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Improved Energy Remain Greedy Algorithm (IERGS) Approach for Maximizing Wireless Sensor Network Lifetime

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ABSTRACT

Scope and vitality protection are two noteworthy issues in remote sensor organizes (WSNs), particularly when sensors are haphazardly conveyed in substantial regions. In such WSNs, sensors are furnished with restricted lifetime batteries and repetitively cover the objective zone. To confront the short lifetime of the WSN, the goal is to advance vitality utilization while keeping up the full detecting scope. A noteworthy system to spare the vitality is to utilize a wake-up booking convention through which a few hubs stay dynamic though the others enter rest state to preserve their vitality. This study shows a unique calculation for hub self-planning to choose which ones need to change to the rest state. The curiosity is to consider the remaining vitality at each hub in the choice of killing excess hubs. Thus, the hub with a low remaining vitality has need over its neighbors to enter rest state. The choice depends on a nearby neighborhood learning that minimizes the calculation overhead. To confirm and assess the proposed calculation, reenactments have been led and have demonstrated that it can add to develop the system lifetime. An examination with existing works is additionally displayed and the execution picks up are highlighted.

***Keywords:**—WSN, Self-scheduling, coverage*

I. INTRODUCTION

Wireless sensor network comprises of large no. of tiny, autonomous, self-organizing motes or sensor nodes that are scattered randomly or uniformly in sensing area. These nodes combine with router and gateway creates a wireless sensor network. In WSNs motes communicates in ad-hoc way in that routes between the motes are dynamically changing. These nodes communicate with each other via radio frequency channel. Each sensor node sense the network and waiting for the event for triggered. When the event is triggered first the information is processed from analog data to digital data and sends to the BS either by direct transmission or by multi hop communication. Mote communicates with neighbor nodes via radio frequency channel. The wireless communication consumes lot of energy and the sensor nodes have a small battery backup. The sensors nodes are deployed in a harsh environment where it is not possible to replace the battery, so once the energy is depleted node is dead. Energy efficiency is a big concern in the wireless sensor network. Energy efficiency in WSNs has attracted many researchers over the years.

1.2.1 Evolution of Sensor Network

During the Cold War sensor network establishment was started by the United States. Large number of acoustic sensors was deployed at pre-planned position at the bottom of the sea to discover and track soviet submarines. The network of acoustic sensors was known as Sound Surveillance System (SOSUS). In SOSUS the human operators played a very important part. The SOSUS has the wired sensor network as it did not have the energy bandwidth problem of wireless network. In 1980, Defense Advanced Research Projects Agency (DARPA) started the research on sensor network and named the program as Distributed Sensor Networks (DSN).DSN includes acoustic sensors communication, processing techniques, self-location algorithms for sensors and distributed software.

II. RELATED WORK

The most important issue that affects the working of wireless sensor network is the distribution of energy load between the sensor nodes. Therefore, it is necessary to manage the balance of energy load between the nodes in the network to increase the life time of the network. LEACH [1] is a hierarchical cluster based routing protocol in which nodes are organized as clusters and cluster head is selected and randomly rotates in the clusters for better distribution of energy load between the nodes in the sensing area. In this protocol instead of direct transmission the nodes send the information to the cluster head and cluster head aggregates the information and send it to the base station. The sensors are low-energy device thus the cost of transmission between the sensor node and base station is high. Therefore LEACH use automated method of data fusion and data aggregation. LEACH is 8 times more efficient than direct transmission. In 2002 S. Lindsey et.al proposed a protocol known as PEGASIS [2] that is an improvement of LEACH protocol. Instead of making multiple clusters it forms chain like structure of sensor nodes by following greedy method. Each node sends and receives data from neighbors and there is one node that is selected to transmit the base station. Data fusion is done at all the node expect the last node. Once a node in a chain is dead the new chain is formed using greedy method to bypass the dead node.

TEEN [3] is a hierarchical clustering protocol. After the cluster formation the cluster heads set the two threshold values: hard threshold value and soft threshold value. The node continues sensing the attribute of the environment but does not transmit the value until the attribute value is beyond the hard threshold value. This way number of transmission are reduced the node does not transmit until the value is in range of interest. The numbers of transmission are further reduced as the sense value is greater than the hard threshold value the node can transmit only when the value of that parameter changes by an amount at or greater than soft threshold value.

Fan Xiangning et.al modified the cluster head selection procedure of leach protocol [8]. The selection criteria for the cluster head is based on the residual energy in the next round. In first round all the nodes have same probability of becoming cluster heads. Clusters heads are selected randomly. After the first round all the nodes have the different residual energy. The nodes having more residual energy is selected as the cluster heads in the next round. NHRPA [9] is a routing protocol that do routing according to the distant between the node and the base station, residual energy and density of nodes distribution. In NHRPA the sensing area is divided into field: one contains the sensor node in transmit range of base station and second field contains the sensor node that are not in transmit range of base station, The node in the first field directly send the data to the base station. And in the second field clusters are formed and cluster heads are selected on the basis of current energy and initial energy.

The time and space complexity of NHRPA is O(N2) where n is the number of node. This protocol is more efficient than other simple hierarchical clustering algorithms.

III. Proposed Work

The IERGS algorithm is divided into rounds, where each one begins by a self-scheduling phase. In this phase, the nodes verify the coverage of their SA. Eligible nodes (those whose SAs are covered by a subset of their CS neighbours) turn off their communication and sensing units to save energy. Ineligible nodes will perform sensing tasks during the remaining of the current round. During the self- scheduling phase, the sensing tasks remain ensured by all working nodes.

The self-scheduling phase includes two steps. First, each node obtains the neighbouring nodes' information. Second, each node calculates its eligibility and decides whether it is eligible to enter its sleep state. Fig. 2 shows the structure of an IERGS round.

The duration of the round depends on the application specificity. Indeed, for applications inducing frequent use of nodes, the duration of rounds should be short to allow more fairness between nodes considering the energy consumption. On the other side, when nodes are less frequently used the rounds duration may be longer without loss of fairness between the nodes. The determination of the rounds duration is out of the scope of this paper.

The following sections describe in detail the two steps of the IERGS algorithm.

Advertisement step: At the beginning of the advertisement step, each node transmits to its neighbour nodes an advertisement message (ADV), including its ID and its current remaining energy. As only the nodes within a communication range equal to Rm are considered for the verification of the SA coverage, each node can transmit its ADV message with the minimum power allowing to reach this range. This power adaptation also enables to minimise the energy consumption.

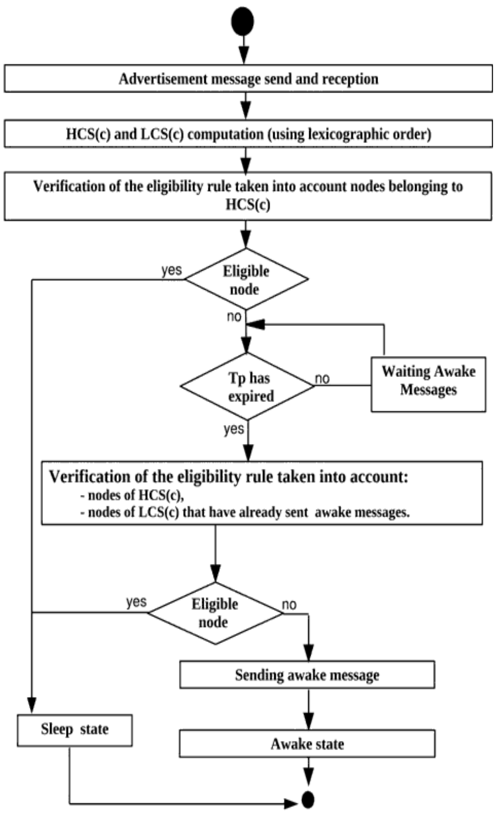

Figure 1 : Flow Chart Advertisement Message send and reception

III. Simulation Result

We have done simulation of improved IERGS algorithm in MATLAB and MATLAB (matrix laboratory) is a multi-paradigm numerical computing environment and fourth-generation programming language. A proprietary programming language developed by MathWorks, MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages, including C, C++, Java, Fortran and Python.

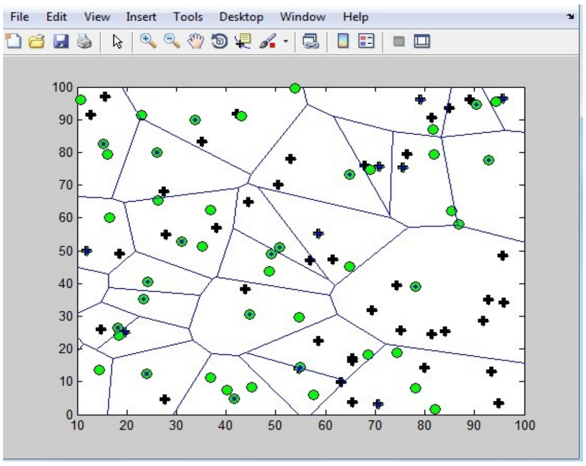

Figure 2(a) X and Y axises represent simulation area in meters and green color circle represent number of HCS nodes and plus sign in black color represent LCS nodes and coverage boundary is represented in blue color lines.

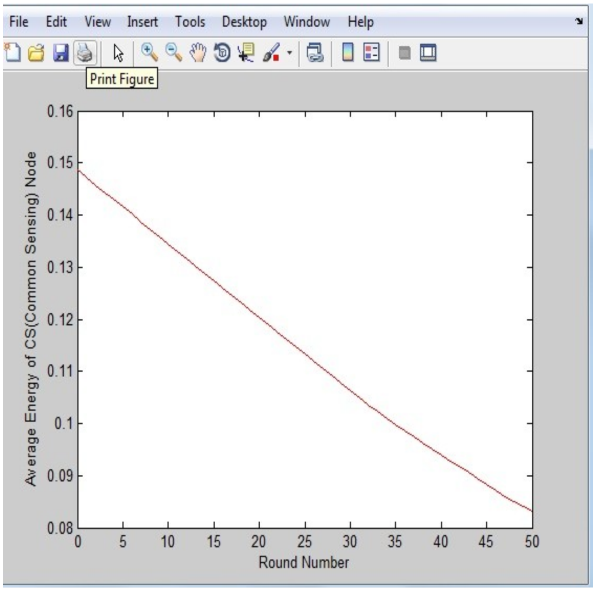

Figure 2 (b) The performance of CS nodes with respect to energy on the basis of number of round perform by algorithm

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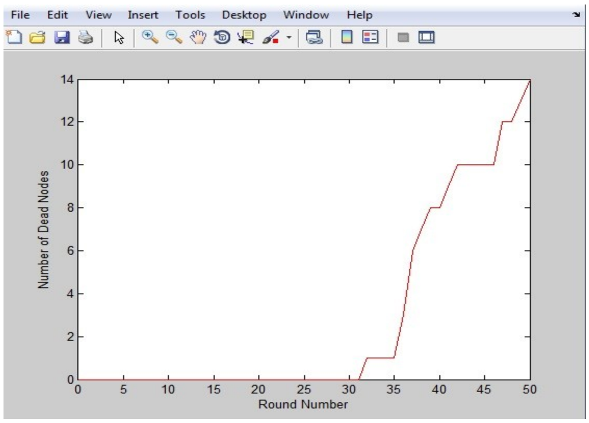

Figure 2 (c) The number of dead nodes with respect to energy on the basis of number of round perform by algorithm

IV.CONCLUSION:

In this paper, the problems of energy conservation and full sensing coverage in large WSNs where nodes are randomly deployed have been addressed. Specifically, an original algorithm, the IERGS algorithm, has been introduced based on a wake-up scheduling concept allowing one to extend the lifetime of the WSN. The IERGS algorithm relies on the novel idea of exploiting the remaining energy in making decision on which node has to enter sleep state.

The first main feature of the IERGS algorithm consists in applying an equity principle by balancing the remaining energy of nodes. This has contributed to extend the WSN lifetime. The second main feature consists in avoiding. Negotiation phases, as decision to enter sleep state uses a computed priority based on a one-hop neighbourhood the perform of network and also focus on the security issues on WSNs. knowledge. This contributes not only to extend WSN lifetime as message exchanges are reduced, but also to avoid blind points and then to preserve the full coverage of the target area. The simulation studies presented in this allowed to verify the contributions of the IERGS algorithm and to evaluate the gains over ERGS existing methods. With the IERGS algorithm, the WSN lifetime is extended compared to the lifetime obtained when using the ERGS algorithm. Such results meet the expectations, especially since the work of ERGS is among the most referenced. Simulation results have also shown that the message loss has no critical impact on the functioning of the IERGS algorithm in terms of blind points. Moreover, the whole coverage of the target area after the deactivation of redundant nodes is formally proven in this paper. This has shown that the local feature of the deactivation decisions has no impact on the general coverage.

REFERENCES:

[1] Wendi Rabiner Heinzelman, Anantha Chandrakasan, and Hari Balakrishnan, "Energy efficient communication protocol for wireless microsensor networks," In Proceedings of the IEEE 33rd Annual Hawaii International Conference on System Sciences, 2000.

[2] Stephanie Lindsey and Cauligi S. Raghavendra, "PEGASIS: Power-efficient gathering in sensor information systems," In Proceedings of the IEEE conference on Aerospace, 2002.

[3] Arati Manjeshwar, and Dharma P. Agrawal. "TEEN: a routing protocol for enhanced efficiency in wireless sensor networks," In Proceedings of the IEEE International Symposium on Parallel and Distributed Processing", 2001.

[4] Huseyin Qzgur Tan and Ibrahim Korpeoglu, "Power efficient data gathering and aggregation in wireless sensor networks," ACM Sigmod Record, Vol. 32, No. 4, 2003, pp. 66-71.

[5] Ossama Younis and Sonia Fahmy, "HEED: a hybrid, energy-efficient, distributed clustering approach for ad hoc sensor networks," IEEE Transactions on Mobile Computing, Vol. 3, No. 4, 2004, pp. 366-379.

[6] Siva D. Muruganathan, Daniel C. F. Ma, Rolly I. Bhasin, and Abraham O. Fapojuwo, "A centralized energy-efficient routing protocol for wireless sensor networks," IEEE Radio Communication Vol. 43 No. 3, 2005, pp 8-13.

[7] Wen-ya Zhang, Zi-ze Liang, Zeng-guang Hou and Min Tan "A power efficient routing protocol for wireless sensor network." In Proceedings of the IEEE International Conference on Networking, Sensing and Control, 2007

[8] Fan Xiangning, and Song Yulin. "Improvement on LEACH protocol of wireless sensor network." IEEE International Conference on Sensor Technologies and Applications, 2007

[9] Cheng Hong-bing, Yang Geng, Hu Su-jun, "NHRPA: a novel hierarchical routing protocol algorithm for wireless sensor networks," The Journal of China Universities of Posts and Telecommunications, Vol. 15, No. 3, 2008, pp. 75-81

[10] Wei Bo, Hu Han-ying and Fu Wen, "An Improved LEACH Protocol for Data Gathering and Aggregation in Wireless Sensor Networks," IEEE International Conference on Computer and Electrical Engineering, 2008.