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Providing Energy Efficient Wireless Sensor Networks Based On Node Rotation

Sowndharya.K[1], Subbulakshmi.G[2]

PG Scholar, Department of CSE, Vandayar Engineering College, Thanjavur, India [1]

Assistant Professor, Department of CSE, Vandayar Engineering College, Thanjavur, India [2]

***Abstract*— The networking maintenance protocols aim to increase the lifetime of the sensor network by only keeping a subset of nodes in an active or awake state, while switching off redundant nodes. There have to be enough active nodes to maintain the connectivity of the network as well as to obtain sensing report in the area where the sensor network is deployed. They are often deployed in remote or inaccessible surroundings, making it extremely challenging for any manual maintenance like battery replacement. In existing, the nodes are maintained by using the replacement of an active or awake state. As a result, one of the main challenges faced by data intensive WSNs are managing the power consumption of nodes to maximize the network lifetime. It presents a new node rotation paradigm for maximizing the lifetime of mobile WSNs. This approach exploits the mobility of nodes to mitigate differential power consumption by having nodes take turns in high power consumption positions without modifying the existing topology. Our node rotation approach is very different than other schemes such as data mules in that all nodes expend relatively little energy on movement and move only a few times during the network lifetime.**

***Index Terms*— Wireless Sensor Network, Node Rotation, Network Lifetime.**

I. INTRODUCTION

Wireless sensor networks refers to a group of spatially dispersed and dedicated sensors for surveying and recording the physical conditions of the surroundings and organizing the collected data at a central location. Wireless sensor networks calculate environmental conditions like temperature, sound, pollution levels, humidity, wind speed and direction, pressure, etc. and to cooperatively pass their data through the network to a main area. The more modern networks are bidirectional, also enabling control of sensor activity. The cost of sensor nodes is similarly mutable, ranging from a few to hundreds of dollars, depending on the complexity of the individual sensor nodes. Size and cost conditions on sensor nodes result in corresponding conditions on resources such as energy, memory, computational speed and bandwidth. The topology of the WSNs can range from a simple star network to an advanced multi-hop wireless mesh network. The propagation technique between the hops of the network can be routing or flooding.

Advantages of the Sensor Networks are

1. Sensors networks allow a system to be extended from one with basic behavior to one that can receive and act on data about the surrounding it operates in.
2. Sensors such as PIR detectors are relatively low cost if using wired versions.

Disadvantages of Sensor Networks are

1. A Sensor Network may require a lot of additional wiring to be connected around the house to allow sensors to work except the sensors used are wireless.
2. Using wireless makes sensor devices much more costly. Retrofitting an existing home rather than a new build could cause a lot of upheaval for the period of the installation.
3. One of the biggest disadvantages of large scale wireless sensor networks lies on the complexity of logistics contain selective replacement of sensors that have ran out of energy.

II. PROCEDURE FOR PAPER SUBMISSION

A. *Chiping Tang and Philip K. McKinley. [4]*

In wireless adhoc networks, wireless nodes communicate with each other by sending data flows either precisely or through intermediate relays. The network topology, and specifically the paths of flows, significantly affect communication energy performance at individual nodes. Excessive or disproportionate energy consumption among nodes can lead to premature loss of the network. To address this trouble, several energy optimization approaches including clustering and topology control have been proposed.

B. *M. J. Handy, M. Haase, D. Timmermann. [5]*

It focuses on reducing the power utilization of wireless micro-sensor networks. Hence, a communication protocol named LEACH (Low-Energy Adaptive Clustering Hierarchy) is altered. We develop LEACH's stochastic cluster head selection algorithm by a deterministic component. Depending on the network configuration an expanding of

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network lifetime by about 30 % can be accomplished. Furthermore, it present a new approach to define lifetime of microsensor networks using three new metrics FND (First Node Dies), HNA (Half of the Nodes Alive), and LND (Last Node Dies).

C. Juby K Baby P K Poonguzhali. [6]

WSN consists of a huge number of wireless sensor nodes. Since wireless sensor nodes are battery powered devices, they have limited processing and transmission power. In order to transfer sensing data to sink effectively, it is important to design a routing protocol for WSNs. Since energy conservancy is a key issue in WSNs, data aggregation should be exploited in order to store energy. In this case, redundant data can be aggregated at intermediate nodes reducing the size and number of exchanged messages and thus, reducing communication costs and energy consumption.

D. Konstantin Mikhaylov and JouniTervonen. [8]

One of the recent tendencies for WSNs that significantly increases their performance and functionality is the utilization of mobile nodes. The contemporary Wireless Sensor Networks have a very broad application area and are becoming the essential part of everyday life. One of the recent tendencies for WSNs is the extension of their functionality and performance by means of using mobile WSN nodes.

E. SoniyaDeshmane and PoonamLambhate. [11]

Wireless sensor network (WSN) refers to a group of spatially dispersed and purposeful sensors for monitoring and recording the physical conditions of the environment. A sink node (Gateway) gathers data from sensors through single or multi-hop communication and processes it by ensuring that end-user can access data. We know Network lifetime is the time until the first sensor node or gang of sensor nodes in the network loss the energy. So network lifetime is depending on sensor lifetime.

III. PROPOSED SYSTEM

New mobile node rotation may propose and the data aggregation may propose to obtain enhanced increased energy efficiency. A new controlled mobility approach to increasing wireless sensor network lifetime, mobile node rotation may propose. A new problem, Max lifetime Node Rotation (Max Life) that models maximizing the lifetime of a WSN using rounds of mobile node rotation may propose. Max Life can incorporate any energy consumption model for both wireless communication and node movement. It can propose a number of algorithms for the general multiple round Max Life problem. We also propose efficient distributed implementations that do not require significant synchronization or overhead. It can confirm upper bounds on the lifetime improvement ratio of mobile node rotation approaches.

Advantages

1. Our approach takes advantage of the fact that many wireless sensor networks have a low duty cycle due to the limited energy availability. Despite the low duty cycle, several power-efficient MAC protocols have been proposed to maintain satisfactory communication performance.
2. It can able to increase the lifetime of the mobiles nodes connected in a network
3. It can enhance the increased energy efficiency.
4. It can efficiently solve the one round Max Life problem by reducing it to the assignment problem.

As the WSN used in Industrial and Environmental monitoring the most critical issues in the WSN is to reduce the energy consumption to increase the lifetime of the wireless sensor network. In most of WSN applications sensors would remain without recharge or change their batteries. So How to increase network lifetime is big problem for WSN. Network lifetime is the time until the first sensor node or gang of sensor nodes in the network runs out of energy. So network lifetime is depending on sensor lifetime. The intermediate hop nodes are working throughout the data transmission so those nodes drain out their energy which automatically shortens the lifetime of the wireless sensor network. It should propose mobile node rotation, a new method for using low price mobile sensor nodes to address differential power consumption and increase WSN lifetime and it propose to rotate the nodes through the high power consumption locations. This approach proposes powerful algorithms for single and multiple rounds of rotations. After the node rotation clustering and data aggregation has been performed. This approach should use various cluster head rotation protocol for balancing energy consumption among the nodes within the cluster. Data aggregation should gather and aggregate data in efficient manner to save the energy.

The sensor network has been formed by using collection of sensor nodes. Sensor deployment is carried out by the Network formation and then the number of sensor node has been calculated for construct the sensor network. Energy level will be assigned for all sensor nodes that will in sensor network. The path should identify based on the energy level between sender and receiver. The minimum energy level has been selected. After analyzing the optimal path, it should check whether the node in active or awake state. If the node in active state means it should transmit data between the sender and receiver otherwise it will perform node rotation. After data transmission it analyze whether the path can be optimal or not. If it is optimal, then the data to be transmitted to the receiver. The process is repeated until it should transfer all the data. All the process should be monitored by using monitoring system from the initial stage and then it should make decision. Mobile Node Rotation is new controlled mobility approach.

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Node consumes more energy if it has lots of descendants or is the farthest from its parents. Rotations of mobile sensors are used to balance energy consumption. So a node at high consumption location swaps its position with a node at low consumption location. Here it performs rotations when nodes are in Inactive mode. By rotating node once, network lifetime doubles and when we rotate node multiple times it beats eight times. In cluster based WSN, the entire network is divided into clusters, with each cluster get a Cluster Head with extra privileges and cluster members. Cluster head aggregates data from cluster members and sends it to the sink. Cluster based approach introduces more changes to network as each rotation requires new route calculation. The main goal of data aggregation algorithms is to gather and aggregate data in an energy useful manner so that network lifetime is enhanced. Data aggregation requires proper routing method for reliable transmission of aggregated data to receiver from the source nodes.

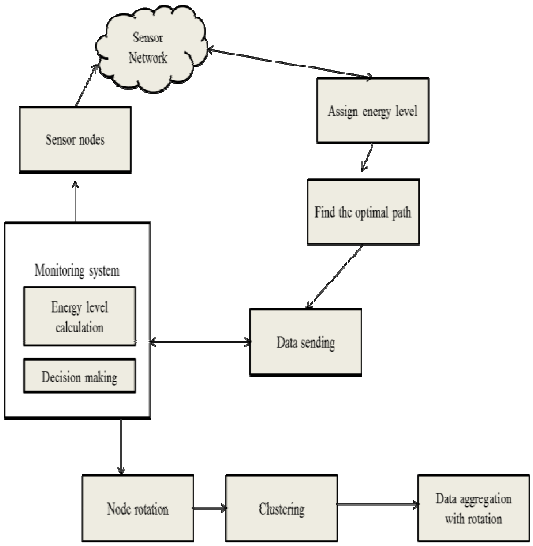

Fig 1 System Architecture

IV. Experimental Analysis

Fig 2 Network Formation

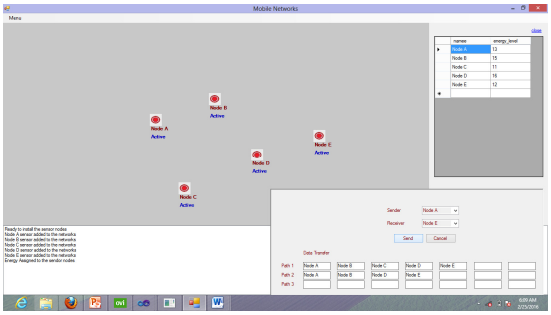

Fig 3 Path Identification

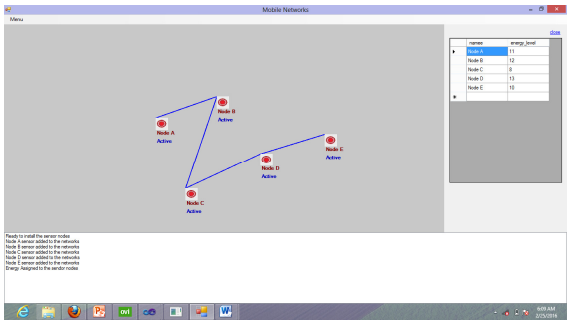

Fig 4 Data Sending

V. Conclusion

To save the energy of the nodes is main function in the designing of wireless sensor networks. In which that, a new node rotation is proposed for maximizing the lifetime of mobile WSNs. This node rotation approach is very different than other schemes such as data mules in that all nodes expend relatively little energy on movement and move only a few times during the network lifetime. This approach extends the lifetime of the network by reducing the communication responsibility of the resource-constrained sensors.

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