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AN ENTHUSIASTIC PATH FOR WIRELESS SENSOR NETWORKS BASED ON CLUSTERING APPROACH

S.Diwakaran[1], Dr.K.VimalaDevi[2]

Assistant professor, Dept. of ECE, Kalasalingam University, Srivilliputhur, Tamilnadu, India [1]

Professor, Dept. of CSE, PSR Engineering College, Sivakasi, Tamilnadu, India [2]

ABSTRACT: Wireless sensor network consists of spatially distributed autonomous sensors to monitor physical and environmental conditions such as temperature, heat and pressure. The main drawback of wireless sensor network is the constraints in energy resources and each sensor node consists of processing unit with limited computational power and limited memory. To overcome these limitations of wireless sensor network, analysis of various routing algorithms done and Energy efficient path created in the network.

Keywords: Clustering, wireless sensor, networks, energy consumption

I.INTRODUCTION

Recent advances in micro electro mechanical systems, technology and wireless communications have led to small and low cost sensor network. The sensor network may comprise much application area such as health monitoring, environmental monitoring including temperature, humidity, lightning condition, pressure etc. Additionally, many domain applications such as factory automation, chemical pollution monitoring, oil and gas remote monitoring, building sensor and security adopt sensor computing.

A Wireless sensor network consists of tiny sensor nodes which has three basic components: a sensing subsystem for data acquisition from the physical surrounding environment, a subsystem for local data processing and storing a wireless transmission subsystem for data transmission. Furthermore, a battery is critical for a sensor node. All the sensors send data that they have sensed from the given region to the base station. The very important issue in this action is energy efficiency of the network.

A wireless sensor network may consist of hundreds of sensor nodes. During the communication process, the sensor nodes exchange information and discover the neighbouring nodes easily.

II.EXISTING WORK

Clustering is the technique which is useful for applications requiring scalability to hundreds or thousands of nodes. The term scalability describes the requirement for load balancing and efficient resource utilization. The natural candidate for clustering is the application that requires the efficient data aggregation. The clustering can also be employed by routing protocols. The vital role in sensor node clustering is to choose a set of cluster heads among the nodes in the network, and cluster the rest of the nodes with these heads.

The cluster architecture allows for better resource allocation and enhances the power control. It balances with different network sizes and node densities under energy constraints.

Low Energy Adaptive Clustering Hierarchy (LEACH): The LEACH protocol is a hierarchical protocol in which most nodes transmit to cluster heads. The operation of the LEACH protocol consists of two phases:

The Setup Phase: In the setup phase, the clusters are organised and the cluster heads are selected. The cluster heads aggregate, compress and forward the data to the base station. Each node determines whether it will become a cluster head, in thus round by choosing a stochastic algorithm at each round. If a node becomes a cluster head for one time, it cannot become cluster head again for P rounds, where P is the desired percentage of cluster heads. Thereafter, the probability of a node to become a cluster head in each round is 1/P. This rotation of cluster heads leads to a balanced energy consumption to all the nodes and hence to a longer lifetime of the network.

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The Steady State Phase: In the Steady State Phase, the data is sent to the base station. The duration of the steady state phase is longer than the duration of the setup phase in order to minimize overhead. Moreover, each node that is not a cluster head selects the closest cluster head and joins that cluster. After that the cluster head creates a schedule for each node in its cluster to transmit its data.

The main advantage of LEACH is that it outperforms conventional communication protocols, in terms of energy dissipation, ease of configuration, and system lifetime/quality of the network. Providing such a low energy, wireless distributed protocol will help the way in a WSN. However, LEACH uses single-hop routing where each node can transmit directly to the cluster-head and the sink. Therefore, it is not recommended for networks that are deployed in large regions. Furthermore, the dynamic clustering may results to extra overhead, e.g. head changes, advertisements etc., which may diminish the gain in energy consumption .

III.PROBLEM FORMULATION

Task is to study, simulate and compare various routing algorithms used in wireless sensor networks, clubbed with some placement algorithms such that they can address the following problem:
Given a remote rectangular field, the tasks is establish a sensor network, having its base station at centre, with some sensor node placement and following a certain routing protocol, such that it can monitor fixed or randomly generated targets and report the targets to the base station, consuming less power & maintenance and without compromising with the performance.

IV.PROPOSED METHOD

Routing in wireless sensor network is a demanding task. This demand has led to many routing protocols. Most of these protocols find the minimum energy path or the shortest path routing. Always using these paths will soon make those nodes to lose Multipath routing will distribute the traffic among multiple paths instead of routing through a single path. The proposed plan in this article is to first find out the neighbor node list and then to find the multiple path from the neighbor nodes. The data packets are distributed through the multiple paths to the destination. The work is been divided into 4 stages:
(I) Initialization stage
(ii) Finding neighbor nodes
(iii) Finding multipath
(iv) Maintenance stage
(i)**Initialization Stage**
In this stage, the nodes are first clustered and the "HELLO" packet message is send to all the nodes. The node which has more energy is elected as cluster head (CH). The remaining nodes are treated as member nodes of that cluster. The node which has the next energy level to the cluster head is treated as next CH. In situation like when the cluster head loses its energy level below the threshold value, then the next CH will act as the cluster head and the current head goes to sleep mode. When the system starts its eration, regular nodes send out collected data to the cluster head, and then the cluster head forwards data to the base station through its neighboring cluster heads using the dynamic routing mechanism to save energy. Clustered wireless sensor network sending the data, the cluster head may lose some energy.
(ii) **Finding neighbor nodes**
Before finding the multipath, create a neighbor table for the source nodes. The steps are as follows: max node -number of nodes in the network x, y -positions of the current node id –node number – threshold energy
R- Residual energy of the node
G node – nodes within the transmission range of current node
Trans range – transmission range
The steps are as follows:
1. Get the value of maximum nodes in each cluster
2. Get the position of source node
3. Let the source node be with node id =0
4. Find the distance between the source node and all other
Nodes using the distance formula dis = $\sqrt{}$ (y2-y1)2 + (x2-x1)2 where (x1, y1) are the positions of the source node and(x2, y2) are the positions of the node from which the distance is to be calculate.

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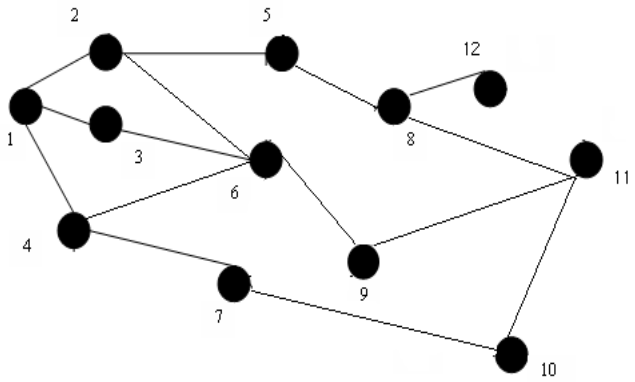
5. if(dis trans _range) then update the neighbors of the source node in the neighbor list In case if the distance is within the transmission range and the node energy is greater than the threshold energy then update the neighbor list of the source node. Consider the following figure.2, node1 is acting as the source and node11 is the destination.



Network model

(iii) **Finding multipath** The next step is to find out the available path for the source to reach the destination in such a way that no node is repeated in the way. By using the neighbor list all possible paths without any repeated node is found out.

Considering the figure we can get the available path for the source node1 as

Node 1->2->5->8->11

Node 1->3->6->9->11

Node1->4->7->10->11

In all these paths no node is repeated or duplicated. Since the data packets are send through 3 different paths there is no chance for traffic or collision in the network. After finding the path, a RREQ message is send to the destination from the source. Once when the RREP message reached the source, the source node can deliver its data to the destination node through the paths. In case, during the iteration of data packets, if the cluster head energy level decreases below the threshold level, the next CH will act as the CH and the previous node goes to sleep mode. However in due cases, these paths may even break due to the nature of network topology in sensor network. In order to maintain a reliable network connection route maintenance is more important.

(iv) **Maintenance stage:**

When sending the data from the source to destination, there may be any breakage in the route. The node which discovers the link breakage between two nodes, it sends a route error (RERR) message to the backward direction to the source node. From the neighbor list table, the source node uses an alternate valid route.

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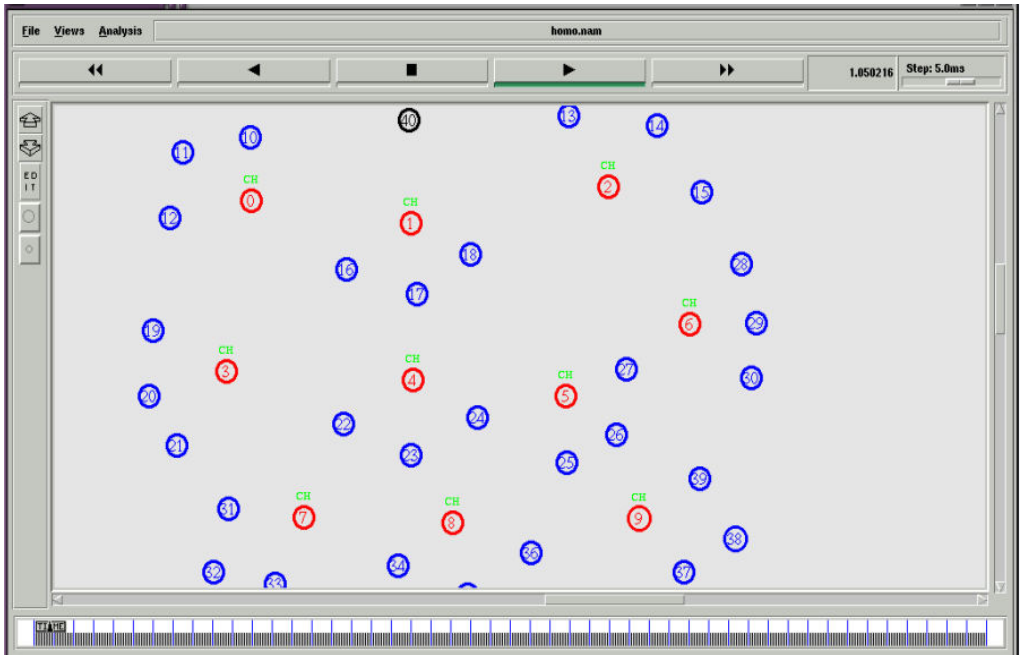

Figure 1: Nodes are clustered

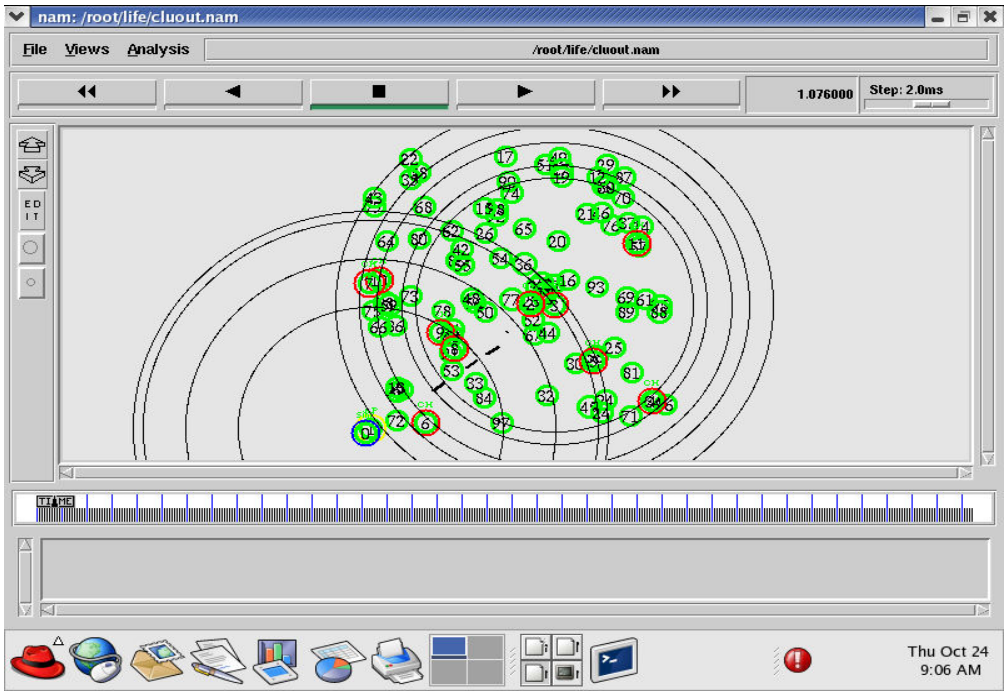

Figure 2: Data is transferred from source to destination

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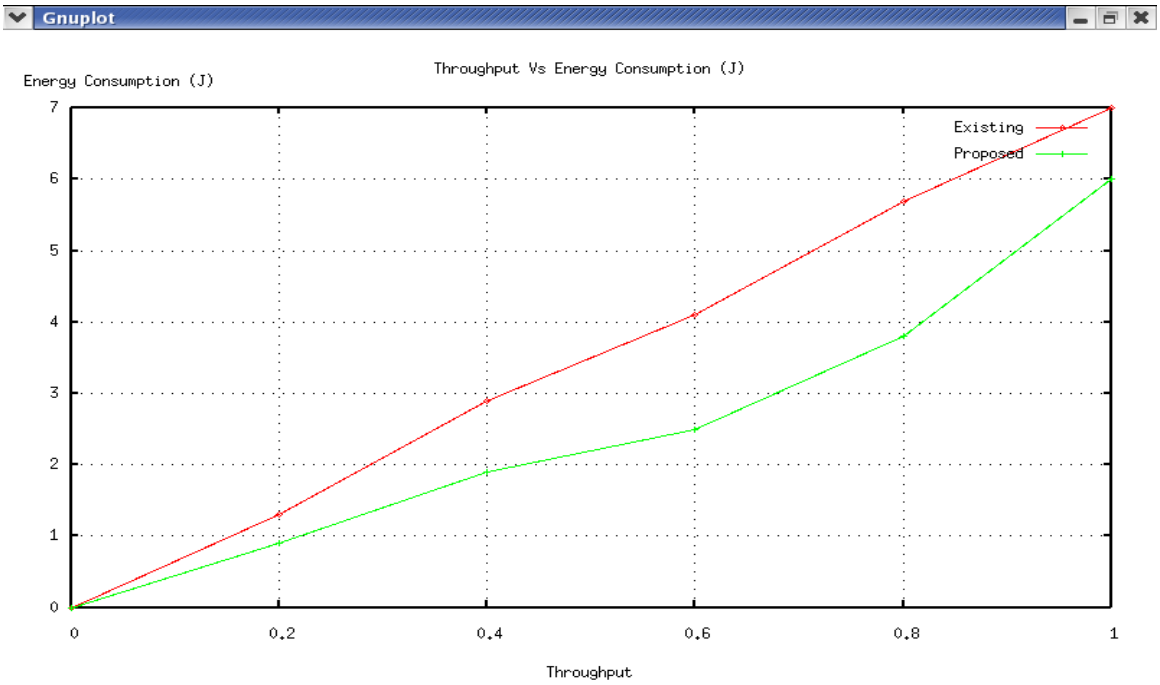
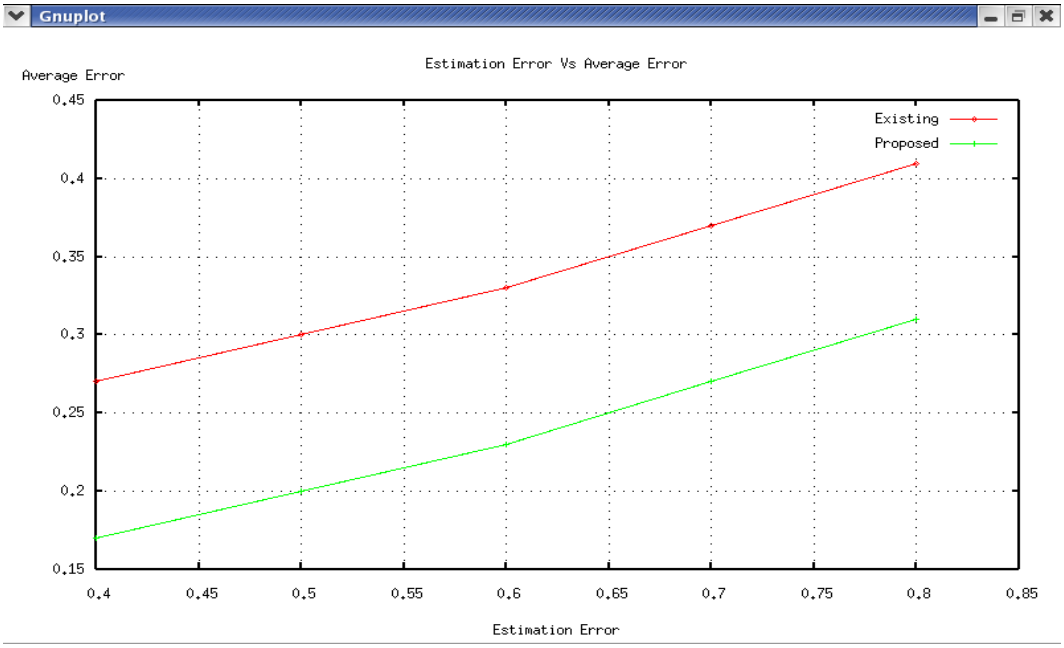
COMPARISION OF THROUHPUT



COMPARISON OF ERROR OCCURS



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V.PERFORMANCE ANALYSIS

The results of the proposed system are compared with the existing shortest path algorithm. The proposed algorithm proves that it uses only less amount of energy while sending the data. The first graph shows that, for more consumption of energy, throughput will be high for existing method. The estimated error will be less than average error in the proposed path shown in the second simulation graph. The graph shows that the total remaining energy is more than the existing energy. Thus the proposed method is much better in performance comparing with existing method.

VI.CONCLUSION

The introduction of novel method to utilize the energy of the nodes through clustered multipath routing. The energy efficiency and ease of deployment makes this algorithm a desirable for wireless sensor networks. The simulation result shows that the energy has been saved, so that the lifetime of the nodes is also increased. There are also future works would like to focus on, the algorithm has to be further investigated in multipath routing for larger number of nodes.

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