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Data Optimization and Secure Data Transfer by Dynamic Sensing and Routing in Rechargeable Sensor Networks

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ABSTRACT: The project is to carefully allocate the timely harvested renewable energy of the sensor for Data Sensing and Data Transmission so that the sensors remains active during the whole process by dynamically adjusting its sensing rate and transmission based on the available energy. Rechargeable sensor network offers a wide range of applications in areas such as traffic monitoring, medical care, inhospitable terrain, robotic exploration, and agriculture surveillance. In RSN, thousands of physically embedded sensor sensors are distributed in possibly harsh terrain and in most applications, it is impossible to replenish energy via replacing batteries. So automatically recharge the batteries from solar devices. In order to cooperatively monitor physical or environmental conditions, the main task of sensor sensors is to collect and transmit data. It is well known that transmitting data consumes much more energy than collecting data. The advent of efficient recharge communications and advancement in electronics has enabled the development of low-power, low-cost, and multi functionality sensor sensors that are characterized by miniaturization and integration

KEYWORDS: Data sensing, dynamic topology, energy allocation, energy harvesting, rechargeable sensor networks, routing.

1 INTRODUCTION

Data gathering optimization was previously addressed in battery-powered WSNs .A popular approach is to jointly optimize data sensing and data transmission globally by using cross-layer optimization. As the energy budget of each sensor is given initially, the problem can be formulated as a deterministic optimization problem. However, energy arrival at each sensor is intrinsically stochastic in RSNs. To optimize data gathering, sensors have to dynamically determine their sensing and transmission strategies in order to fully utilize the harvested energy according to the instant profile of energy arrival. These unique features make data gathering in RSNs a radically new and challenging problem, which is far from data gathering in battery-powered WSNs. In this paper, we seek to optimize data gathering in RSNs by jointly considering data sensing and data transmission. Existing works either assumed a static network topology or considered data sensing and data transmission independently. For example, Liu *et al.* proposed a distributed algorithm to jointly compute a routing structure and a high lexicographic rate as assignment, provided that the available logical links are predetermined . In practice, according to the amount of available energy, each sensor can adaptively adjust its transmit energy consumption within a certain range during network operation to improve the efficiency of data gathering by selecting optimal sensing rate and routing. Therefore, the dynamic feature of network topology should be taken into account to improve the efficiency of data gathering. In addition, since sensors should communicate with each other to compute the optimal data sensing and data transmission upon different energy allocation, 1 changing the energy allocation frequently may bring extra energy cost for communication and computation. Thus, the extra energy cost, as well as the computational complexity, should be taken into consideration. We introduce the related work in Section II and describe the network model and problem formulation in Section III. Then, a balanced energy allocation scheme (BEAS) for each sensor to manage its energy use efficiently is proposed and a distributed sensing rate and routing control (DSR2C) algorithm to find the optimal sensing rate and routing is designed. By taking into account time-varying characteristic of network topology, our goal is to maximize the data gathering by jointly optimizing the optimal energy allocation, data sensing and data transmission. Thus our work is different from existing works and has the potential to significantly improve the network performance. In addition, we proposed an improved energy allocation scheme to reduce the extra energy cost and a topology control scheme to reduce computational complexity for the sensors to obtain the optimal data sensing and data transmission.

2 EXISTING SYSTEM

In existing system to improve the energy efficiency for transmitting data, most of the existing optimal data sensing and routing strategies attempt to find the minimum energy path between a source and a sink to achieve optimal energy consumption. To designing an to compute the optimal data sensing and routing policy change the energy allocation will bring huge communication for information exchange there is main issues, in case of sensor networks, is Stairwell, since it involves not only finding the minimum energy path from a single sensor to destination, but also balancing the distribution of Expected energy of the whole network. Furthermore, the unreliable wireless links and network partition may cause packet loss and multiple retransmissions in a preselected good path. Retransmitting packet over the preselected good path inevitably induces significant energy cost.

3 PROPOSED SYSTEM

In this paper, we propose a Balanced Energy Allocation Scheme (BEAS) for managing the energy use so that all sensors can effectively utilize the harvested energy and Distributed Sensing Rate and Routing Control (DSR2C) algorithm for choosing the best energy path to transmit the data without much energy loss. In these algorithms we introduce that the sensor dynamically adjust its sensing rate depending upon the energy. Each sensor consists of a solar cell or device, a rechargeable battery and a wireless module. We introduce the forwarder list based on the distance to energy efficient sensor (EEN) and residual energy of each sensor. Here we sends the data to sink using one dimensional network, so it cannot divert to other sensors, it will go straightly to sink. Another process of rout finding is depends on its coverage. In this process effectively transfer the value data to the sink. Data transmit first data sensing level based depends upon energy level will low and it depends the works coverage will be reconstruct then will be transmit data. One method will be send the data based on neighbor communications and another method to transmit the data depends on the convergence rate in a large scale sensor network it mean large distance to send the message.

4 MODULES

As discussed earlier, there are four methods to implement the data gathering optimaization. The modules are as follows:

1. Network Formation,
2. Distance based Route Finding,
3. Energy based Route Finding,
4. Data Transfer.

Each sensor will be sensing the temperature and humidity and consumes energy continuously for every 10 seconds. Each sensor's energy will be distributed between Sensing Rate and Transmission based on the algorithm. Using multicast socket, all sensors are used to detect the neighbor sensors. Once after finding neighbor sensors a queue is maintained for each neighboring sensor called as real queue. Once the sensor sends the data to the sink, energy will be reduced and it dynamically adjusts its sensing rate.

In this distance based route finding process, every sensor has a distance and a coverage area. Using multicast socket, all sensors are used to detect the neighbor sensors. Once after finding neighbor sensors a queue is maintained for each neighboring sensor to the Sink called as available path. A sensor can have any number of available paths. That can be used to make a route.

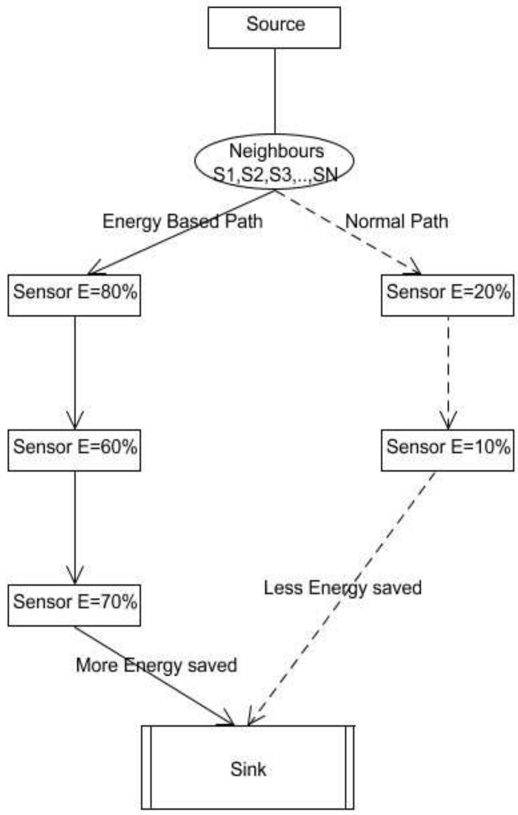
In this energy based route finding process, every sensor has an individual energy level. The energy level will differ from one sensor to another sensor. The highest energy level sensor is chosen as data forwarder. The higher energy sensors are forming the route for source to sink. In the data transmission process sensors energy can be reduced depends upon the data length. Energy level will be reduced automatically recharge from solar cell for each sensor.

The transmission route depends on energy of each node. All the sensors are dedicated to send the sensed information to the Sink continuously. The sensor which sensed the data chooses one of the neighbors in the range which has maximum energy and sends the information to that node. That sensor which got the information follows the same procedure to send to the next node in the neighbors. This way the information from each sensor reaches the sink. This method will save the energy of each sensor by dynamically choosing the path based on the energy.

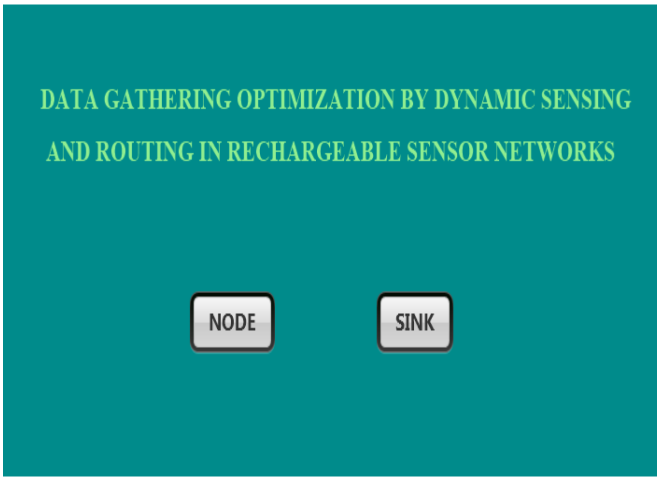
5 SYSTEM REQUIREMENTS

Serial No	Experimental Setup	
	Support Needed	***Specification***
1	Hard Disk	250GB and above
2	RAM	2GB and above
3	Processor	Core2Duoand above
5	Software Tools	JDK 1.6, java FX 1.3
6	Backend	Java
7	OS	Windows 7 or more.

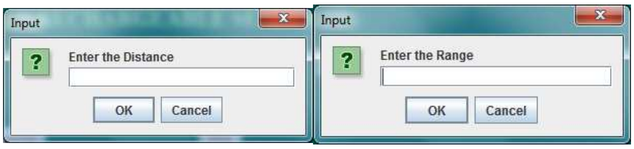
6 ARCHITECTURE DIAGRAM

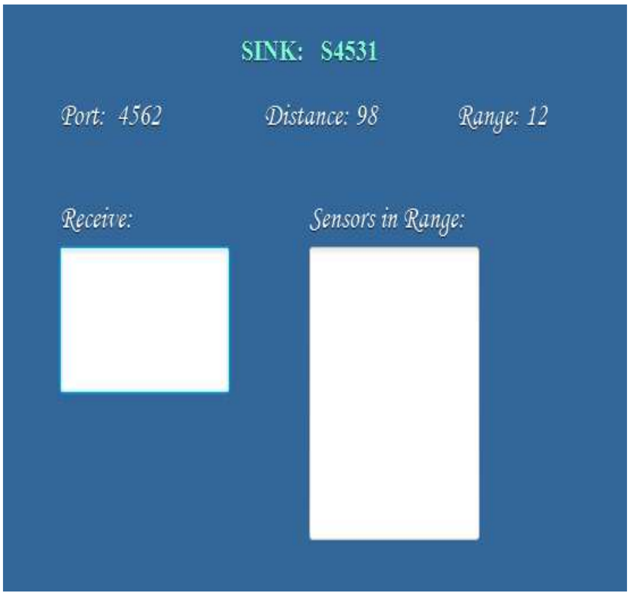


7 EXPERIMENTAL RESULTS



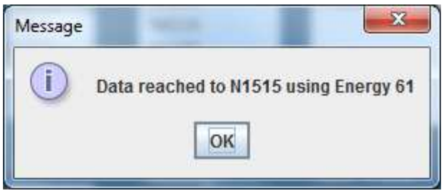
As discussed, The data gathering optimization page will diaplay with Node and Sink options.





After clicking Sink option we have to give input as distance and range value, sink page will be created.

If we click node option, node page will be display with the neighbouring nodes and data sensing



If Energy is low it will atomatically recharge every five seconds,After recharge the energy sensing and transmitted level will changed. And the best path will be choosen by high energy level

Finally the Sink will reciving all sensing datas

8 CONCLUSION

Thus we design two algorithm BEAS and DSR2C for effectively utilizing the available energy and choose the path to sink that best suits to save the energy. To sense the data rates and flow rates using decomposition while taking the dynamic of network topology. It depends on energy to use manage it distribute the data, energy consumption and maximizing network lifetime in one dimensional network.

By introducing flow variables to simplify the relationship between sensing rates and flow rates, we developed a distributed sensing rate and routing control (DSR2C) algorithm to obtain the optimal sensing rate and routing by employing theory of dual decomposition while taking the dynamic feature of network topology into account. An improved BEAS was proposed by taking extra energy cost into consideration to manage the energy allocation and a topology control scheme

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