Reduce Energy Consumption in WSN Using Nature Stimulated Technique

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Abstract: Wireless sensor networks, sometimes called wireless sensor and actuator networks. Wireless Sensor Network comprise of the nodes operated by the batteries. These nodes are generally deployed in human inaccessible areas to sense important data from the environment. Energy consumption is the main issue while designing a protocol for them. If the nodes batteries die out soon, it becomes very difficult and costly to replace them. Therefore the focus has always been given to designing of the algorithms and protocols which helps the nodes to save their batteries so that they can work for longer duration of time in the network. The proposed scheme will be analysed on the basis of these three parameters throughput, Delay and energy consumptions. The proposed scheme is expected to outperform the existing technique.

Keywords: WSN, Energy consumption, Network Lifetime.

1. INTRODUCTION

Recent years have witnessed an increasing interest in using wireless sensor networks (WSNs) in many applications, including environmental monitoring and military field surveillance. In these applications, tiny sensors are deployed and left unattended to continuously report parameters such as temperature, pressure, humidity, light, and chemical activity. Reports transmitted by these sensors are collected by observers (e.g., base stations). The dense deployment and unattended nature of WSNs make it quite difficult to recharge node batteries. Therefore, energy Efficiency is a major design goal in these networks. A wireless sensor network is an infrastructure comprised of sensing (Measuring), computing, and communication elements that gives an administrator the ability to instrument, observe, and react to events and phenomena in a specified environment.WSN are a very large array of diverse sensor nodes that are interconnected by a communication network. The sensing data are shared between the sensor nodes and are used as input for a distributed estimation system. The fundamental objectives for WSN are reliability, accuracy, flexibility, cost effectiveness, and ease of deployment. WSN is made up of individual multifunctional sensor nodes. The proposed scheme will be analysed on the basis of Throughput, Delay and Energy Consumption.

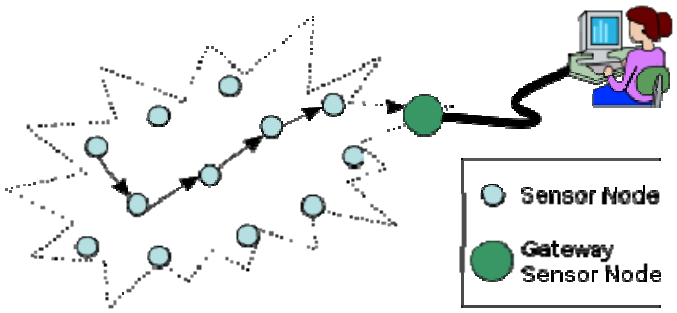

Figure 1: Wireless Sensor Network

2. LITERATURE SURVEY

Algorithm to Reduce Energy Consumption using Nature-Inspired Technique in Wireless Sensor Network by Shafali; Sharma, S.; Randhawa, N.S.; Sharma, D.

This paper focuses on this perspective and proposes a nature inspired approach to acquire a route of high energy for addressing data to the destination in order to diminish the energy consumption and rise the network lifetime. The simulation result carried out on MATLAB and concludes that the proposed technique consumes minimum energy in comparison to the existing route finding algorithms. For the proposed technique the sensing area is divided into cells and in each cell the equal number of nodes is deployed and initial energy values are assigned

to each node. The total energy of each route is calculated and the maximum energy value obtained by any route is considered as a best fitness value. To obtain a route the iterations are carried out using MRPSO which helps to update the initial population. Updating the initial population we would be obtaining the Position Best solutions and all the Position best solutions are further considered to get the Global best which is the route containing the maximum energy value among all the Position best solution. Finally, as per the Global Best the energy efficient route is achieved.

Transmission Scheme for life span Maximization of Wireless Sensor Networks based upon Optimal-Distance by Xuxun Liu

The novelty of this strategy is introducing two notions, most energy-efficient distance and most energy-balanced distance; a local most favourable-distance achievement mechanism is presented for not only high energy efficiency but also good energy balancing in WSNs; Secondly, by working out a network lifetime evaluation method, a global optimal-distance acquirement scheme is developed to achieve energy exhaustion minimization for sensor nodes with maximal energy consumption throughout the network. Our goal is to seek an optimal transmission distance for nodes of each sector. The search is performed by ant colony Optimization, where there is an ant on every sector initially. After that, every ant moves from a sector to another near the sink according to a specific probability.

Energy-efficient routing protocol use particle swarm clustering algorithm and inter-cluster routing algorithm for WSN by Xia Li, Wang Gang, Liu Zongqi, Zhang Yanyan.

This paper presents an energy-efficient routing protocol based on PSCA (particle swarm clustering algorithm) and ICRA (inter-cluster routing algorithm) for WSN, In PSCA Clustering algorithm can be divided into these two steps, one is select the cluster heads, the other is self-organizing clustering, choosing the cluster heads is the important part of the clustering algorithm. Inter-cluster routing algorithm uses the greedy algorithm to select the next hop node; is designed to avoid long distance communication between the cluster head and the sink node. Based on the improved PSO algorithm, all the nodes send the information of their energy and position to the sink node, and then it executes the clustering algorithm to choose the cluster heads and then broadcast the result to every node indistinguishably. After other non cluster head nodes receive the messages, they choose to join a cluster. In order to reduce the energy consumption of communication, the non-cluster head nodes choose the closest cluster to join.

Connected Dominating Set with Energy Efficient Construction by Using Ant Colony Optimization Technique in Wireless Sensor Network by Nimisha, T.S.; Ramalakshmi, R.

In this paper we are constructing an energy efficient connected dominating set using the ACO (Ant Colony Optimization technique) and it compared with the Genetic Algorithm (GA) based Connected Dominating Set (CDS). CDS construction time and the CDS size are used for the performance analysis of our proposed technique. Results showed that the nodes in the connected dominating set are energy efficient.

Optimal Coverage of Wireless Sensor Network using Termite Colony Optimization Algorithm by Das, P.P.; Chakraborty, N.; Allayear, S.M.

This paper presents a Termite Colony Optimization (TCO) algorithm, an adaptable and balanced way, which optimizes a minimal number of sensors while covering a maximum area. TCO is a population based met heuristic approach developed from the intelligent behaviour of termite that is known to us as Swarm Intelligence. There are some experiment with varying different parameters like grid size, number of sensors and termites. It has also proved the capability of our TCO over the constraints and difficulties as well. The idea is based on radio network which is extension of Radio Network Design (RND) problem. In this section we describe the coverage problem. When deploying a WSN, the positioning of the sensor nodes becomes one of the major concerns.

Hierarchical Data Dissemination based upon Ant Colony Optimization in WSN By Boucetta, C.; Idoudi, H.; Saidane, L.A.

In this paper, Author present a Power Aware Scheduling and Clustering algorithm based on Ant Colony Optimization (PASC-ACO). In the proposed approach, energy is saved by scheduling some nodes in the active state to generate data and keep network connectivity, while putting others in the sleep state. PASC-ACO is divided into two phases: setup phase and data transmission. The objective of the first phase is to realize dynamic clustering and to define the scheduling of nodes in the same cell. In the second phase, the active node in each zone uses ACO to send data to the base station.

Visualisation of effectiveness revelation and energy utilization of sensors using heat map in wireless sensor networks by Jeong, Y.S.; Chung, Y.J.; Park, J.H.

In this paper, Author proposed a technique that based on an existing binary model that uses the detection rate of nodes draft on a heat map. In addition to coverage visualisation, the visualisation technique can be used to predict the energy life span of a node. The simulator that can verify visualisation techniques for efficient

coverage visualisation and energy life span prediction has been designed and implemented. This simulator, which the authors have named present reduction state observer on Wireless Sensor Network device (CROWD), performs sensor network simulation by a fundamental sensor network and multi-mobile objects. CROWD also shows the detection rate of sensors on a heat map.

Wireless Sensor Network Path Optimization as based upon the Particle Swarm Algorithm by ZHU Xia, ZHANG Yulin

This paper proposes a Particle swarm optimization algorithm (PSOA) for Wireless Sensor Network (WSN) path optimization. In the network the current node which is computed through particle swarm optimization determines the next node according to the link set, and constitutes a new group, until it finds the optimal path. PSO designs and increases the mutation operator. This algorithm can find successful optimization of WSN routing, not only the solution quality is greater to genetic algorithm, but also increase the success rate. In experimental results verified that proposed PSO-WSN intelligent method can get away from local minima, so has better convergence than GA(generic algorithm)-WSN. So, it achieves very high accuracy rate of acknowledgment and thus provides support in classification.

Wireless Sensor Network by Beitollahzadeh, J.; Shahraki, A.A.; Mohammadi, K.

In this paper, Author proposed a new algorithm based on approach for energy-conscious routing in wireless sensor networks, it can reduce energy consumption and increase the network duration in wireless sensor networks. This algorithm has used from fuzzy neural network for clustering and section of cluster head nodes between other nodes. The simulation results display that the proposed algorithm can be used in wide area of applications in WSNs. Formation of clusters based on energy level and coordinates of sensor nodes. Fuzzy relevance-based cluster head selection and cluster head detection that is closer than other cluster heads to base station. Sending data from each sensor node to its cluster head. Distinction of data transmission method and sending data from cluster heads directly or indirectly.

3. EXISTING WORK

In [1] the clustering concept has been used by dividing the region into cells. Clustering approach will help save the energies of the node. Next main thing where the energy is consumed, it is involved in the routing of packets from the cluster heads to the base station. The authors have used the ant colony optimization technique to make the path from source to destination node. The underlying assumption is that from each cell one node must be selected to forward the data to the destination in multi hop fashion. The energy of the path, selected on the basis of highest pheromone value, is considered as the initial best fitness value. After that energies of the possible paths are updated after every iteration (where iteration means sending of the data successfully from the source node to the destination) using MRPSO. If the energy of the updated path is more than the initial path then the new path is selected for the routing.

4. PROPOSED WORK

The source node will start sending the route request messages to the nodes in its cell. Data will send in adjacent cells of the network. A node will forward the route request only if its energy is greater than Et. Where Et= 0.9 * Average energy of the nodes in the network If any node does not satisfy this condition then it will not forward the Route Request / Forward Ants in the network. When the request reaches the destination node, the initial path will be constructed having the highest pheromone value. The nodes in the path which are chosen will act as cluster heads now. Once the first iteration is over, the updated values of energy for the possible paths will be calculated i.e. Pbest solutions. From the Pbest solutions the path having the highest energy will be considered, it will serve as Global best solution. If the energy of the new path is more than the initial best fitness value then it will be chosen to send the data to the destination node. It will now serve as new best fitness value.

5. CONCLUSION

In this paper various approaches which aim to increase the lifetime of the sensor nodes have been analyzed. The authors have also used the concept of particle swarm optimization and ant colony optimization to reduce the energy consumption by the sensor nodes in the network. The proposed scheme will be implemented in NS2.35 and analysed on the basis of parameters.

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