Lifetime Improvement using Mobile Agent in Wireless Sensor Network

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Abstract

Wireless sensor networks have attracted much attention in the research community over the last few years, driven by a wealth of theoretical and practical challenges and an increasing number of practical civilian applications. 'one deployment, multiple applications' is an emerging trend in the development of WSN, due to the high cost of deploying hundreds and thousands of sensors nodes over a wide geographical area and the application-specific nature of tasking a WSN. A wireless sensor network is a collection of nodes organized into a cooperative network. To reduce the energy consumption, the transmission of data between sensor nodes must be reduced in order to preserve the remaining energy in cluster node. We propose a new energy balancing architecture based on cluster with hexagonal geometry with radius R.select the base station and after select the cluster head with maximum energy of the node and after select mobile agent in minimum distance to cluster head and second highest maximum energy. And then send the data mobile agent to cluster head and cluster head to base station and we have energy management must be followed to balance the energy in the whole network and improving network lifetime.

Keywords: Wireless Sensor Network, Mobile Agent

I. INTRODUCTION

An assemblage of sensing devices that can communicate wirelessly. Each device can sense, process, and talk to its coequal. A wireless sensor network is an amassment of nodes organized into a cooperative network. Each node consist of processing efficiency (one or more microcontrollers, CPUs, or DSP chips), may contain multiple types of memory (program, data and flash memories), have a RF transceiver (usually with a single omni directional antenna), have a power source (e.g., batteries and solar cells), and accommodate various sensors and actuators. [3] The nodes communicate wirelessly and often self-organize after being arranged in an ad hoc fashion. [3]

WSN consist of propagated self-governing sensors to monitor physical or environmental conditions. WSN consist of an array of sensors. Each sensor network node has typically several parts: a Radio, Transceiver, Antenna and microcontroller. A Base station connects the sensor network to another network to promote the data sensed for future processing. [5]

A Wireless Sensor Network (WSN) is networks of small devices, called sensor nodes, that are encapsulated in the real world for observations related to an application and are connected by a wireless network Protocol originators for WSNs place a high significance on energy conservation, since the nodes run on limited battery power. Data accomplished by the nodes is typically broadcasted to the sink over a multi hop wireless network. In such a network, a node might allocate most of its power hand over to other nodes' packets, use up its battery. Supplementary, as nodes die out, the network tends to get detached, leading to loss of coverage and connectivity [4].

This paper is organized as follows: Section 2 describe as a mobile agent in wireless sensor network Section 3.offers a literature review to identify the prominent research already conducted on this paper's central objective Section 4.Problem Statement Section 5.Analysis Section 6.Simulation results. Section 7.Conclusion

II. MOBILE AGENT FOR WIRELESS SENSOR NETWORK

A Mobile agent is a distinctive kind of software or computer programs that move or travel to another place between the nodes of a network to performed by a task alone and cleverly, in response to changing conditions in the network environment, to feel the aim of the agent messenger [7]. Mobile agent is send to the monitoring areas for information association by the base station. Mobile agent interchange data with cluster-head node one by one and transport physical data back to the base station. Another thing of the unnamed vehicle is responsible for visiting all source sensor nodes in a cluster and transporting physical data information to the cluster-head node. [8]

Mobile Agent model has been efficiently data accumulation ability in Wireless Sensor Network. Unnamed Vehicle is a type of computing entity which can collect precedence information sensed, operating individually and getting a series and sequence of aims on the behalf of users. [8] It performing data processing one by one while move from node to node and have a number of features, and included reactivity, independence, goal-oriented, else including mobility, adaptability, communication skills like including

consultation and cooperation, etc. The unnamed vehicle have been visited the network either periodically or on demand (when the application requires) and import back to the data. [8]

III. LITERATURE REVIEW

In this section, we describe some of previous research in this area and also explain the key concepts related to the proposed approach.

Energy Optimization using Neighborhood based weighted rendezvous technique for WSN, Ruthvic S D, Ravi B and Udaya Kumar Shenoy presented their paper in international journal pf computer application in 2015. In this paper proposed simple neighborhood based rendezvous technique, in which base station has been allowed to visit a subset of the sensor nodes to collect the data through single way communication. The advantage of this work is that the algorithm achieves better WSN lifetime comparing to static base station case and randomly movement strategy. Future work is extend this algorithm to deal with multiple deadlines and multiple mobile base stations [9].

Energy Consumption balancing in WSN, Rais Amine, Bouragba Khalid, Ziyati E thoussain, Ouzzif Mohammad published in IEEE 2014. In this paper decrease the network traffic overhead and prolong the lifespan of the network they suggest a new energy balancing architecture based on hexagonal clusters. Use of a mobile agent for each and every cluster and several base stations for the entire network can resolve the issue of uneven energy consumption of both cluster environment like inter and intra-cluster environments. The main benefit of this paper is energy management must be followed to balancing the energy in the whole wireless sensor network with a similar distribution of data by changing the location of the cluster head and sink node with the utilisition of mobile agent and multiple sinks. The drawback of this paper is mobile agent will be chosen randomly. So network lifetime will be decreases [10].

Balancing Energy Consumption with mobile agent in WSN, Kai Lin, Min Chen, SheraliZeadally, Joel J.P.C. Rodrigues suggested this research paper in journal Elsevier (2012). In this paper suggested the energy balancing cluster routing based on a mobile agent (EBMA) for wireless sensor network. To get better performance, the cluster structure is formed based on cellular topology taking into account the energy balancing of inter cluster and intra cluster environments. The main advantage of this paper is that Energy balancing cluster routing based on a mobile agent can efficiently balance energy consumption and perform high efficiency scale of network deployment [13].

Mobile Agent routing algorithm in WSN, Sheng Zhang, Zhang He, and Huili Yang suggested this research paper in Springer-Verlag Berlin Heilberg in 2012. Benefit of this paper is that Ant colony system is in focuses which to investigate the initial maximum migration path for mobile agent in wireless sensor networks environment. The results of contrastive experiment show that the suggested algorithm is superior to two other algorithms both on convergence speed and global search capability. Future work of this paper is how to improve ACO and make it suit to WSN environment are the focus of research [8].

Energy-Latency improved sensor networks using Mobile agents in textile Industry, G. Sundari and P. E. Sankaranarayanan presented in International Journal of wireless and mobile networks in 2011. The main benefit of this paper is that the latency improved MAC layer protocol to access the channel in the cluster and also used energy efficiency cluster formation algorithm based on residual energy of the all sensor node and this protocol will be handle multiple event message efficiently. The main problem of this technique is that nodes can be well synchronized among them, which is not easily to achieving in the widely distributed and scalable environment of a wireless sensor network [15].

Java Based Mobile Agent Platforms for wireless sensor network, Francesco Aiello, Alessio Carbone, Giancarlo Fortino, Stefano Galzarano presented in IEEE 2010. In this paper presents the recently getting mobile agent platforms for Wireless Sensor Network which are dependent either on Tiny OS or on Java Sun SPOT. The future work of this paper is devoted to determining the solution for agent based communication interoperability between MAPS and AFME agent which would be enable the developing or heterogeneous agent based Wireless Sensor Network application [17].

IV. PROBLEM STATEMENT

Energy draining in a wireless sensor network is due to message transmission from node to base station and which increase the consumption as the distance of the node increase from the base station. So, network lifetime improvement is challenge for all the researches. Wireless sensor network will be using mobile agent to improve lifetime of the network. In wireless network energy management and balancing the energy consumption using mobile agent. Create the network and make the cluster and select the mobile agent with maximum energy of the all nodes. So we will change the position of mobile agent and communicate from node to sink node with mobile agentand data will be sent mobile agent to base station. So this way we will manage the energy and balancing the energy in network. And after all we will improve network lifetime.

V. ANALYSIS

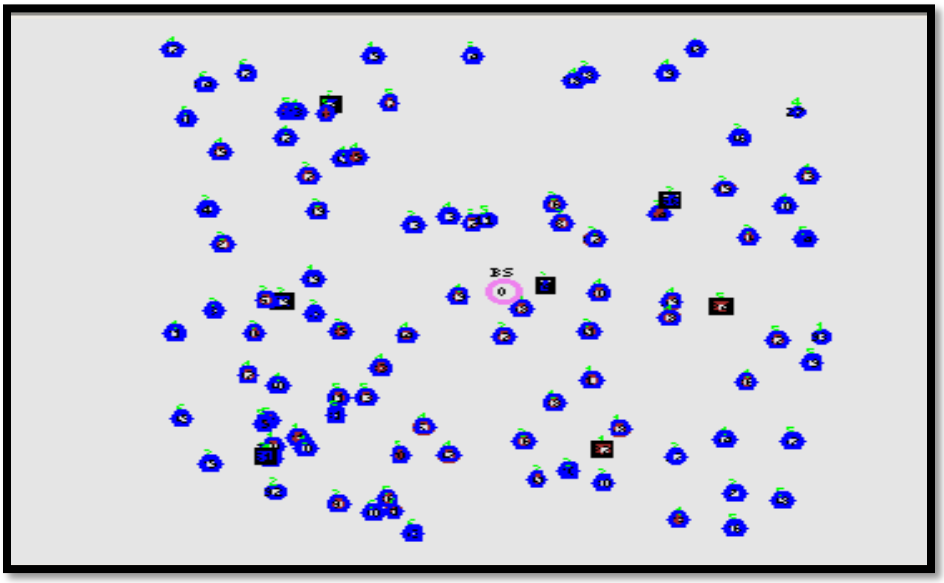

Fig. 1: Create a cluster

In this figure create the network and network has initial energy and create a 7 clusters in hexagonal shape and Number of nodes will be available in each cluster. In this network sink node will be located. And make the cluster head with maximum energy and cluster head denoted as mobile agent so multiple mobile agents will be created. Each and every node has initial energy. Every node has threshold value. And calculate the threshold and after energy consumption to this network. If some node will not be communicate to the sink node because of maximum distance. So this major problem will be solved by mobile agent. So create mobile agent and mobile agent is a movable and communicate the node to the sink. And if some area has maximum remaining energy and some node has below threshold energy then this node does not communicate to sink node. So mobile agent goes to this area and gets information from this node and after communicates to sink node. So this way improves the lifetime of the network.

VI. SIMULATION RESULTS

A. Changing Nodes and Calculate Packet Delivery Ratio

In this graph number of nodes increase then frequently packet delivery ratio will be increased. After 120 node packet delivery ratio will be constant.

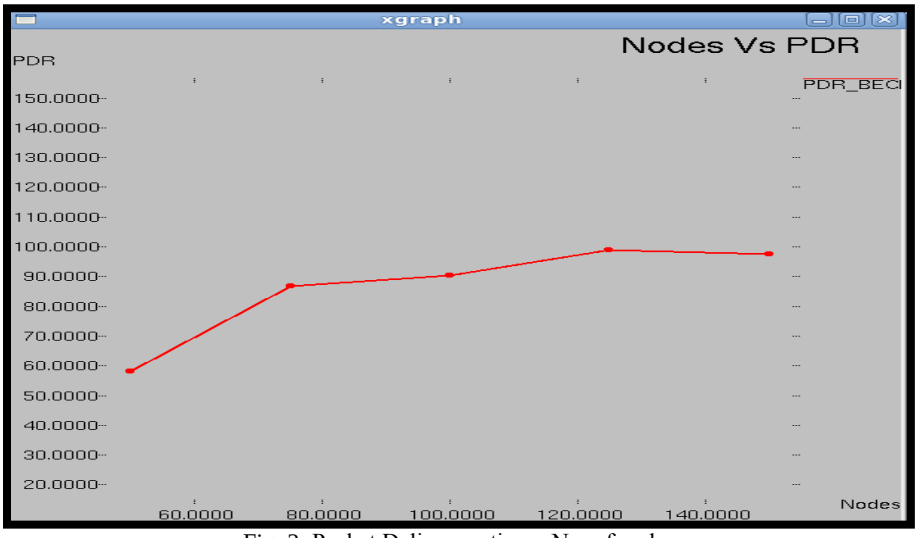

Fig. 2: Packet Delivery ratio → No. of nodes

B. Changing Nodes and Calculate Delay

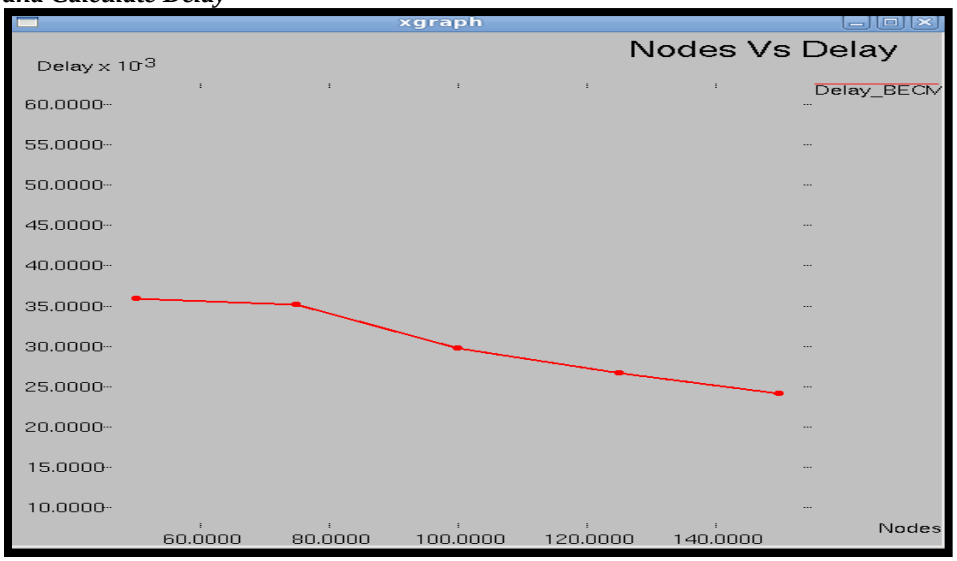

Fig 3: No. of nodes → delay

In this graph we have noticed a Number of nodes will be change and calculate delay. If number of nodes increase then frequently delay will be decreased.

C. Changing Nodes and Calculate average energy consumption

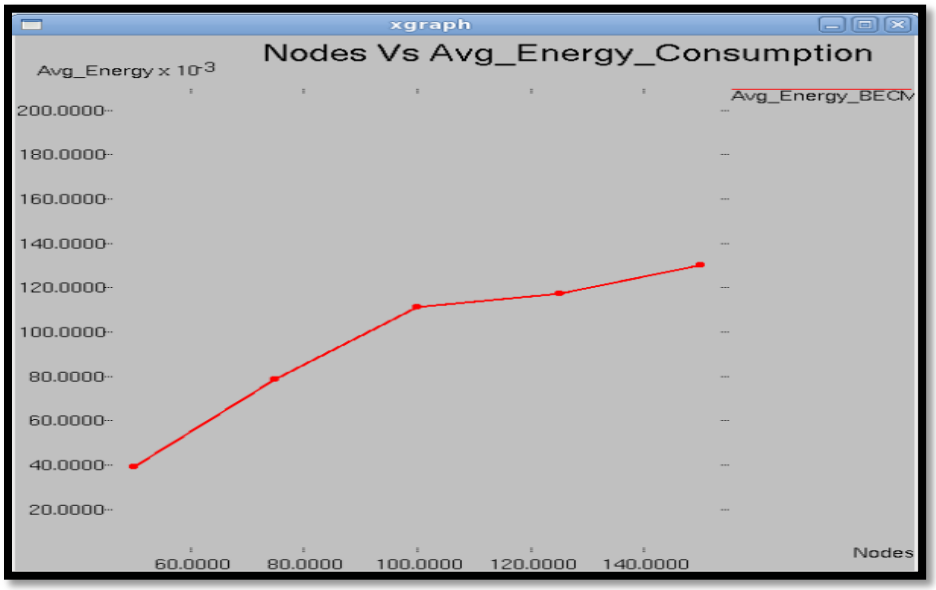

Fig 4: No. of nodes→Avg energy consumption

In this figure we have noticed that a Number of nodes will be change and calculate average energy consumption. If number of nodes increase then frequently average energy consumption will be increased.

D. Changing nodes and Calculate Throughput

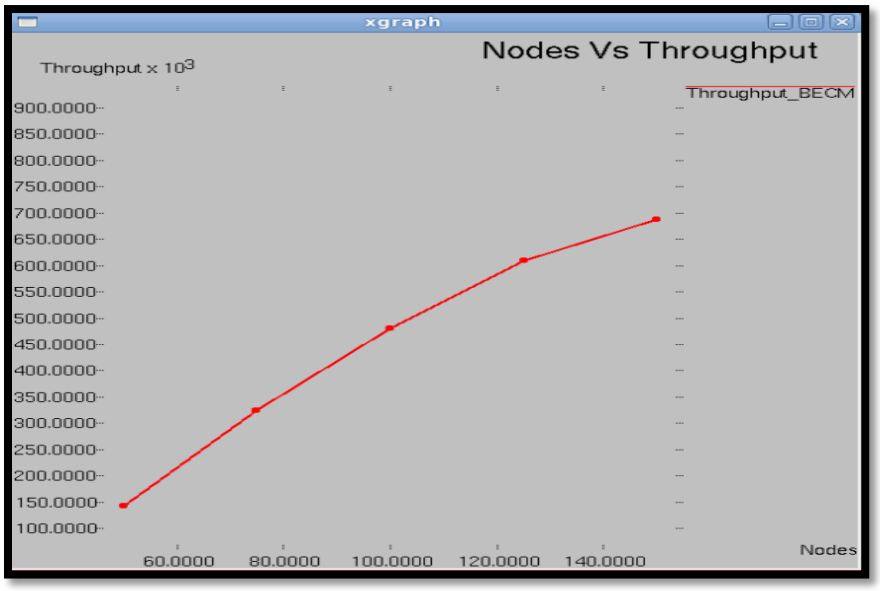

Fig. 5: No. of nodes → Throughput

In this graph Nodes will be changed by frequently and we will calculate throughput. If nodes will be increased then frequently throughput will also be increased.

E. Changing of nodes and Calculate Lifetime

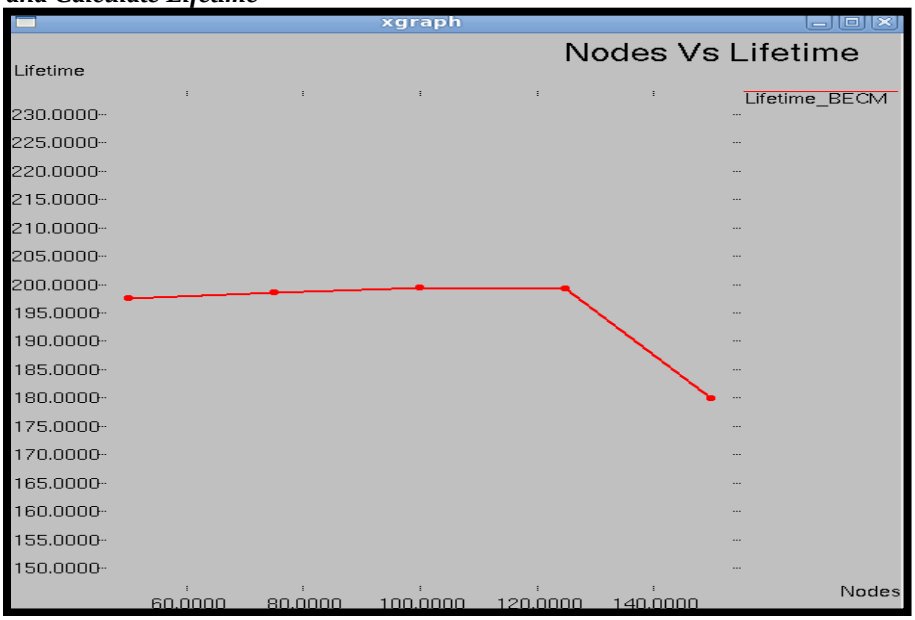

Fig. 6: no. of nodes → lifetime

In this graph nodes will be changed by frequently and we will calculate lifetime. If nodes will be increased then lifetime will be constantly increased 120 nodes then after 120 nodes lifetime will be constantly decreased.

F. Changing of nodes and Calculate Remaining Energy

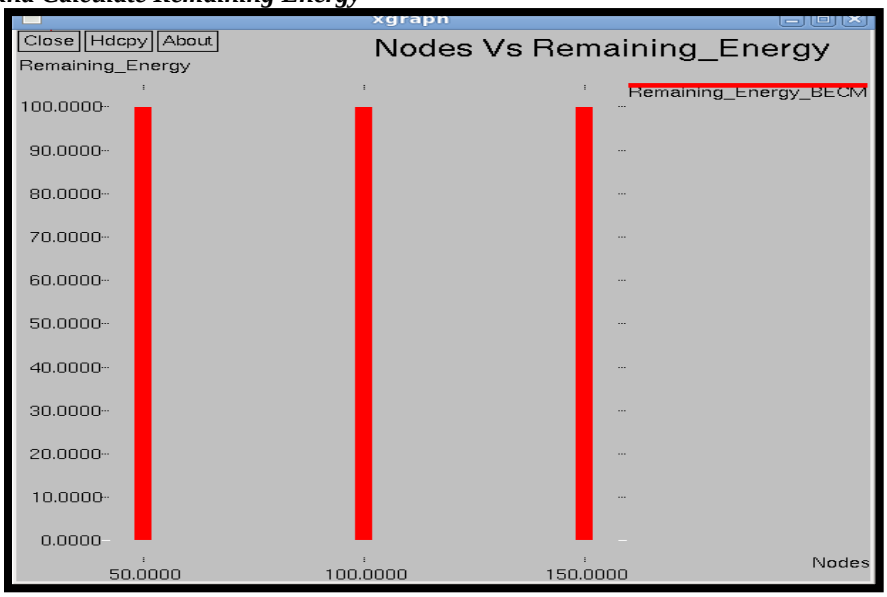

Fig. 7: no of nodes → remaining energy

In this graph nodes will be changed by frequently and we will calculate remaining energy. We will notice remaining energy will be constant at each node.

VII. CONCLUSION

We have mainly focus on how to balance the energy in the whole network with an equal distribution of data by changing the location of the mobile agent and base station with use of mobile agent and how to improving network lifetime. We have make cluster and cluster head will be selected with the maximum energy and cluster head denoted as mobile agent. And multiple mobile agent will be selected. After some time some energy will be reduced then we have choose another mobile agent. After communicate to mobile agent to base station. We will be tried to increase network lifetime. For improving network lifetime through mapping throughput, packet delivery ratio, routing overhead, end to end delay, Average Energy consumption, and lifetime and remaining energy. So this way we have improved network lifetime.

ACKNOWLEDGMENT

I would like to express my deepest appreciation to all those who provided me the possibility to complete this report. A special gratitude I give to our supervisor, Mr. Dhaval Patel, whose contribution in stimulating suggestions and encouragement, helped me to coordinate my Dissertation work especially in writing this report.

Furthermore I would also like to acknowledge with much appreciation the crucial role of the staff, who gave the permission to use all required equipment and the necessary materials to complete the task. Last but not least, many thanks go to the head of the seminar, whose have invested his full effort in guiding to me in achieving the goal. I have to appreciate the guidance given by other supervisor as well as the panels especially in our Dissertation work that has improved our presentation skills thanks to their comment and advices.

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