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Intelligent Energy Routing Protocol in Wireless Sensor Networks

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Abstract: ***In Wireless Sensor Networks (WSN) energy is a extremely significant subject because these networks comprise of low power sensor nodes. This paper offers a new protocol to meet energy efficiency. The protocol has a diverse importance in energy efficiency as decreasing energy utilization in nodes, prolonging lifetime of the whole network, growing organization consistency and load balance of the network, decreasing packet postponements in the network. The new protocol recommends an intelligent routing protocol algorithm. It is centred on reinforcement learning techniques. It uses a new clustering method which is applied to the network and it is recognised using a connected graph. Then records is transferred using the Q-value parameter of reinforcement learning technique. The simulation outcomes display that the protocol has perfection in different factors such as network lifespan, packet delivery, packet delay, and network balance.***

Keywords: ***Intelligent routing protocol algorithm, energy efficiency, Reinforcement learning techniques, Clustering methods, Q-value parameter***

I. INTRODUCTION

A WSN is a huge collection of sensor nodes, which is arranged into different forms. It might be a system of disseminated autonomous devices referred to as sensors. Sensor nodes operate on the power source i.e. battery which is necessary for its communication. Size of the network will be flexible enough for insertion or deletion of nodes. The biggest challenges are battery capability, information measure and computing power to enhance network life, preserve numerous power sources and conserve the network energy is important. To save the power of the network, a scheduling method is used to boost the life of the network. The limited power in sensors challenges the routing protocol. Thus an impact awareness chiefly based routing algorithms must be familiarized to conserve the power and hence extend the network lifetime. In sleep scheduling nearly all of the nodes are subjected to sleep mode to boost the life of the network. Techniques used with sleep scheduling are routing and tree based algorithm, which advances the performance of the network. Different types of sleep scheduling techniques like Energy Efficient Scheduling, Energy Efficient TDMA Sleep Scheduling, Balanced-energy Sleep Scheduling, Optimal Sleep Scheduling, and Dynamic Sleep Scheduling are used for saving the energy of the nodes and extend the existence of the network.

II. LITERATURE SURVEY

The basics and operation of a genetic algorithm for instrumentation purposes are presented in paper [1]. The genetic algorithm sets up an initialization module of a decision support system. The technique development involved the characterization of the individual's representation with the intention of a graph-based fitness function, with the formulation of numerous other ad hoc implemented features. The performance and efficacy of the genetic algorithm were evaluated by preparing the instrumentation proposal of an ammonia synthesis plant. The initialization delivered prospered in accelerating the design procedures. It also consummates great perfection in the overall value of the ensuing instrument configuration. Therefore, it establishes a valued tool for dealing with real industrial problems. Advances in smart sensors have improved information processing and discovery skill in wireless communication. In sensor networks, each sensor node has constrained wireless computational power to transmit the statistics to the base station. Thus, to intensify the sensor and transmission area the WSN encompasses many sensor nodes. Each sensor node has a low level of battery power that cannot be refilled. In paper [2], a fault node recovery algorithm is proposed to amplify the life of a wireless sensor network when some of the sensor nodes are put to sleep.

The algorithm is based on the grade diffusion algorithm and genetic algorithm. The algorithm can end up in less substitutes of sensor nodes and more reused routing paths. In the simulation, the proposed algorithm surges active nodes by 8.7 times, falls the rate of data loss by around 98.8%, and cuts the rate of energy expenditure by about 31.1%. Thus, the algorithm boosts the wireless sensor network lifespan and shrinks the cost of the sensor nodes substitution. Progresses in hardware technology, conventional tactics to software development are not operational for evolving efficient algorithms for run-time environments. The problem originates from too basic hardware intellection model in the software development procedure. The incongruity between the theoretical hardware model and real hardware design should be reimbursed in designing an effective algorithm. In paper [3], focus is on memory hierarchy, and algorithm design. Both the cache properties and the cache-aware development are explored. A few simple rules are proposed for reviewing a developed algorithm to enrich the consumption of the cache. To confirm the efficacy of the principle proposed, optimization techniques, including particle swarm optimization (PSO) and the genetic algorithm (GA), are employed. Simulation results exhibit that the guidelines are theoretically helpful for look over various algorithms.

III. PROBLEM DEFINITION

The major challenges are battery capability, information degree and computing power, to augment network life, realm several power sources and conserve the network energy is important. A scheduling procedure is used to save power and augment the life of the network. The limited power in sensors defies the routing protocol. Thus an influence awareness chiefly based routing algorithms must be familiarized to conserve wireless sensor network power and hence extend the network life time. Efficient intelligent energy Routing Information Protocol (RIP) in Wireless Sensor Networks (WSN's) includes clustering mechanism between two nodes in placed in a cluster and the information is communicated with Q-Value parameter reinforcement learning technique.

IV. EXISTING SYSTEM

Energy is significant factor of Wireless Sensor Networks (WSN's). Primarily more attention to the modern protocols were given to Quality Of Service (QOS), bandwidth, packet delivery and reliability factors and attention to energy resources were less. Sensor nodes in prior WSN's are small-scale devices that have very low batteries and their charging is difficult. Energy saving has exchange with some of design factors such as reliability or system overhead. The customary approach [4] to sensor network routing involves the Directed Diffusion (DD) [5] and the Grade Diffusion (GD) [6] algorithm, which led to WSN leak, require more relay nodes etc.

V. PROPOSED SYSTEM

Hierarchical based protocol is appropriate for energy saving issues, which is the practice of ordering routers in a hierarchical manner. The novel protocol uses data aggregation strategy and builds balance between design factors. In this protocol, network is separated into clusters and have a CH (Cluster Head) node for each cluster which intermediates between sensor in their clusters and other clusters. The objective is choice of finest CH node, which imposes overhead control on network. RPR (Resilient Packet Ring) algorithm fallouts in less substitutes of sensor nodes and more reused routing paths.

VI. SYSTEM ARCHITECTURE

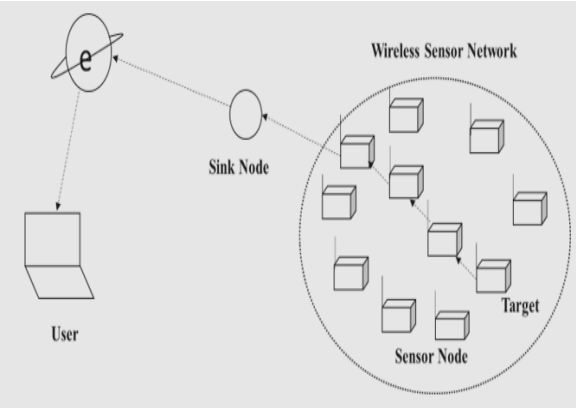

Figure 1: Defines the structure, behaviour and outlook of the system.

The interaction with the system begins when a user sends a request. This request is broadcasted to all the sensor nodes in a wireless sensor networks. Each sensor network entails of several clusters, which is a group of sensor nodes built on the basis of their fitness value. These clusters have a cluster head called CH node that collects information from the sensor nodes depending on their fitness value. CHs are selected on the basis of remaining energy. The nodes shift amid sleep and active modes to minimize energy intake.

One of the reasons of greater data rate achievement is extended network life span. The main objective here is, to enhance cluster-head selection process. In the proposed approach, constancy period of network and lifetime has been augmented.

VII. DATA FLOW DIAGRAM

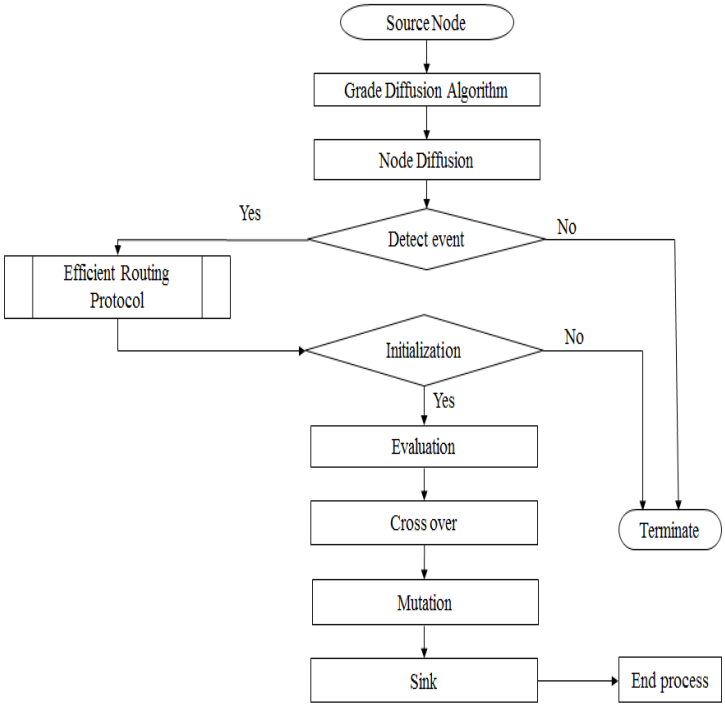

Figure 2: Network representation of a system

The source node in our design is the CH node, which gathers the information from all other sensor nodes in a particular cluster. We use grade diffusion algorithm for identifying the nodes that are active and hence results in lesser replacement of sensor nodes and more reused routing paths. Node diffusion [7] is the process of combining the sensor nodes with same fitness value so that they form a cluster. It checks against the fitness value of each sensor nodes. If any sensor nodes have greater survivability chances, it applies efficient routing information protocol otherwise it terminates. Application of routing information protocol includes four processes:

1. Initialization: In this phase, the genetic algorithm produces chromosomes, and each chromosome is a probable solution. The chromosomes are recognized based on the population, which is defined by the user. The chromosome size is the number of nodes that are not functioning properly. The components in the genes are either 0 or 1. A 1 indicates the node should be replaced, and a 0 indicates that the node will not be replaced.
2. Evaluation: The fitness value is calculated according to a fitness function, and the parameters of the fitness function are the chromosome's genes. Genes cannot be put directly in the fitness function in the fault node recovery algorithm, since the genes of the chromosome include data whether the node should be replaced or not. The objective is to reclaim the most routing paths and to replace the fewer sensor nodes.
3. Crossover: It is a part of genetic algorithm to flip the individual chromosome. Two discrete chromosomes are chosen from the coupling pool to produce two new descendants. A verge point is selected between the first and last genes of the parent folks. Then, the segment of each specific on either side of the crossover point is substituted and concatenated.
4. Mutation: This step can present characteristics not found in the original individuals and avoids the genetic algorithm from converging too fast. In this algorithm, we invert a gene randomly in the chromosome. The chromosome with the best fitness value is the solution after the iteration.

CONCLUSION

The observation portrays that in Energy Efficient Sleep Awake Aware energy degeneracy is suitably disseminated among all the nodes in the network which in result enhanced network lifespan. Effective cluster head selection algorithm helps in improved and constant data rate transmission. Simulation results illustrates that the alive nodes differ as network grows and first node dies around 1800 round. Result also shows that in uneven region starts very later as relate to other protocols. Results illustrates that in nodes perish at a constant rate. A unique sleep scheduling method is presented which is based on the level-by-level offset schedule, to achieve low propagation suspension in a large scale wireless sensor networks.

FUTURE ENHANCEMENTS

The concept of typically pairing midst sensor nodes energy utilization is optimized. Simulating the network parameters can be a useful approach for wireless sensor networks.

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