INFORMATION OF THE DOCTORAL THESIS

Thesis title: *"Routing save consumption power in Wireless sensor network"*

Speciality::   Information System

Code: 9.48.01.04

Ph.D. Candidate:

Supervisor 1:

Training institution: Posts and Telecommunications Institute of Technology

NEW FINDINGS OF THE THESIS

This thesis provides the reader with an overview routing of Wireless Sensor Network, evaluation and analysis of clustering algorithms in wireless sensor networks and design solutions based on clustering routing techniques which perform on static and mobile sink models together with evaluation of solutions method through simulation. New contributions of the research process shown in the thesis are as follows:

1) Proposals are based on the static sink model:

The first contribution: NCS has proposed a better mechanism for routing in heterogeneous sensor networks based on energy level. This proposal was published in International Journal of Computer Networks & Communications (IJCNC) Vol.9, No.4, July 2017.

The second contribution: In order to improve the efficiency of the selection of host clusters, the researcher proposed to incorporate the fuzzy clustering algorithm εFCM in selecting CH node into SEP protocol.

The third contribution: Proposing the application of Fuzzy Logic theory in combination with LEACH algorithm to improve energy efficiency. However, this proposal is only the beginning of research on applying Fuzzy Logic to increase energy efficiency in wireless sensor networks. In order to efficiently route through the node-

to-node data transmission route and prolong network life, the method of proposing an algorithm that using a combination of fuzzy logic approaches and a modified A-star algorithm. The priority progress in the route formation node selection. The proposed method has the ability to choose the optimal route from the source node to the base station by prioritizing the highest residual energy, minimum number of hops, the lowest traffic load, and being a good node.

2) Proposals are based on the dynamic sink model:

The first contribution: Given 2 proposals, Among them, the first proposal combines energy efficiency based on the LEACH routing protocol developed for the mobile sink as the basis for the initial research. The second proposal is most effective when considering combining clustering based on fuzzy logic with a portable sink model. Two proposals are designed, compared with LEACH, CHEF and shown to be more efficient for working with homogeneous sensor environments. Both of the introduced proposals were enhanced with a mobile sink following a predictable path for the data acquisition mechanism, which determines the state of sink motion better relative to network life. Adopting fuzzy logic in the cluster head selection process is better than LEACH and the idea of combining the CHEF fuzzy clustering algorithm with a mobile sink balances energy consumption between CH nodes because transmission range can be reduced between those nodes and the sink. Therefore, combining the strategy of moving the sink in a fixed path with the fuzzy clustering improves the network lifetime.

The second contribution: Next, Author proposed a way to improve the lifetime of the wireless sensor network using fuzzy clustering, combined with the predictable mobile sink. In it, the cluster head selection is based on the remaining three energy parameters, the local distance and distance to sink. The deployment of the mobile sink has contributed to solving the energy loss problem, the sink moving in the middle and near the network center will give better results. The algorithm uses the LEACH-C clustering routing protocol in combination with the Dijkstra algorithm, ACO finds the shortest path for the mobile sink from the SINK station to the CH head clusters to collect sensor information. The proposal proposed a strategy to define a path for moble sink migration in terms of saving energy consumption on the mobile sink and improving WSN lifetime.

APPLICATIONS, PRACTICAL APPLICABILITY AND MATTES NEED FURTHER STUDIES

In some applications such as health monitoring, fire monitoring, there are strict delays of data collection requirements, meaning that data collected by the sensor nodes must be sent to the sink within the certain limit. Therefore, the main challenge here is how to design the sink's optimized path to minimize the power consumption of the entire network in terms of satisfying the delay requirements. The main goal of the WSN is to provide the end user with information gathered around the sensor area by the sink, data communication (send and receive) is the node's most energy consuming operation and consumption. The energy consumption is proportional to the distance between the sender and the receiver, meaning that the closer the sender is to the receiver, the lower the energy consumption decreases and vice versa. Therefore, to achieve higher energy saving results, the mobility of the base station is intended to increase the lifespan of WSNs. Recently, researchers have focused more on using Sink mobility to tackle the power loss problem in wireless sensor networks (WSN).

Currently, the study of energy optimization techniques and algorithms combined with fuzzy clustering, mobile sinks are very meaningful in practice and developing algorithms is the task of researchers in the field. WSN, contributes to the continuous development of this technology.

Supervisor 1   **Candidate Ph.D**