

Cluster Head Selection and Role Rotation Algorithm for Enhanced Performance in Wireless Sensor Networks



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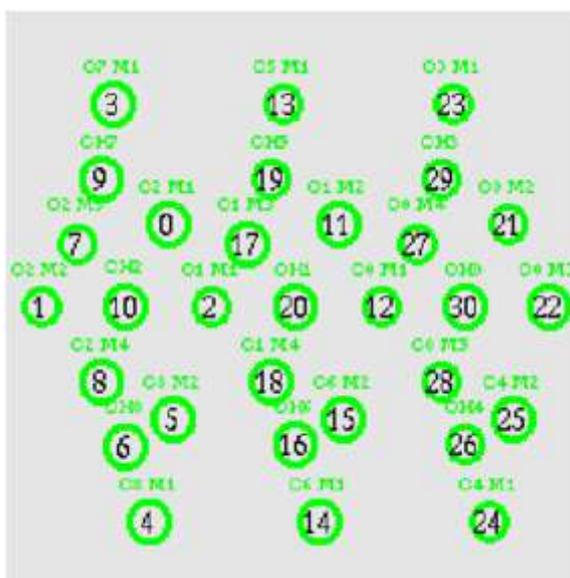
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Abstract:

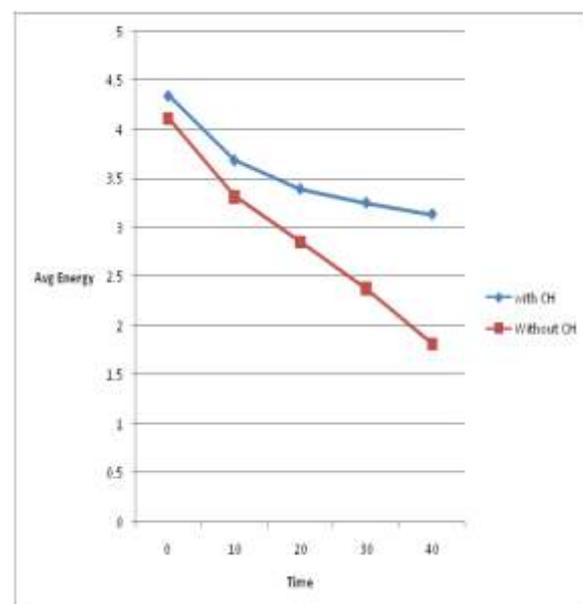
Wireless Sensor Networks (WSNs) consists of spatially distributed autonomous sensors to monitor physical or environmental conditions, such as temperature, sound, pressure, etc. Sensors in WSN cooperatively pass their data through the network to a centralised location. Sensor nodes are comprised of limited and generally irreplaceable power sources. One of the most important constraints on sensor nodes is the requirement for low power consumption. In order to enhance the performance of the network by saving energy of the node and to support data aggregation the WSN is partitioned into a number of small groups called clusters. In these clusters, the nodes are arranged in hierarchical topology. Each cluster comprises of a cluster head, which aggregates data from cluster members and transmits it to the sink. NS2 does not have built in feature for clustering. Therefore, it is essential to incorporate this feature in NS2 for efficient WSN configuration.

In this project an algorithm for formation of cluster and election of cluster head is developed in network simulator NS2. Initially, all the nodes are placed in a terrain to form a network. Broadcast packets are exchanged among the nodes to form neighbour table. According to the proposed algorithm, the node with highest number of neighbour nodes is elected as the cluster head. Cluster is formed among all the nodes which are one hop far from each other. All the neighbour nodes of a cluster head are known as cluster members. Cluster members only communicate with the cluster. All the cluster members transmit sensed data to the cluster head, which further transmits it to the sink.

Advantages of cluster formation on network energy are studied through simulations in NS2. Simulations are carried out for WSN scenarios with and without cluster head. From the obtained results, it is observed that a clustered network is more energy efficient when compared to a network without clustering.



Flowchart depicting data exchange



Performance of MERIP in terms of PDR