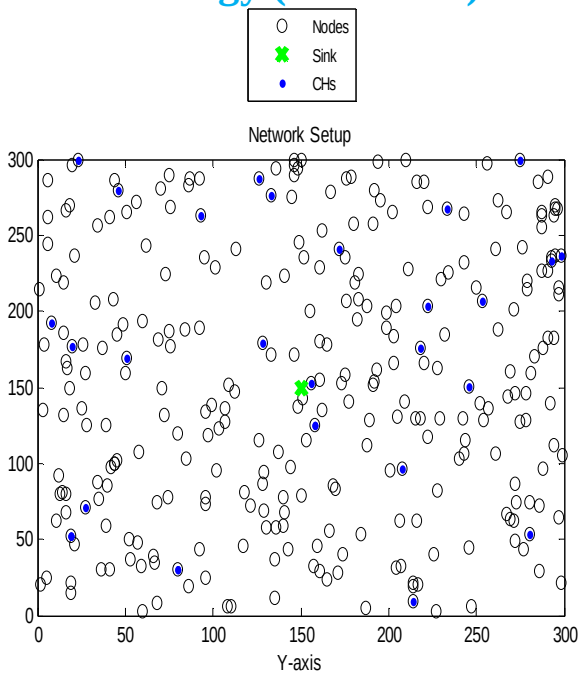


Figure 4 Selection of cluster head in the network

The figure 5 below represents network with the formation of cluster heads. It shows that the sink node is placed at the mid of the network and marked as cross sign. The total area covered by the network is 300*300.

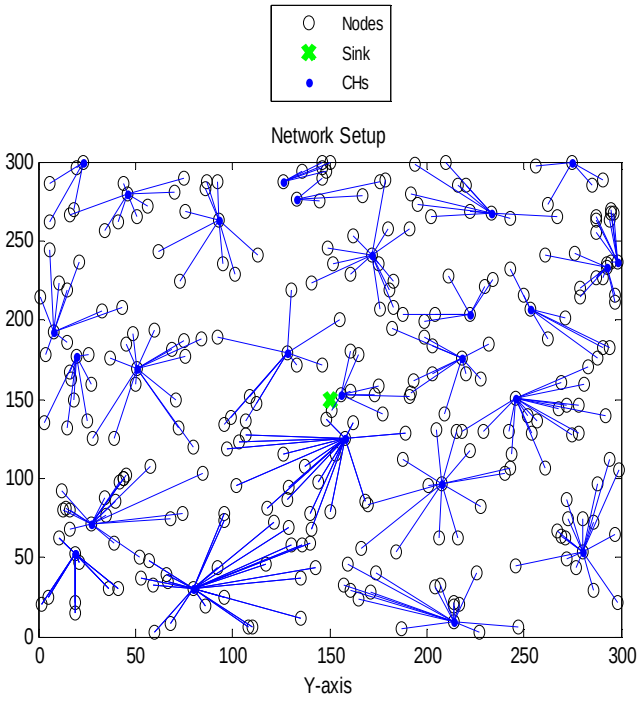


Figure5 Formation of clusters

The graph (Figure 6) below shows the efficiency of the proposed work in the terms of dead nodes. The graph below represents the total number of dead nodes in the network as the rounds are increasing. Only 180 nodes from the 300 nodes are dead with respect to rounds in the network.

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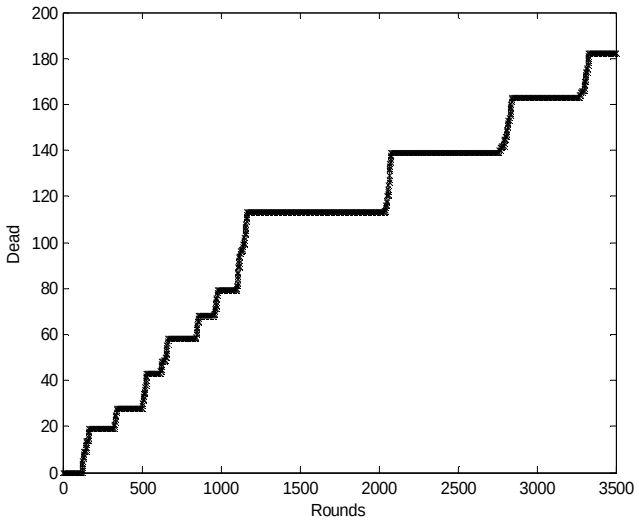


Figure 6 number of dead nodes while transmission

The figure 7 below defines number of alive nodes in the network. The graph shows that the proposed system has large number of alive nodes in the network. At the final stage of the round most of the nodes are alive. Total 3500 rounds are considered for implementation.

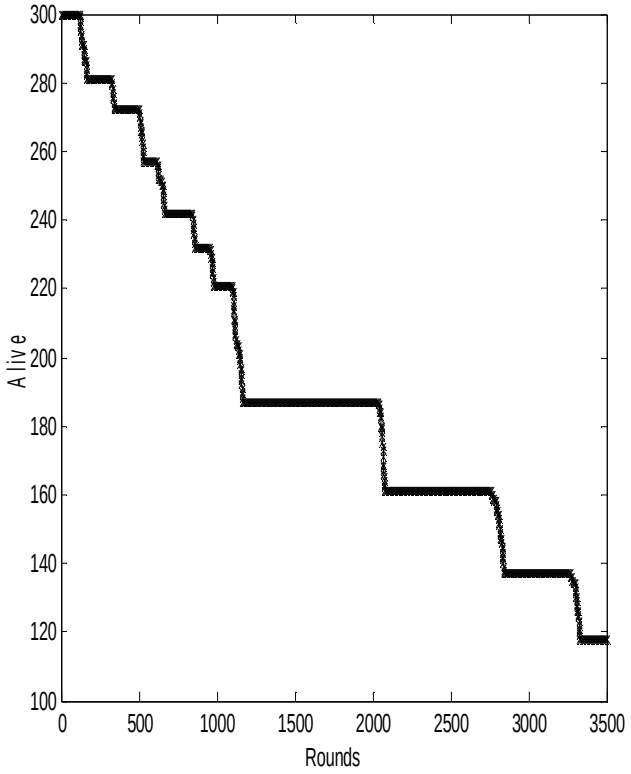


Figure7 numbers of alive nodes with respect to rounds in the network

In the figure 8 below represents the first node dead in the network. Second node is dead in the 120th round which is more efficient.

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ISSN: 2321-9653
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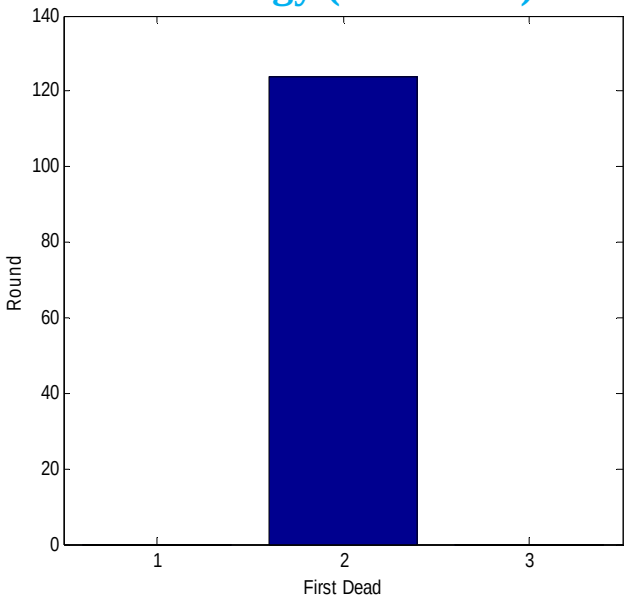


Figure 8 First dead nodes in the network

The figure 9 below shows average residual energy of the nodes in the network. The graph shows that the average residual energy of proposed work remains till the completion of rounds that shows the competence.

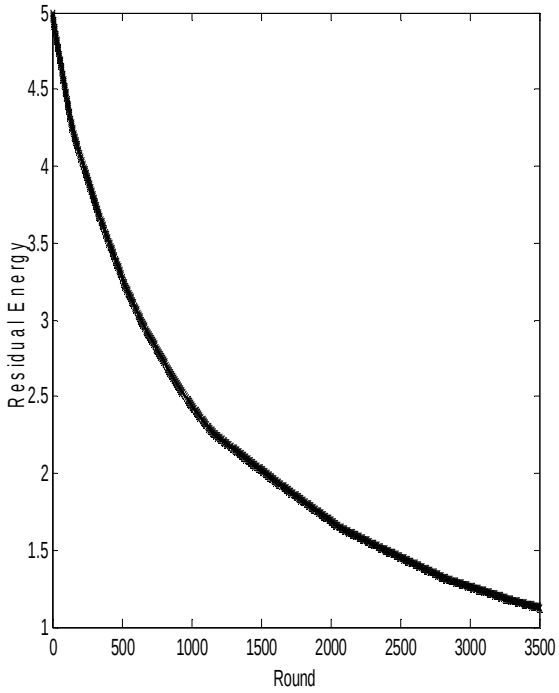


Figure 9 Residual energy of the nodes versus rounds

The graph below (figure 10) shows the efficiency of the proposed work in the terms of dead nodes with respect to different techniques such as Wcera, Teen and proposed. All the nodes are dead in case of Wcera and Teen but in the proposed technique nodes are still alive for transmission.

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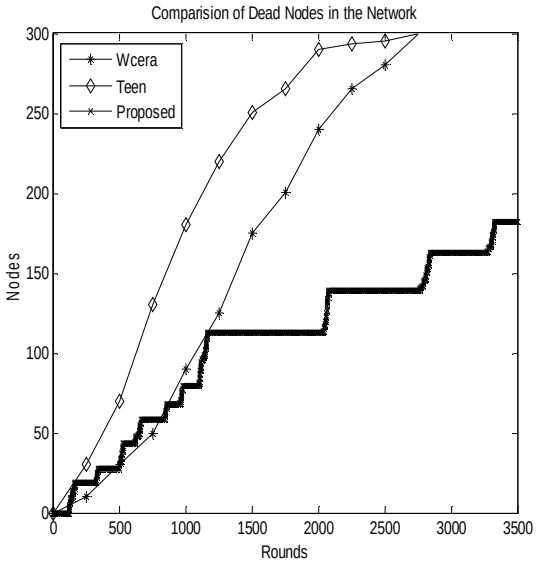


Figure 10 Comparison of dead nodes in the network

The figure 11 below defines the comparison graph of various techniques i.e. WCERA, TEEN and proposed work on the basis of number of alive nodes in the network. The graph shows that the proposed system has large number of alive nodes in the network as compare to other works. Number of alive nodes till number of rounds is more stable in case of proposed technique as compared to other techniques.

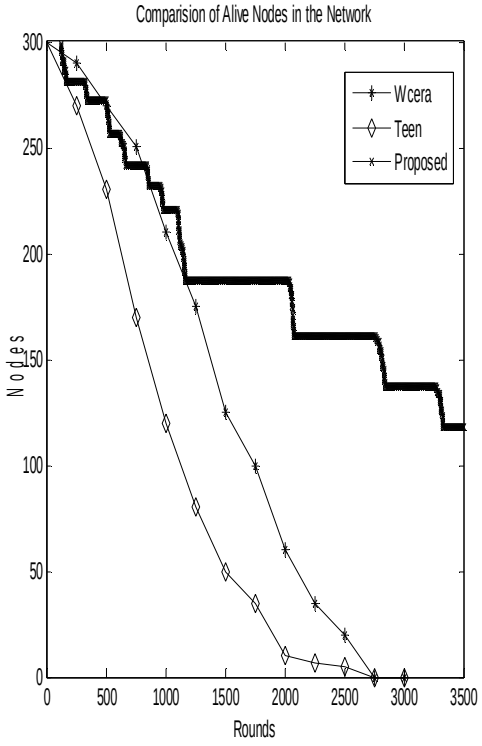


Figure 11 Comparison of Alive nodes in the network versus rounds

The figure 12 below shows a comparison graph on the basis of average residual energy in the network. The graph shows that the average residual energy of WCERA is exhausted after 80 rounds, in case of teen it is exhausted after 70 rounds whereas in case of proposed work the residual energy remains till the completion of rounds.

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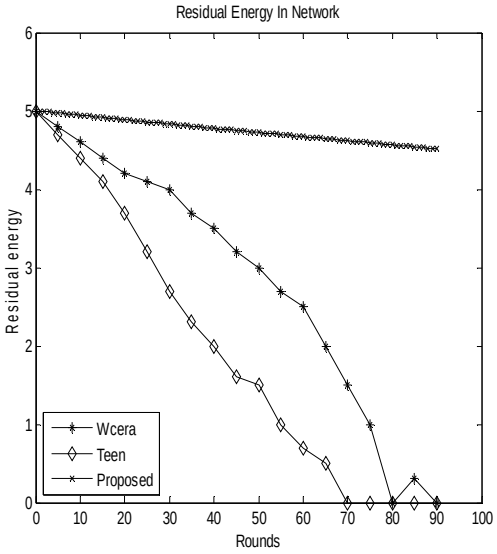


Figure12 Residual energy of different techniques in the network

VI. CONCLUSION AND FUTURE SCOPE

In this proposed work after considering the concept of the distance as well as maintaining the present work advantage of the energy role in CH selection which was named with a hybrid of LEACH and HEED the proposed section will definitely enhance the performance of the hybrid model of existing systems. Along with this, as the communication rounds are reducing the energy will be saved for much longer time and can be stable for more communication which is major need of present WSN. Comparison has done using different exiting technqiue to show the efficency of the proposed technique. Simulation results proven the fact that proposed technqiue provides better results in terms of energy , number of alive nodes, dead nodes and residual energy of the nodes in the network.

In future various parameters rather than energy can be used for selecting the cluster heads such as throughput, delay, packet lost tec. Varioys techniques can also be introduced to enhance the work.

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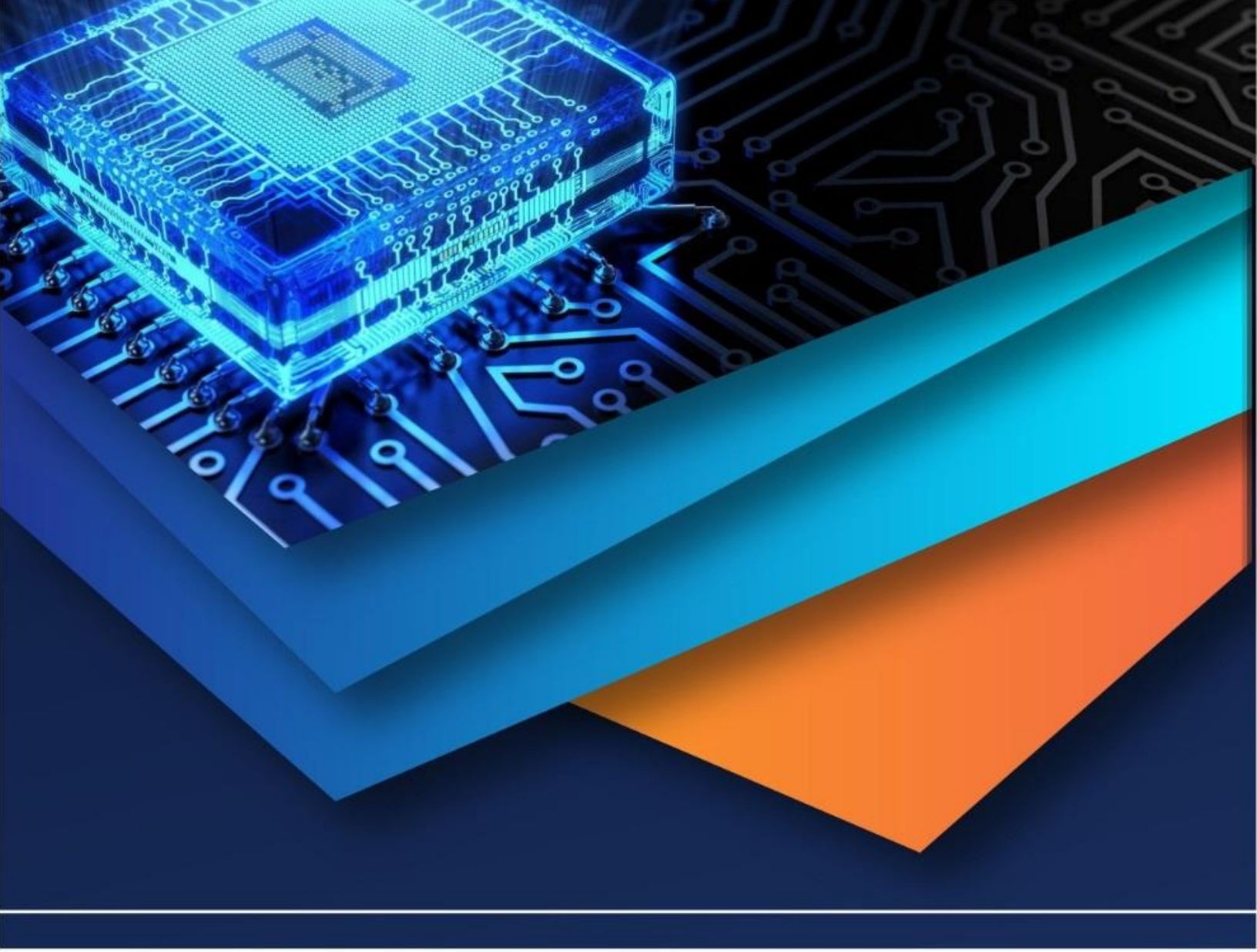
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