

A NOVEL ENERGY EFFICIENT CLUSTERING TECHNIQUE BASED ON VIRTUAL HEXAGON FOR WIRELESS SENSOR NETWORKS

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ABSTRACT. *In the development of wireless sensor networks (WSNs) applications, how to organize sensors into a wireless communication network and route the sensed data from sensors to a remote sink is a particular challenging problem. Therefore, WSNs need a protocol to route data and prolong the lifetime of sensor networks. The clustering technique is an efficient approach for reducing energy consumption in wireless sensor networks. To achieve these purposes, this paper presents a novel clustering algorithm based on virtual hexagon for prolonging lifetime of sensor networks. During the phase of cluster initialization, a sensed zone is divided into several virtual hexagons and the overlapping sensors of circular cluster can be avoided. Furthermore, we make some sub-circles in the formatted virtual hexagon based on the average distance between common sensors (non-cluster head sensors) and the cluster's center. Depending on the weight value function, each sensor forms a cluster heads order list. The proposed clustering technique adopts a new method for cluster head election, which can avoid the frequent selection of cluster head. The new clustering algorithm scales well and converges fast for large-scale wireless sensor networks. Simulation results demonstrate that our proposed algorithm is effective in prolonging the lifetime of networks.*

Keywords: Wireless sensor networks, Cluster, Energy efficient, Virtual hexagon

1. Introduction. In mobile ad hoc and sensor networks, many clustering algorithms elect cluster heads (CHs) based on node identity [1-3], connectivity degree [4] or connected dominating set [5]. The complexity of this clustering approach is $O(N)$, where N is the number of nodes. Comparably, the algorithm of [6] generates d -hop cluster with $O(d)$ rounds. The main advantage of sensor networks clustering algorithm is the ability to balance and reduce energy consumption of nodes by associating them with a particular cluster and by performing data aggregation to decrease the number of packets transmitted to the sink.