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An Efficient Routing Algorithm Using Bat Algorithm in WSN (Survey)

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Abstract*— WSN is major field among researches to get better and enhanced life time for network, one of the main fields is to calculate CH (Cluster Heads) more precisely and accurately to get better results. Now researchers are moving towards election of cluster heads as taking more and more parameters like residual energy, distance from base station etc. in recent works researches are using the no of sensors present for the particular sensor node to elect as a cluster head node is used. Here we are proposing modified algorithm which uses BAT Algorithm to get CH election optimized and fast.

Keywords*— Wireless sensor network, Bat algorithm, localization, Optimization

I. INTRODUCTION

Modern developments in making energy efficient WSN (Wireless Sensor Network) is giving new direction to deploy these networks in applications like industrial monitoring, surveillance, traffic monitoring, cropping monitoring, habitat monitoring, crowd counting etc. Use of WSN networks is making engineers to evolve innovative and efficient ideas in this field. A lot of research in data compression, data routing, and in-network aggregation has been proposed in recent years.

A WSN consists of a large number of nodes spread over a specific area where we want to look after at the changes going on there. A sensor node simply consists of actuators, memory, sensors, a processor and they do have communication ability. All these sensor nodes are allowed to communicate through a wireless medium. The wireless medium may either of radio frequencies, infrared or any other medium. These nodes are deployed in a random fashion and they can communicate among themselves to make an ad- hoc network.

If the node is not able to communicate with other through direct link, i.e. they are out of coverage area of each other, the data can be send to the other node by using the nodes in between them. This property is referred as multi-hoping. All sensor nodes work cooperatively to serve the requests. Generally WSNs are not centralized one as there is peer-to-peer communication between the nodes. So there is no requirement of prior established infrastructure to deploy the network. WSN gives flexibility of adding nodes and removing the nodes as required. But this gives rise to many drastic changes to deal with in the network topology such as updating the path, or the network tree, etc. In a WSN the node that gathers the data information refers to sink.

Very well known problem in using these networks is limited battery life. This is due to fact that the size of a sensor node is expected to be small and this leads to constraints on size of its components i.e. processors, battery size, data storing memory, all are needed to be small. So any optimization in these types of networks must focus on optimizing energy consumption. In Wireless Sensor Network a lot of sensed data and routing information has to be sent which often have some time constraints so that the information can be utilized before any mishap occurs, e.g. machinery monitoring, industrial monitoring, etc. The energy power consumption is much higher in data communication than internal processing. So energy conservation in WSN (Wireless Sensor Network) is needs to be addressed.

II. LITRATURE SURVEY

Zahra Beiranvand, Sakthidevi, E. Srievidhyajanani "Secured Fuzzy Based Routing Framework for Dynamic Wireless Sensor Networks" IEEE 2013 .

Fuzzy Based Trust-Aware Routing Framework (FBTARF) is the proposed method for security improvisation in dynamic WSN. FBTARF provides energy-efficient routing and reliable trust using fuzzification methods. Also, FBTARF provides the effective solution against harmful attacks due to identity deception. The dynamic nature of FBT ARF is analyzed by means of detailed evaluation using simulation and empirical experimental procedures. This has been studied for large-scale WSN under various environments including mobile and harsh network conditions. To improvise the security parameters, the proposed work is developed using a Fuzzy Based Trust Model which simultaneously considers multiple constraints and provides better security and energy conservation.

Yakov Nae "A distributed Protocol IEEE 2013 .

This paper has two main contributions: enhancement of the overall storage capacity in WSNs and a novel routing approach, which we call a deterministic "random" walk. Here suggested a distributed protocol for storage

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aggregation that allows individual sensors to build "on-demand" and deterministic Distributed Storage Chains (DSC). These chains represent adjacencies between sensors who share their storage capacity. Consequently, sensors are no longer subjected to their local storage constrains, but to the global storage capacity of the WSN.

Oliver Stecklina and Peter Langendoerfer , Christian Goltz "A Fair Energy Trade Multi-Hop Routing in Wireless Sensor Networks" IEEE 2013 [1]

In this paper, presented a Fair Energy Trade Multi-Hop Routing (FET-MHR) protocol for Wireless Sensor Networks guaranteeing a minimum network lifetime. Introduced a routing metric that implements a fair energy trade among all nodes. Nodes with low energy resources and links with a bad quality index are avoided. By that take into account the energy spent for sending in the past (low battery) as well as energy needed for sending in the future (bad link quality). Considering both aspects when selecting routing paths including their metrics helps increasing the node's lifetime significantly.

Jaesung Park, Yong Nyeon Kim, and Jin Yong Byun "A Forwarder Selection Method for Greedy Mode Operation of a Geographic Routing Protocol in a WSN" IEEE 2013 [2]

In this paper, proposed a forwarder selection method for the greedy mode operation of a geographic routing protocol in a wireless sensor network. For this, devised a forwarder selection metric by combining multiple performance metrics including energy consumption, forwarding direction, congestion level of a potential forwarder, and forward progress. the proposed method reduces an amount of wasted energy.

Thu Q.Ngo, Dien Q.Nguyen " Routing Protocol for Virtualization of Wireless Sensors Networks" IEEE 2013 In this paper, proposed a new dynamic switch process for EMRP that use the current energy value of relay and backup node and evaluate the performance of new switch strategy in terms of total residual energy, load balance, network lifetime and rate delivery compared with the old scheme[3]. Via simulation, realized that the newEMRP protocol can achieve better rate delivery and load balance than EMRP.

Jia Xu,Ning Jin, Xizhong Lou,Ting Peng,Qian Zhou,Yanmin Chen "Improvement of LEACH protocol for WSN" IEEE 2012 total residual energy, load balance, network lifetime and rate delivery compared with the old scheme[4] .Via simulation, realized that the newEMRP protocol can achieve better rate delivery and load balance than EMRP.

Jia Xu,Ning Jin, Xizhong Lou,Ting Peng,Qian Zhou,Yanmin Chen "Improvement of LEACH protocol for WSN" IEEE 2012 .

In this paper proposed a revised cluster routing algorithm named E-LEACH to enhance the hierarchical routing protocol LEACH. In the E-LEACH algorithm, the original way of the selection of the cluster heads is random and the round time for the selection is fixed. In the E-LEACH algorithm, considered the remnant power of the sensor nodes in order to balance network loads and changes the round time depends on the optimal cluster size.

Liangrui Tang, Sheng Liu "Improvement on LEACH Routing Algorithm for Wireless Sensor Networks" IEEE 2011[5] .

A novel routing algorithm based on Low Energy Adaptive Clustering Hierarchy (LEACH) routing protocol is proposed in this paper. In order to improve the random probability of cluster head (CH) election, the factors of residual energy and the frequency of becoming CHs are introduced. Hence, with the increasing number of running time, the nodes with more residual energy and fewer times of becoming CHs are more likely to be chosen as CHs, so that the energy consumption could be balanced.

III. OBJECTIVE

1. Uniformly distributed deploying of sensors as per to the environment given in the base paper.
2. Placing of sink in the area.
3. Showing with GUI to run algorithm more sophistically.
4. Implementing BAT Algorithm to optimize CH election for each round.
5. Run algorithm for defined period of time and plot various graphs like (network lifetime Vs time and sensors dead Vs time)
6. Comparison of result with base paper.

IV. METHODOLOGY

The methodology being used for the proposed work is applying the Neural Network for unqual geographical area distribution to equalize distribution of sensor nodes. The results of the proposed work will be evaluated using MATLAB2011b simulator. MATLAB stand for Matrix Laboratory is a numerical computing environment and fourth-generation programming language Developed by Math Works. MATLAB is widely used in academic and research institutions as well as industrial enterprises. 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, and FORTRAN. The chairman of the computer science department Cleve Moler, started developing MATLAB at the University of New Mexico, in the late 1970s.

V. CONCLUSION

Localization is one of the key techniques of wireless sensor networks(WSN). In this paper the localization problem in Wireless Sensor Network is formulated as an optimization problem and Bat algorithm is utilized to solve this problem. Simulation result shows that the localization accuracy is very high and Bat Algorithm (BA) can achieve higher

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accurate position estimation than BBO. A hybrid stochastic algorithm may be proposed to achieve more accuracy. The effectiveness of proposed algorithm may verify on experimental set up of sensor network.

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