A

Dissertation

On

Clustering in WSN Using Firefly Algorithm

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ABSTRACT

Wireless Sensor Networks consists of hundreds to thousands of limited energy battery powered sensor nodes. The use and applicability of WSNs has increased in many areas like vehicular movement, weather monitoring, security and surveillance, industry applications etc. The nodes in WSNs sense the environment and send the desired information to a processing centre (base station) either directly or via other nodes. The sensor nodes are inaccessible to the user once they are deployed. Replacing the battery is not possible every time. Hence in order to improve the lifetime of the network, energy efficiency of the network needs to be maximized by decreasing the energy consumption of all the sensor nodes and balancing energy consumption of every node.

In this dissertation we developed an algorithm (Firefly-DCH) for clustering in wireless sensor network. This is a centralized approach in which base station performs clustering on the basis of data sent by the nodes. Clustering involves selecting the cluster head and allocating the nodes to cluster head using some objective function. In this algorithm two cluster heads are selected called primary and secondary cluster head. An objective function is defined to minimize the intra cluster distance to optimize the energy consumption of the network. The clusters formed by this algorithm are compact in size and number of nodes allocated to different clusters is almost uniform. The proposed algorithm is fault tolerant as if one of the two cluster head dies another one can serve as single cluster head within network without any interruption in communication. Thus it saves the time for re-clustering. Our proposed algorithm is observed to perform better than the conventional clustering protocols like LEACH, standard firefly algorithm in terms of network lifetime.

Keywords: Wireless Sensor Network, Clustering methods, Firefly algorithm, Firefly-DCH, network lifetime, energy efficient clustering.

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CERTIFICATE

This is to certify that the dissertation titled "**Clustering in WSN Using Firefly Algorithm**" is bonafide record of work done by **Priti Singh**, **Roll No. 2K13/CSE/17** at **Delhi Technological University** for the partial fulfillment of the requirement for the degree of Master of Technology in Computer Science and Engineering. This project is carried out under my supervision and has not been submitted elsewhere, either in part or full, for the award of any other degree or diploma to the best of my knowledge and belief.

(Mr. Vinod Kumar)

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List of Abbreviation

WSNs : Wireless Sensor Networks

BS : Base Station

MMP : Mobile Management Plane

PMP : Power Management Plane

TMP : Task Management Plane

CH : Cluster Head

TDMA : Time Division Multiple Access

RSS : Received Signal Strength

LEACH : Low energy Adaptive Clustering Hierarchy

HEED : Hybrid Energy Efficient Distributed Clustering

BFS : Breadth First Search

GA : Genetic Algorithm

ACO : Ant Colony Optimization

PSO : Particle Swarm Optimization

MST : Minimum Spanning Tree

SNR : Signal to Noise Ratio

DCH : Double Cluster Head