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Path Optimization Algorithm in Wireless Sensor Network with Obstacle

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ABSTRACT

Clustering is used for prolonging the network lifetime in WSN. It groups sensor nodes into different groups and selects a single node as a cluster head (CH) for all the groups. CHS collect the data from consonant clusters and forward the data to base station. In this paper, we proposed path optimization algorithm in Wireless Sensor Network with an obstacle (POAWSNO) that periodically selects the cluster heads according to quality factor. The quality factor is estimated by three criteria including quality of the link, remaining energy and degree of the node. Path optimization technique determines the shortest path during obstacle present in the WSN. POT is used to reduce the hop count and packet delay. The simulation results demonstrate that this approach improves the throughput and reduce the loss of packets and energy consumption in the network using network simulator.

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1. INTRODUCTION

Wireless sensor network uses radio frequencies to make distributed sensing tasks. WSNs have their applications in plant monitoring, fire detection and leakage of chemical, battlefield surveillance, automation in transportation, health, radiations, industrial use and gas detection. Geographic routing does not require global topology of the WSNs. A sensor node makes routing resolution based on the geographic position of itself and its neighbors. The sensors forward the data to the neighbor, which is closest to the sink. This reduces the average hop count. However, geographic routing cannot optimize the number of hops while a sensor has no neighbor closer to the base station. The incident of the problem can be caused by many factors such as sparse deployment of sensors, obstacles and sensors failures.

We propose Energy-Efficient Algorithm in Wireless Sensor Network with an obstacle. The electing cluster head is based on the quality factor that is evaluated by the robustness of the link, degree of the node and residual energy [1].

2. RELATED WORK

A distributed algorithm named scalable energy efficient clustering hierarchy (SPEECH) [1] scheme selects Cluster Head (CH) and relays separately based on nodes eligibilities. In this way, high and low degree nodes are representing as CHS and relays. SPEECH mainly used to mitigation of CHS energy burden. Fan-Shaped Clustering (FSC) [2] scheme introduced partition a large-scale network into fan-shaped clustering. Reliable Reactive Routing Enhancement (R3E) [3] increases the resilience to link dynamics for WSNs/IWSNs.

In Energy-Efficient Timer-based One-shot max function computation (TMC) algorithm, the nodes are grouped into clusters and computation occurs over two contention stages. Geographic Routing [4] is for prolonging the network lifetime and optimizes the routing path among obstacles in clustered WSN. A Virtual Coordinate-Based Bypassing Void Routing protocol [5] is used to transform a random structure composed of void edges into a regular one by mapping edge nodes coordinates to a virtual circle Combine technique for classification of IRS P6 LISS-III satellite images also used [6].

Regional Energy Aware Clustering with Isolated Nodes (REAC-IN) scheme has proposed for prolonging the lifetime of WSN. In this scheme, the Cluster Heads (CHs) selected based on the weight. REAC-IN scheme improves lifetime and stability of the network. Power control strategy [7] has proposed transmission power control for cluster head based on multi-packet reception in clustering WSN. Media Access Delay and Throughput Analysis of Voice Codec with Silence Suppression on Wireless Ad Hoc Network is presented in this paper [8].

Distributed cluster head scheduling scheme (DCHS) supports for two-tier WSN architecture and elects cluster head based on Received Signal Strength (RSS) and residual energy of the sensor node. In this paper described that the Hash-based Technique to Identify the Selfish Node in Mobile Ad-hoc Network [9]. Enhanced Developed Distributed Energy-efficient Clustering (EDDEEC) and Energy Efficient and Balanced Cluster-based Data Aggregation algorithm (EEBCDA) introduced efficient CH election probability. It provides long lifetime and stability. Power efficient multicast opportunistic routing protocol to optimize lifetime of MANET is presented in this paper [10]. The proposed BPF has low inclusion misfortune and smaller size due to the moderate wave impact. Mean while, sharp dismissal groups prompted by the nearness of two transmission zeros [11].

3. PROPOSED SCHEME

In this paper, we propose an Energy-Efficient Algorithm in Wireless Sensor Network with an obstacle (POAWSNO) is a clustering protocol for wireless sensor networks. The sensor nodes periodically monitor the environment and send information to the base station. The entire network is split into clusters, and this reduces the energy utilization for data transmission. The network activity is organized various stages.

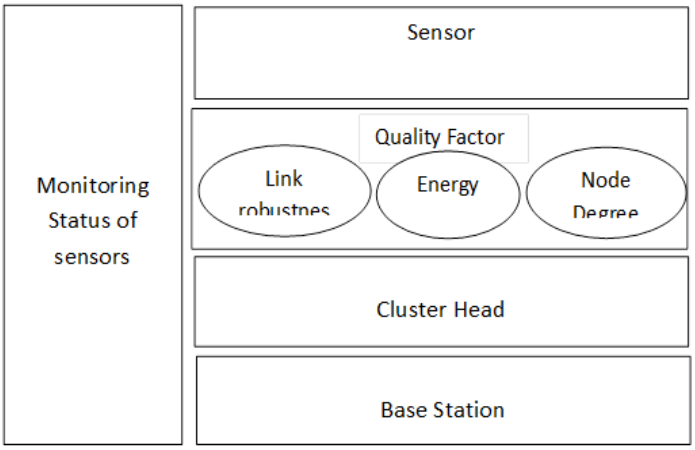

Figure 1. Architecture of POAWSNO

3.1. Partition Stage

The entire sensor node transfers the data of its location, link robustness, node degree, and energy. By using Global Positioning System (GPS), the sensor nodes obtain their current location. The base station after receiving the data calculates the quality factor of the sensor node, and the cluster head is thus selected.

3.2. Election Stage

Cluster Head is responsible for receiving data from sensor nodes inside the clusters, collecting this data and sends the collect data to the base station. The cluster head selection by Quality Factor, which is estimate depend on the robustness of the link, degree of the node and energy. The base station selects the highest quality factor node as a cluster head.

3.3. Obstacle Evaluation Stage

In this stage, the shortest path from source is attained to base station which also achieves minimum hop count among obstacles. The source before sending the data to the base station and identifies the barriers between the source and base stations. If there is no obstacle, forward the data to the base station using geographical routing. Otherwise, the source discovers the shortest path using Dijkstra shortest path algorithm. The path optimization technique reduces the energy consumption while routing and sensory data and hence, prolong the lifetime.

3.4. Transmission Stage

The data transfer stage contains three main activities: Data gathering, Data Aggregation, and Data sending. At sensing period, all sensor nodes send the data to their cluster heads, which in turn receive the data from cluster members instead of the cluster heads check the redundant data and eliminate them. The original data are then combined Media Access Delay and Throughput Analysis of Voice Codec with Silence Suppression on Wireless Ad Hoc Network [9]. The cluster heads transmit the aggregate data to the base station.

4. SIMULATION ANALYSIS

NS2 is an open source programming language written in C++ and OTCL (Object Oriented Tool Command Language). The nodes are communicated with each other by using the communication protocol User Datagram Protocol (UDP). The traffic is handled using the traffic model CBR. The radio waves are propagated by using the propagation model two-ray ground. All the nodes receive the signal from all direction by using the Omni directional antenna. The performance of the proposed scheme is evaluated by the parameters packet delivery ratio, packet loss ratio, average delay, throughput and residual energy Hash-based Technique to Identify the Selfish Node in Mobile Ad-hoc Network explained here [10].

5. CONCLUSION

An Energy Efficient Clustering Scheme among obstacles in WSN for selecting cluster head along with Wireless Sensor Networks. The election of cluster head is evaluated by link robustness, node degree, and energy. Path optimization technique estimates the shortest path while an obstacle is present in the WSN. POT is used to reduce the hop count and packet delay. Simulation results show that the EEWSNO has extended the network lifetime and reduce the energy consumption and transmission delay.

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