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DESIGN FOR CLUSTERING THAT DOES NOT WASTE ENERGY IN A WIRELESS SENSOR NETWORK

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Abstract- In general, a wireless sensor network is made up of many sensors that are all linked to a network wirelessly so that they can watch and handle different physical surroundings. Often, the sensor node with the fastest and least energy-intensive way is chosen so that the data it collects gets to its target without any data loss. When data is being sent, the sensor nodes may lose power because the device nodes are close to the sink and each node has a limited amount of battery power. This shortens the life of the wireless sensor networks. By installing a movable sink, the node that is close to the sink will not lose power as quickly. So, sink mobile is used to collect data in a way that uses less energy. This is called grouping. The sink receives the data and acts as a vehicle. This can make the sensor on the point in the network last longer.

INTRODUCTION

One way to get information about a real thing or process is to use sensing. This includes recording when things happen. A thing that can do this kind of sensing is called a sensor. A wireless sensor network is made up of self-contained sensors that are spread out in different areas to keep an eye on things like temperature, pressure, and other physical or environmental conditions. The data will be sent to at least one sink, usually through multi-hop contact.

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The sensor nodes are set to work with batteries and are often placed in places that are hard to get to, sometimes in big groups. Some things are hard to replace or can't be done at all, but sink is full of energy. The most important thing in WSN is the energy of the monitor. The main goal of WSN is to make the best use of energy to extend the life of the network. The WSN is made up of between a few hundred and several thousand nodes.

I. RELATED WORKS

Chong addressed WSN energy conservationissues and suggested concepts and techniques to extract environmental information useful to control sensor operations to enable sensor nodes energy conservation, thereby prolonging the lifetime of the network. These concepts and techniques were formulated as a generic framework called Context Awareness in Sensing Environments. This targets the network level energy conservation.

A sensor network can obtain state based data from their deployed area. To reduce cost, data sent to the sink through intermediate sensors is aggregated (compressed) by a sensors subset called “aggregators”. As sensors are equipped with small and un-replenish able energy reserves, a critical issue is deploying appropriate number of aggregators strategically to minimize energy consumed by transporting and aggregating data. In WSN, the neighborhood nodes may collect redundant set of data from the environment.

To reduce the processing power and the amount of data forwarded to the sink node, clustering approach can be used. Total number of sensor nodes in the network is divided into little number of clusters. Data to be forwarded from the sensor nodes to the sink node are aggregated and sent. Each cluster has a cluster head whose main role is energy conservation. To increase the lifetime of clusters, cluster role is rotated to other sensor nodes of the cluster periodically. This clustering approach is used in Low Energy Adaptive Clustering Hierarchy (LEACH) protocol (Heinzelman et al 2000).

LEACH-Mobile protocol is an improvement of LEACH protocol when the sensor nodes are mobile nodes (Kim & Chung 2006). Whenever a sensor node moves within the cluster or leaves from one cluster and joins into another cluster, the membership to the cluster is redefined and time schedule to reach the new location of moving node is confirmed in TDMA schedule. Any typical decision system needs accurate and whole information of the domain.

Musale & Borde (2013) presented Analysis of Cluster Based Routing Protocol for Mobile Wireless Sensor Network Cluster based routing protocol. WSN nodes had heterogeneous energy levels and many of the cluster head selection algorithms were based on the node's residual energy. To distribute information about routing, clusters maintained inter and intra cluster link which was useful for routing. Whenever a node was selected as a cluster head, the details of new cluster head were broadcasted to other nodes in the cluster. Moving nodes decided to join into the cluster based on the distance from their location to the new CH. This LEACH algorithm supported mobility of nodes and confirmed about whether a mobile node was able to transmit the data with new CH. This new algorithm had less power consumption than LEACH algorithm.

A simple Energy Efficient Routing Protocol (SEER) to improve network lifetime by limiting the number of messages that were sent through the network. It uses a flat network structure for scalability and source initiated communication, along with event driven reporting to reduce the number of message transmissions. Computational efficiency was achieved by a relatively simple method for routing path selection. Routing decisions were based on the distance to the base station as well as on remaining battery energy levels of nodes on the path towards the base station. SEER reduces the overall energy consumption. Simulation results showed that it achieved energy savings for a set of specific conditions. The results confirm that the routing protocol was novel and made an important contribution physically implemented on a variety of existing WSN nodes while still achieved a very high level of energy efficiency.

In "Low Energy Adaptive Clustering Hierarchy with Deterministic Cluster-Head Selection", by M. J. Handy, M. Haase, D. Timmermann. This paper focuses on reducing the power consumption of wireless micro sensor networks. Therefore, a communication protocol named LEACH (Low-Energy Adaptive Clustering Hierarchy) is modified. The author extend LEACH's stochastic cluster head selection algorithm by a deterministic component. Depending on the network configuration an increase of network lifetime by about 30 % can be accomplished. Furthermore, author present a new approach to define lifetime of micro-sensor networks using three new metrics FND (First Node Dies), HNA (Half of the Nodes Alive), and LND (Last Node Dies). This paper proposes a modification of LEACH's cluster head selection algorithm to reduce energy consumption. For a micro-sensor network author make the following assumptions:

The base station (BS) is located far from the sensors and immobile.

All nodes in the network are homogenous and energy-constrained.

All nodes are able to reach BS. Nodes have no location information.

Symmetric propagation channel**.**

Cluster-heads perform data compression.

II. EXISTING

First of all we will set the wireless network topology to form wireless sensor network. After initialization of network, We configure the number of sensor nodes that can join cluster of wireless sensor network We can consider the energy level to elect the CH**.** We configure the traffic lode for the entire wireless sensor network**.** We can limit the number of node who can elect as a CH**.**

Disadvantages:

- Accuracy is low.
- If Header node battery is low causes of packet loss.

III. PROPOSED SYSTEM

We have proposed a mobile sink relocation with MIMO technique and Energetic data Collection using Mobile Sink (EDCMS). Energetic data Collection using Mobile Sink collect the data from multiple cluster head node.

Advantages:

- Data aggregation at cluster head
- Cluster head communicate directly with other node.

Our project scope is to prolong the network lifetime through aggregating data at the cluster heads. Clustering methods in WSN lead the sensor nodes to be organized into small disjoint groups, where each cluster has a coordinator referred as CH. In this cluster based approach the sensors do not need to communicate directly with BS. Instead, the CHs are responsible to organize cluster members and send the data collected within the cluster to the BS.

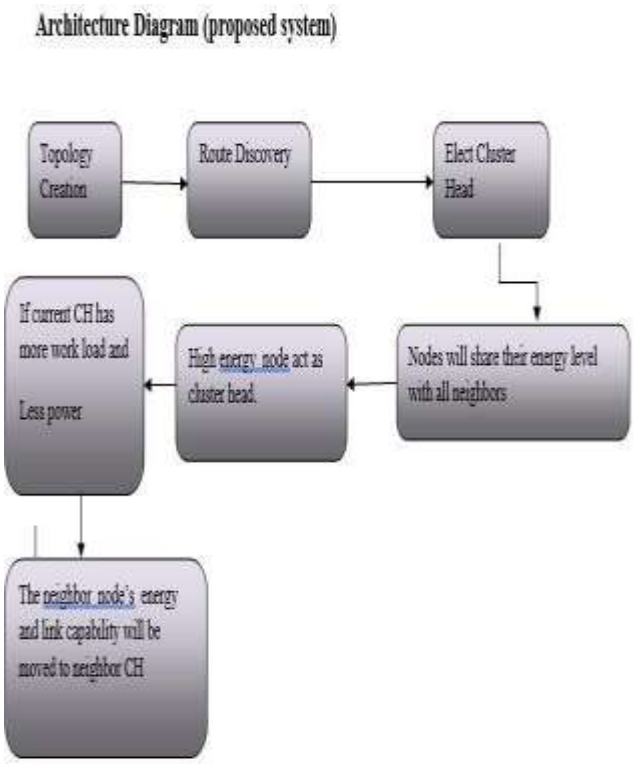

Fig: 1, Architecture diagram

The ultimate goal of this project is to provide high energy efficient life time management system for WSN. The most challenging aspect of WSN is that they are energy resource-constrained and that energy cannot be replenished. Clustering methods in WSN lead the sensor nodes to be organized into small disjoint groups, where each cluster has a coordinator referred as CH. Maintaining the created clusters is the main challenging task in the methods. To choose a node as a CH, it is necessary to define its eligibility. That is calculated based on local information of the nodes' current situations such as its residual energy. The eligibility of the selected CHs however, reduces as the sensor nodes are consuming energy for transferring data. However, there is possibility that the CHs may fail and function incorrectly due to a number of reasons such as power

instability. During the failure, the CHs are unable to collect and transfer data correctly. This affects the performance of the WSN. Early detection of failure of CHs will reduce the data loss and provide possible minimal recovery efforts. This paper proposes a self-configurable clustering mechanism to detect the disordered CHs and replace them with other nodes. LEACH has been developed based on a clustering mechanism to select CHs using optimal probability. The protocol works on periodic randomized rotations of the CH within the cluster range between zero and one. If the random number is less than the pre-determined threshold value, the node becomes a CH for the current round.

We have succeeded to achieve a reduction in energy dissipation compared to direct communication and transmission protocols. In LEACH protocol, the number of clusters is predefined; LEACH cannot guarantee an acceptable CH distribution. Additionally, due to lack of support in deploying network with a large number of sensor nodes, the protocol cannot be used in a large region. Moreover, LEACH suffers from significant energy consumption when there is no CH selected in some rounds. In our proposed system, there are three main parameters are considered to elect the cluster head 1) the residual energy in CHs candidates is used in electing CHs with an acceptable energy level. 2) Node Centrality (NC): is a value that shows how central the node is among its mobile neighbors within the entire network. 3) Local Distance (LD): This is sum of the distances from a deployed node to its neighbors.

ALGORITHM

1. At first, the sink collects the residual battery energy from each sensor node within the communication range of the sink.
2. Then, the sensor node in the direction heading to the moving destination which is in the transmission range of the sink is chosen such that it has the maximum residual battery energy value among the sensor nodes.
3. Next node chosen will be the intermediate moving destination node & the sink will be relocated to this position.
4. Along this path, the mobile sink will relocate itself from one intermediate moving destination to the other and finally it will reach the moving destination.

When the nodes are being placed and tested according to our objective. They show the following results,

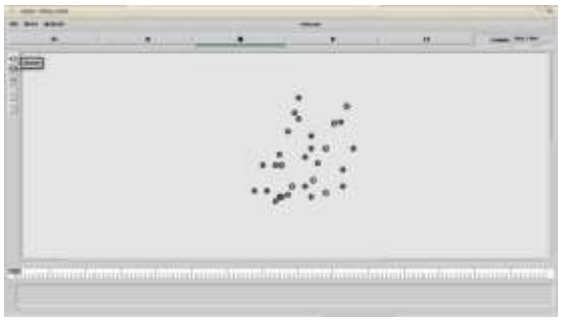

Fig: 2, Testing node placement

Fig: 3, Periodic update testing

Fig: 4, Neighbor update testing

IV. CONCLUSION

One way to make a wireless sensor network last longer is to group the sensors together. LEACH uses the range area to decide how to group things together, and the choice of which cluster head to use is made at random. If you pick the cluster head at random, you might pick a sensor node with low energy as the cluster head. These nodes are more likely to die, which means you have to re-cluster more often, which wastes more power. The proposed method cuts down on signal delay and fixes the issue that triangle route causes. We tested how well our theme works with the current method for collecting data in a wireless sensor network by simulating it and looking at the results. Taking into account the different events that can happen with WSN, our theme is to make the network last longer than the current method.

V. FUTURE WORK

The Main objective of this paper is, Sink node is acting as a mobile sink node and it collects the data from every CH node to reduce the energy efficiency. When designing such a system various parameters have to be taken into account to overcome others limitations.

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