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RESEARCH ARTICLE OPEN ACCESS

ROUTING PROTOCOL ON WIRELESS SENSOR NETWORK USING ACO AND DEEC

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Abstract:- Sensors nodes in WSNs' applications are battery constrained thus innovative techniques are needed to eliminate energy inefficiency that shorten the network lifetime. There is dead node identification problem during the transmission of data because at that time path is not identified. Another problem is the network life time problem due to the redundancy. During the transmission energy is lossed, so there is energy consumption problem. There is NP-hard scheduling problem that we have seen in the literature survey. Another problem is the more bandwidth and less network life time problem. To implement Hybrid Algorithm for routing in Wireless sensor network using CH-leach and DEEC. To ACO and LEACH protocol on wireless sensor network using Clustering. CH-Leach Protocol, an approach of algorithm proposed, this proposed research used number of connection in cluster, and for each cluster head (CH) communicate with base station, however the selection of the cluster head based on the number of cluster on the network gird area, this method allow the network to adopted the best scenario to extend life time of the network, different ways of cluster are formed, in order to avoid the condition that one cluster will contain large of connection nodes and the rest is not, the maximum number of the cluster head is chosen in different scenario to test the network coverage. a series of experiments on different scenarios were implemented and tested. For energy consumption in wireless sensor network EEUC protocol, zone-divided and energy-balanced clustering routing protocol (ZECR) is used to enhance this work. In this paintings the higher performance is executed as a substitute then the present paintings due to the fact the present paintings is most effective relies upon on bodily shape however our paintings is carried out with logical paintings and the general output is 70%.

Keywords: - Low Energy Adaptive Clustering Hierarchy (LEACH); Low Energy Adaptive Clustering Hierarchy-Centralized (LEACH-C); DEEC.

I. INTRODUCTION

Wireless sensor networks (WSNs) have been identified as one of the most important technologies for the 21st century. The tiny, low cost and low power sensors are able to communicate within a short range and work together to form a sensor network for gathering data from a field. [1]

These sensors have data processing and communication capabilities. They have also enabled us to monitor and collect data in any environment. They sense the conditions in which they are surrounded and transform their data to electronic signals. The electronic signals are transmitted over radio waves to the base station (BS). [2]

Processing such electronic signals reveals some valuable characteristics of that environment. The usefulness of WSNs is more noticeable when they are used in inaccessible areas since there is no need to adhere to a specific network structure. Another unique feature that represents a significant improvement over traditional networks is the cooperative effort of sensor nodes [3].

Raw data is collected by sensor nodes. Since the sensor nodes are equipped with an on-board processor, the raw data may be manipulated as desired. For instance, for a sensor node collecting temperature data the values retained may be limited to temperatures less than a certain threshold. As the main power source for all nodes is a battery, the energy supply for each sensor node is constrained. The primary goal in designing WSNs is maximizing network lifetime as it is impractical to change or replace exhausted batteries [4].

Such constraint necessitates energy awareness in designing WSNs. There are two competing objectives in the design of WSNs. The first objective is the capability to exchange large amount of data between the nodes and the base station. The second constraining objective is minimizing the energy consumption. The two competing objectives reveal the importance of efficient routing protocol in WSNs [4].

Therefore, many routing algorithms have been proposed due to the challenges in designing an energy efficient network. Among all the proposed methods, hierarchical routing protocols greatly satisfy the limitations and constraints in WSNs [5]. Hierarchical routing protocols, also known as cluster-based routing, is mainly considered as a two layer architecture where one layer is engaged in cluster head selection and the other layer is responsible for routing. A cluster head (CH) in hierarchical routing is the node which is responsible for collecting data from other nodes in the cluster, aggregating all data and sending the aggregated data to the base station [6].

A specific clustering protocol known as LEACH (Energy-efficient communication protocol for wireless micro sensor networks) is analyzed in this work. As part of this work, our analysis of LEACH leads to the development of a new energy-efficient protocol known as WEEC (A Weighted Energy Efficient Clustering for Wireless Sensor Networks) [7].

When working with a large amount of time varying data, another important issue that should be considered is the graphical representation of such data to aid in the visual identification of network behaviour. Energy consumption is central to this work and the energy level of each node in the WSN is of particular interest, since the energy level of each node is finite. An accurate and effective visualization tool would provide a quick and accessible means to view the energy level of each node in the field to support the development of routing algorithms that minimize energy consumption [7].

II. MOTIVATION

Sensor nodes are used for event detection, continuous sensing and local control of actuators. There are many applications due to the wireless connection and micro-sensing features of WSNs. For example in military applications, WSNs enable commanders to constantly monitor the status of their troops. Moreover, information about the condition and availability of the equipment in the battlefield could be obtained by using WSNs [3].

Health applications are other examples of applications of WSNs that highlight the importance of research in this area. Accidental falls are especially hazardous to the health of elderly people. Such accidents could be monitored by the installed sensor networks. The installed sensor network could also be used for detecting heart attack as well as monitoring blood pressure.[4]

However, for developing useful and efficient applications, the challenges and obstacles apparent in the design of such networks should be properly addressed and solved. One such challenge is particularly important and relates to the development of energy efficient WSNs.[4]

Sensors nodes in WSNs' applications are battery constrained thus innovative techniques are needed to eliminate energy inefficiency that shorten the network lifetime. From the military perspective, critical data may be required at certain point in the future from nodes where energy levels are low. Therefore the identification of certain nodes which their energy level is less than a threshold is needed. [5]

Without a means to visualize the energy levels of each node, it is difficult to assess the energy distribution in the WSN and node failures may be lead to catastrophic results. A tool to visualize the residual energy of each node provides a method to avoid such events. In the medical field, a tool to visualize the residual energy of WSN nodes may also prove useful. [5]

As explained in the healthcare example previously, the monitoring of patients requires constant collection of crucial data to detect, for example, falls, imminent heart attacks or dangerous blood pressure levels. Maintaining such data collection rates requires efficient energy consumption, while ensuring that node failures are identified prior to their occurrence. Monitoring the residual energy level of each WSN node with an effective visualization tool is a method to prevent such node failures.[6]

III. ALGORITHM

Step 1: Create a Network creation with following
1. Network. height=100
2. Network. Width=100; N=Total_Nodes.
3. For each n´ in N
counter = 1;
x= rand (1, 1)*xm.
y = rand (1, 1)*ym.
Node. name (n) = counter; counter = counter + 1;
Endforeach
4. Cov_set = [ ]; //it would contain the limited area node.
for i =1 to N
cov_count=2;
for j=1: N
if (i! =j) // a node cannot compute distance to itself
d = √ ((CL (m).x-SN (i).x) ^2 + (CL (m).y-SN (i).y) ^2);
t= (p/ (1-p*(mod (rnd, 1/p))));
end if end for end for

Above algorithm describes the node deployment in the whole network. In proposed network 100*100 network development takes place with coverage set = 1.

Step 2: Find the path
1. For i=1: Network.Simulation.Rounds
2. Source=Initialize. Source;
3. Source.Id=Node.name (source); Path= [ ]; Pathelement=2;
Path [1] =Source;
4. Source.Packet.count=100;
5. Destination.Id=Node.name (Destination);
6. Current_cov_set_source=cov_set
(source.Id,:)dest_found=0; possible_nodes=[ ];
7. While (dest_found! =1)
8. For each all n in current_cov_set
If(x(all n)>xloc(Source.Id) && (x(all n)-xloc(Destination.Id)
< 0
Possible_nodes [possiblenoedcount] = all n;
Possiblenodecount+=1;
Endif
9. Selection=possible node count*Random;
10. Selected_node=Possible_nodes [selection];
11. Possible_Nodes=[ ]; Path(Path element) = selected_Node
12. End

Step 3: Set the different energy.

Step 4: Apply the random election of normal and advance Node.

Step 5: Apply the counter to count the distance between nodes, clusters and Base station and apply distance formula to find the distance.

Step 6: Choose the multiple paths with energy
S(i).E=S(i).E- ((tx_energy)*(4000) + multipath*4000*(dist*dist*dist*dist));

Step 7: Apply the CH-LEACH , DEEC and Hybrid Routing Protocol for transmission of data from Base station to different nodes through BS.

Step8: Find the first dead, half dead and full dead nodes during transmission of data from BS to nodes and clusters.

Step 9: Calculation of Energy dissipated based on distance
if (distance>do)
S(i).E=S(i).E- ((ETX+EDA)*(4000) + Emp*4000*(distance*distance*distance*distance));
end
if (distance<=do)
S(i).E=S(i).E- ((ETX+EDA)*(4000) + Efs*4000*(distance * distance));
end
Step 10: Draw Varnoi diagram for network.
Step 11: if Step 2 to Step 9 is completed then
Calculate
Rho1 = (number of bit error)/ (total number of bit send)
Bit Error Rate = Rho1 +Em
p= N/R
N is the number of bits, and
R is the rate of transmission (say in bits per second)
Delay=abs(p +Em),
Remaining_Energy = ETx (k, d) = Eelec * k + Єamp *k * d2, d>1
ERx (k) = Eelec * k
Energy Consumption= mean(Remaining_Energy)+Em
and
Size of the packet= abs ((abc) +Em)*packet
Transmission time =datatxperiod*10
Throughput= (Size of the packet / Transmission time)
End

IV. RESULTS &DISCUSSION

The different problems are faced and all these problems are resolved with different Objectives. The Complied result snap shorts are given below:

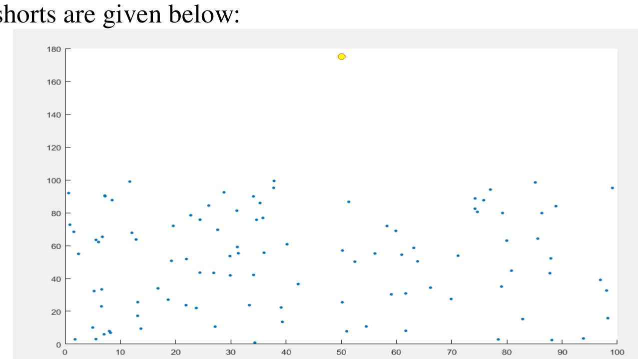

Figure 1: Deployment of sensor nodes

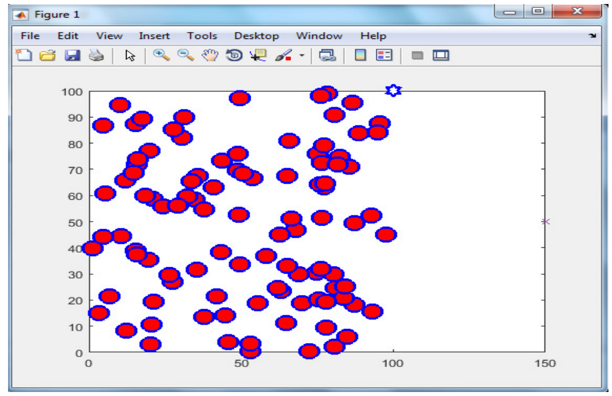

Figure 2: Nodes and Base Station on 100x100 areas

The figure 1 and figure 2 is the deployment of sensor nodes on wireless sensor network. In these figure nodes are displayed in red and blue color and base station is marked with yellow and white color. All these nodes are used to transfer the data through base station.

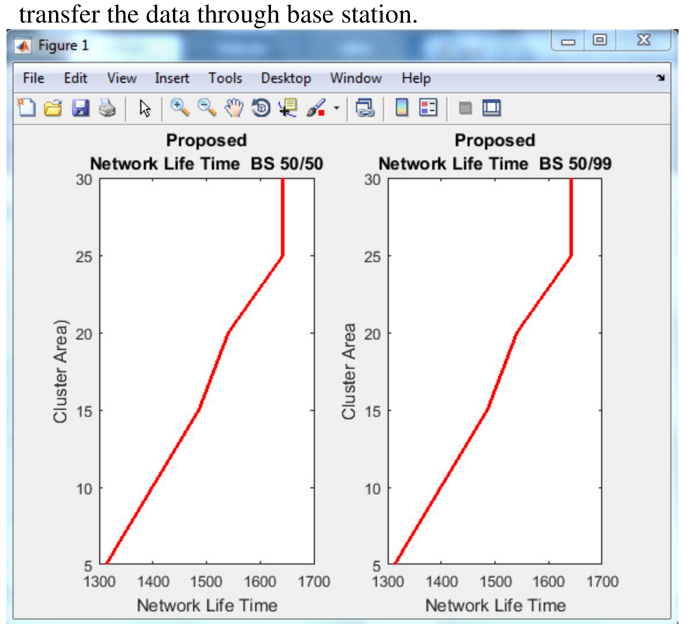

Figure 3: Network life time for 50/50 and 50/99 BS position

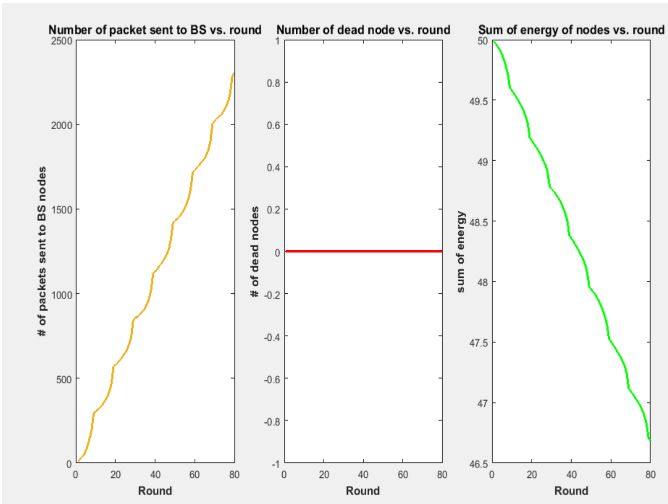

Figure 4: Packet to BS nodes vs. Round

The figure 3 is the representation of network life time with different position of Base station. In this figure the position of base station is 50/50 and 50/99. The graph is plotted between cluster area and network life time. The figure 4 is the representation of packet to Base station node vs. round. In this figure 3 graphs are plotted. The first graph is the number of packet sent to BS vs. number of rounds. The second graph is the Number of dead nodes vs. round and the third figure is Sum of energy of nodes vs. round. In this figure 1st the energy is high and then it is decreased , then the remaining energy is 45 joule.

Table 1: Network life time of different protocols

Number of Cluster Area	Network Life Time					
	DEEC		CH-Leach		Proposed work	
	BS 50/50	BS 50/99	BS 50/50	BS 50/99	BS 50/50	BS 50/99
5	1228	1177	1330	1310	1332	1313
10	1227	1198	1412	1397	1413	1399
15	1224	1204	1543	1484	1545	1486
20	1229	1198	1553	1539	1557	1541
25	1249	1261	1695	1641	1697	1643
30	1228	1216	1756	1641	1759	1642

Table 2: Life Time of the Network on Different Cluster area, Base Station located on (50/50).

Number of cluster area	Number of Rounds		
	DEEC	CH-LEACH	Proposed work
5	1177	1300	1410
10	1200	1388	1460
15	1200	1450	1490
20	1200	1500	1550
25	1250	1620	1670
30	1210	1635	1690

Table 3: Life Time of the Network on Different Cluster area, Base Station Located on (edge).

Number of cluster area	Number of Rounds		
	DEEC	CH-LEACH	Proposed work
5	1210	1350	1400
10	1205	1400	1450
15	1200	1570	1600
20	1220	1580	1620
25	1230	1630	1670
30	1210	1780	1820

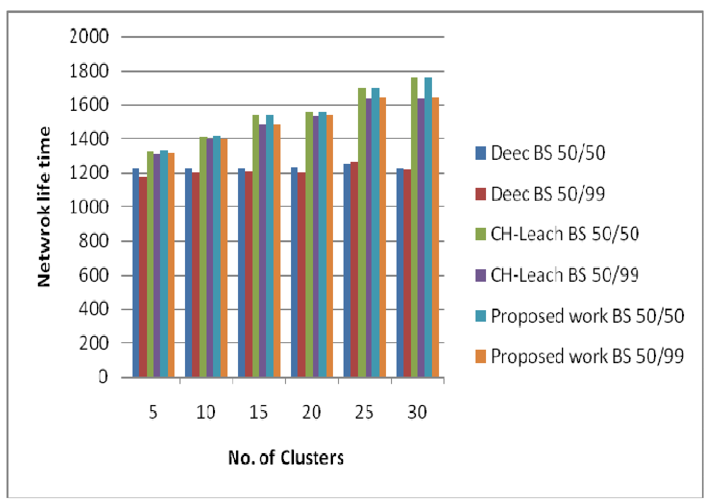

Figure 5: Comparison of different protocols

V. CONCLUSION & FUTURE WORK

Wireless sensor network (WSN) can be considered as an uncommon breed of wireless ad hoc networks with decreased or no mobility. These networks combine wireless communication and negligible on board computation facilities with detecting and monitoring of physical and environmental phenomena. In this work novel strategies for both topology and a routing algorithm are proposed to maximization of the network life time. CH-Leach Protocol, an approach of algorithm proposed, this proposed research used number of connection in cluster, and for each cluster head (CH) communicate with base station, however the selection of the cluster head based on the number of cluster on the network gird area, this method allow the network to adopted the best scenario to extend life time of the network, different ways of cluster are formed, in order to avoid the condition that one cluster will contain large of connection nodes and the rest is not, the maximum number of the cluster head is chosen in different scenario to test the network coverage. a series of experiments on different scenarios were implemented and tested. The life time of the network in CH-Leach shows major extension compared to CH-Leach, DEEC protocols and proposed protocol. The main aim of this work was to design and implement a protocol which enhance exiting protocols in order extend the Life Time of Network.

Further directions of this study will be deal with clustered sensor networks with more than two levels of hierarchy and more than three types of nodes. For energy consumption in wireless sensor network EEUC protocol, zone-divided and energy-balanced clustering routing protocol (ZECR) is used to enhance this work.

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