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ENERGY EFFICIENT METHOD BASED ON RAINBOW ROUTING ALGORITHM FOR WIRELESS SENSOR NETWORKS

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ABSTRACT

The wireless sensor network (WSN) has been an active research area for past few years but there is some limitations in the consumption of energy and storage , it seems there is a need in a routing protocol in the Wireless Sensor Networks Field. The energy and storage balance based on Rainbow Routing protocol for WSN is proposed in this paper. The Rainbow routing algorithm is define by the cross layer protocol and their main ingredients is geographic routing, load balancing and contention based relay selection. The Rainbow protocol has a mechanism with in and around the dead ends, the integration of the protocols are used for the balancing of energy and storage.

Introduction

WIRELESS Sensor Networks (WSN) are being gradually used more in the variety of application ranging from health care, environmental monitoring to industrial application. Ensuring energy proficient operations are critical, especially given that a typical Wireless Sensor Network is deployed in remote and un accessible areas and sensor nodes are equipped with a limited battery source. A typical WSN consists of a large number of nodes deployed over a large area. Hence, packets generated at nodes that are outside the communication range of the sink have to be relayed by other nodes. It has been well accepted that the energy expended in transmission and reception of packets forms a significant component of the total energy budget of a sensor node. The nodes at which the information transfer should have high capacity to send the data with great accuracy and less cost. . For that, the system has to be implemented with efficient algorithm and protocol. Algorithms which are used in this is Low Energy Adaptive Clustering Hierarchy(LEACH), for hierarchical routing algorithm. Energy Efficient Uneven Clustering(EEUC) which consumes energy by inter cluster data forwarding.

It uses a periodic schedule to the node crossing but it does not synchronize the node and it is use for the dynamic scenarios. Energy is save by using the node to wake up only at the time of need, in rest of time it is in sleeping node. The information should be deliver with reliability and it should free from robustness. There are two forms of energy residual energy and initial energy which the initial energy is required for the initialization of every node and residual energy is used for the data transferring.

Related works

A .Energy- Efficient Uneven Clustering (EEUC) Protocol

Energy efficient uneven clustering protocol in which uncertain cluster head uses un even competition ranges R_c to construct cluster for uneven sizes.

$$R_c = \left(1 - c\,\frac{d_{max} - d(i,sink)}{d_{max} - d_{min}}\right) R_c^0 \quad (2)$$

where d_{max} is denoted as the extreme distance and d_{min} is the shortest distance between the sink and nodes, d(i,sink) is distance between sink node and i. R_c^0 is a fixed value but R_c is changeable in order to differ their values. Value of the 'c' is change from 0 to 1 based on the value of opposition range. The size of the cluster is larger when it is far away from the sink and it is smaller when it is closer to the sink. When the cluster is far from the sink it consumes little more energy. Hence the energy can

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be saved when the cluster is maintained in the closer range to the sink.

B. Network

Sensor node is randomly spread in the rectangular sensing field. In which, data are sent to the cluster head and then from cluster head to sink node. The distribution of node consists of the data which is in the rectangular W×H field. In this network model, the nodes are like each other (i.e) isomorphic they have restricted energy and communication ability. It consist of the N total number of nodes which has the data can be defined as V=(v1,v2,…v).

C. Clustering

Clustering is the main topology at which the node are forms in to groups. The cluster consists of certain number of nodes where a single node is act as a cluster head. The cluster head selection is made with another selection algorithm. Cluster head should be capable to communicate with the other node easily with no any defect. If any problems while transferring the information then it should not be cluster head any more. Cluster head is the super class node with no defect and

D. Low energy adaptive clustering Hierarchy (LEACH) Protocol

LEACH is a Wireless sensor network hierarchical routing algorithm which the nodes form their local clusters themselves.

The data are transfer from node to the cluster head and it spreads over the sink from the cluster head. The sink is spread from a cluster head and the cluster node gets the information from the node. The clustering algorithms which have fallen into the scope of this paper are LEACH [4], PEGASIS [5] and PEDAP [6]. These algorithms organize networks with different network topologies. The operations of LEACH are briefly described as follows. LEACH is a decentralized algorithm by which the form of multiple clusters with two or more hops topology. In LEACH, one head is selected for each cluster and it is called as cluster head. A cluster head will collect data from its cluster members. As the contents of the collected data are highly correlated, with the use of data/ decision fusion techniques, multiple data packet scan be combined into one single packet. Therefore, fewer transmissions are required by a cluster head to report its data to a base station. In [4], it has been shown that networks with LEACH can have longer network lifetime than those with minimum-trans- mission-energy (MTE) or direct transmission. LEACH is easy to implement and its decentralized properties make it robust to intentional attacks. However, LEACH has limited control over the number of cluster heads These transfer are made in the start phase and in the setup phase it choose number between 0 and 1. If the number is less than the certain threshold value T(n) then it is allocated as cluster head.

$$T(n)= \begin{cases} p/(1-p \times r \bmod(1/p)), & n \in G \\ 0, & \text{else} \end{cases}$$

where 'p' is denoted as percentage of the cluster head, 'r' is denoted as current number of round and 'G' is denoted as set of nodes which are not yet cluster. The non cluster head node joins the cluster with greater strength by choosing the cluster head and then the data are received from all the cluster members by the cluster head and it is send to the sink. These type of data transfer are made in the steady state phase.

E. Sink

The original energy can be denoted as E and when it is drained the node dies but the energy of the sink can be added to the original energy. There is a fixed location for the sink node and sensor node to reduce the selection process. The sink node broadcast the message to the other cluster nodes in the sensing field. The distance between sink node and sensor node can be compute by receive the signal strength from the both sink node and sensor node. After the topological development process the central node can be assigned before that it cannot be nominated. There is a lot of topological development process to identify the central node.

Existing system

I. Forward Aware Factor for Energy Balanced Routing Method

FAF-EBRM (Forward Aware Factor for Energy Balanced Routing Method) is widely used in large scale Wireless Sensor Network for static data collection and event detection mainly for the industrial application. This system balance the routing hence we can save some energy while transferring the data from one node to other.

This routing method is used to choose the node in the time of data transmission when an intermediate node fails. By the analysis of Data transmission in Wireless Sensor Network Forward Aware Factor is an efficient way to reduce the energy wastage by balance the routing. It selects the nearest node to the damaged node as a path to reach the destination with some path considerations. Some of the nearest node cannot further transfer to the another node in that case this system will go for selection of another node when it goes further it requires little more energy. By considering the energy we cannot go further with this protocol. If the newly selected node fails to connect with another node then it forms a defect called 'Energy hole' this wastes the energy by unwanted selection of nodes for the data transferring.

Proposed system

Rainbow routing algorithm, whose main ingredients (geographic map-reading, load balancing, contention-based transmit selection) is having an effective rate at consuming energy with less wastage by choosing the correct packets and it can also deselects the damaged or unprocessed nodes for the transmission. The Rainbow routing algorithm converges casting in WSNs even though it is connected it can be sparse and with connectivity holes. Achieves performance superior to existing protocols in terms of energy efficiency, packet delivery ratio (PDR), and latency. The Rainbow mechanism allows guarantee packet delivery in realistic deployment. Simulation results also show better performance than that of two recent proposals for routing around dead ends. The node selection is made by using this algorithm when there is a defect in the current node. The algorithm selects the proficient nodes at which the information are send safely and quickly with no defects.

I. Data transfer rate

This graph will shows the data transfer rate through the various nodes. The existing system rate will increase gradually but proposed protocol has sudden increase in the rate of data transferring.

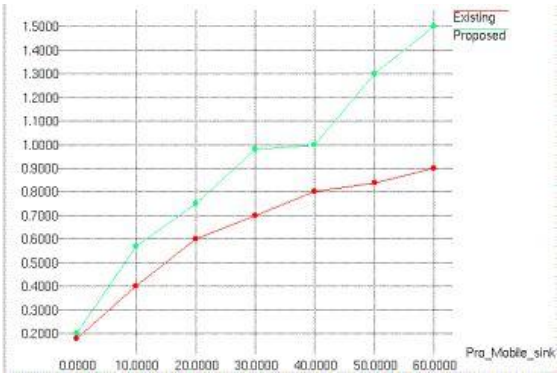

Fig 1. Data transfer rate

Fig 1. shows the graph for data transfer rate through the various nodes. The existing system rate will increase gradually but proposed protocol has sudden increase in the rate of data transferring.

II. Energy consumption level

The energy consumption level of both the existing and proposed system will explain with this graph. There is a constant level of consumption in energy after gradual increase in both the protocols, but the proposed have more energy exclusion than the existing system.

Conclusion

In this paper, the consumption of energy with less wastage while transferring the data through various nodes in wireless sensor networks. The energy is consume by using Rainbow routing algorithm for the selection of nodes in the time of any defect in the intermediate node. This proper node selection will produce a higher possibility of data transfer and energy consumption. The current development is made using Network Simulator.

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