PEGASIS in Wireless Sensor Network

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Abstract – A sensor network consist of low cost sensor nodes which gather data from the environment and transmit them to sink, where they will be afterward processed. Due to high density of sensor node and obstructed communication range, Packet Forwarding in sensor networks is regularly achieved all over multi-hop data transmission .This paper present routing protocol for wireless sensor network (WSN).PEGASIS protocol is chain based routing scheme.The key problems in Wireless Sensor Networks (WSNs) is the design of energy-adapted Routing Algorithm, due to the limited energy of sensor node. Earliar PEGASIS protocol is depend on the parameters i.e. Distance and Residual energy. In this paper changes is being carried out in decision framework. Our main goal is to raise the network lifetime as well as raise the existence of live nodes so that lots of nodes will remain lie.

Index Terms – Wireless Sensor Networks, PEGASIS , Routing protocol

1. INTRODUCTION

The node of wireless sensor networks is represent with narrow energy. Wireless sensor node spread out into the network to listen the physical or environmental condition such as temperature ,sound , viberation at different location. The data move over the network each sensor absorb energy in receiving or sending the data. The period of network based on the energy is used on every communication. And how we can prolong the period of node in which router protocol plays an significant role. Wireless sensor network is a network that contained thousand of smallest node that are graphically distributed which listen physical or environmental conditions.

In WSN , energy consumption is of two type. First is, useful energy consumption and second is wasteful energy consumption.

Useful energy consumption is due to :

1. Transmitting/receiving data,
2. Processing query requests
3. Forwarding queries/data to neighbouring nodes.

Wasteful energy consumption is due to:

1. Idle listening to the media
2. Retransmitting due to packet collisions.

Therefore, we observe that little energy is used while sending and receiving the data. At the beginning, protocol are not prepare according to specification. So we proposed energy efficient PEGASIS of Hierarchical routing techniques can service in reducing useful energy consumption. In this paper we present General PEGASIS, Load Balanced PEGASIS.

2. RELATED WORK

For knowing the detail in WSN we read it many research paper. In **[**1-3**]** research paper, read the basic about WSN. What routing challenges comes in WSN, we highlight the different concept of routing protocol with specific reference to energy efficient, fault-tolerance, QoS in multipath routing protocols and its implications of data transmissions on wireless sensor network.

In [4] research paper, we studied the categories about the hierarchical routing protocol i.e. LEACH (Low Energy Adaptive Cluster Head) protocol and PEGASIS (Power Efficient Gathering in Sensor Information System).

In [5] research paper, we studied in detail about LEACH protocol . We have to find out the problem of LEACH prototol i.e. single hop model or we can say that hotspot problem .

In the next [6] research paper, we studied about the PEGASIS protocol, we get the solution of problem of LEACH protocol .But we have to found the problem in PEGASIS protocol i.e. loading problem means that chain is long ,node dies early as possible because of energy is limited in sensor node.But our aim to maximise the network lifetime. So, we found out the solution of the problem of PEGASIS . In the next section, we discuss about the PEGASIS protocol and its problem.

3. GENERAL PEGASIS

The PEGASIS(Power Efficient Gathering in Sensor Information Systems) protocol construct the chain of sensor node using a greedy approach. In the PEGASIS, construct the chain starting from the farthest node to sink node by using greedy approach. The closest node is send the data to its neighbour node is put as next node in the chain. This process is go on when all the sensor node are included in chain. This way will disseminate load of energy among the sensor node in network. Before passing the data to next node the data fusion take place. PEGASIS is a two step process.

1. Chain Construction
2. Gathering Data

Chain Construction:-In chain construction, construct the chain route the data from all node and send to leader node. The leader

node is selected by high energy node selection procedure. In this procedure, for every round of data communication, we selected the number of node which is nearest to sink and in that node which have highest energy is selected as leader node. This strategy is aimed maximising towards the lifetime of node in network. In figure 1 ,chain is constructed between the nodes and finally the node n5 is selected to pass the data to base station or sink.

Gathering Data:- In this step, after selected the leader node now gather the data from the all node in the chain and leader node is responsible for forwarding the aggregated data to sink node.

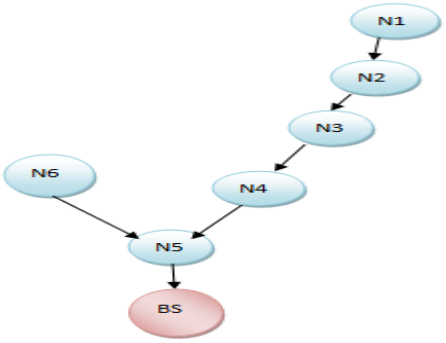


Fig. 1

Therefore in the figure1, the farthest node N1 send the data to N2 ,N2 node has its own data and also N1 data. Then N2 uses data fusion process and send the fused data to N3.This process will continue until leader node get the all data and the leader node send the aggregated data to sink node. In the GENERAL PEGASIS , more energy required to send the fused data but the energy is limited of sensor node. So, nodes goes die quickly. It will decrease the network lifetime as well as decrease the presence of live node so that no more node will remain exist.

4. CONTRIBUTION

Our contribution is to increase the network lifetime as well as increase the presence of live node. For this purpose , we find the solution of the problem of PEGASIS .We balance the load of every node and increases the network lifetime. firstly, we calculated the average distance of long chain. In that average distance, the node i.e. nearest to average distance in which we selected two leader node that have highest energy and also closest to the base station. Instead of one we selected two leader node used in single chain is given hierarchical structure so that long chain is avoided. PEGASIS with double leader node outperform PEGASIS, reduces the distance between node, reducing the number of messages sent to and from other nodes and using only one transmission to BS per round ,node does not goes die early as possible. Therefore, it balance the load of node. It will increase the network lifetime as well as increase the presence of live node and so does the quality of the network.

Conclusion part depicts the main points as the constructive finds obtained from the proposed system. Conclusion should not be the same as abstract. Conclusion should be modelled efficiently.

5. PROBLEM IN PEGASIS PROTOCOL

Since there is only one head node, it may be bottle neck of network causing delay problem.

Redundant transmission of data as only one head node is selected.

Delaying in data collection.

6. PROPOSED METHODOLOGY

In Load Balanced PEGASIS, first of all we deploy the sensor node in geographical area. We create the cluster of sensor node & this individual cluster apply the process of chain formation & data gathering &before sending to Base Station. The various steps are used to balanced the PEGASIS are as follows:

- First of all ,we define the initial node i.e. SN_i and destination DN_i node which is near to Base Station where i varies from 1to N.
- Select the farthest node from the Base Station in every region.
- Formed the chain by using greedy algorithm.
- Now , we find the average distance of chain.
- At the average distance ,we select the two leader node which have highest energy and nearest to Base Station & connect to Base Station.
- Now,leader nodes gather data from node in chain and leader nodes send the data to Base Station.
- And continue this process upto r rounds.

7. RESULT

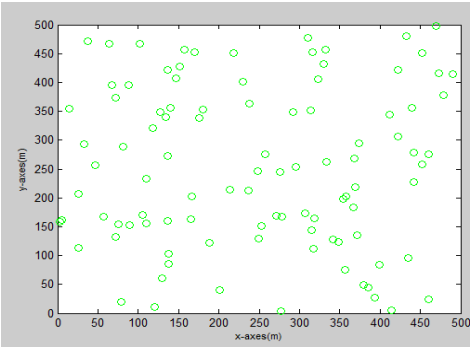


Fig 2.

Firstly the random number of nodes are scattered in the area which is shown in figure 2.

Now the nodes are classified into the cluster form and this is in figure 3.

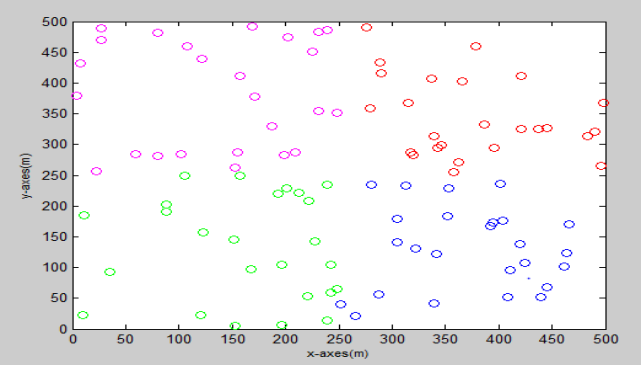


Fig 3.

Now the different clusters are performed to make the chain in its own cluster. And also sending the data to the BS and like this way the data is reached to the BS which shown in figure 4.

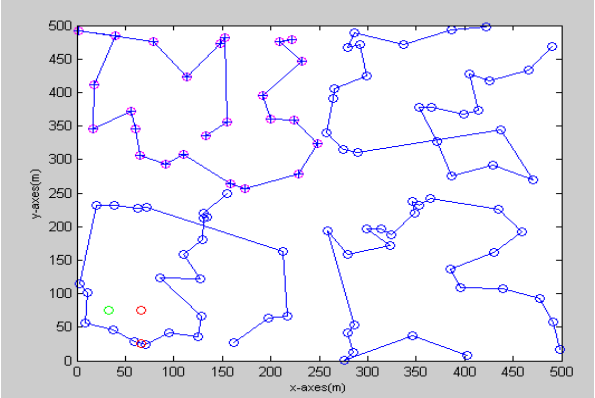
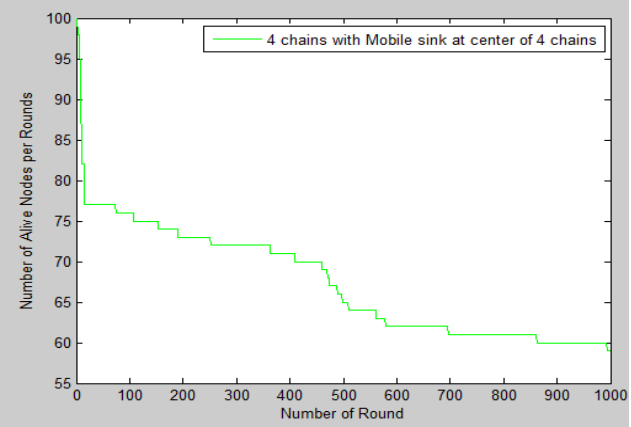


Fig 4.

The number of alive nodes are shown in figure 5.



Parameter values for the system:

Parameter	Existed Value	Resulted Value
Sensor Field	100x100	100x100
Number of Nodes	100	100
Initial Energy	0.5	0.5
Emp	0.0013pj/bit/m4	0.0013pj/bit/m4
Packet Size	2000bits	2000bits
Alive Nodes	23	59

8. COMPARISON

Parameter	SPIN	LEACH	General PEGASIS	Modified PEGASIS
Type of protocol	Flat	Hierarchical	Hierarchical	Hierarchical
Delivery of Data Model	Data centric based	Cluster based	Chain based	Chain based
Power Consumption	Limited	Higher than SPIN but lower than General PEGASIS	High	Maximum
Overhead	High	Lower than SPIN but higher than General PEGASIS	Lower than LEACH	low
Leader Node per round	0	1	1	2
Network Lifetime	low	Higher than SPIN	High	Very High
Scalable	limited	Good	Better	Best

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