Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X

IJCSMC, Vol. 4, Issue. 5, May 2015, pg.769 – 772

RESEARCH ARTICLE

SINK RELOCATION AND CONTINUOUS AGGREGATION FOR NETWORK LIFETIME ENHANCEMENT IN WIRELESS SENSOR NETWORK

Mahantesh Laddi (Author)
Computer Network and Engineering
Ballari Institute of Technology and Management
Bellary, India
Mahantesh18689@gmail.com

Prof. Sudhakar Avareddy (Guide)
Computer Science Engineering
Ballari Institute of Technology & Management
Bellary, India
sudhakar_avareddy@rediffmail.com

Abstract - The rapid advances in the wireless sensor network (WSN) have enabled the development of the low power, low cost, multifunctional nodes for a wireless communication. In wireless sensor network the critical task is to ,how to conserve the limited power resources to extend the network lifetime of the WSN as long as possible while performing sensing the data and reporting the sensed data to the sink via multi hopping. The sensor nodes near the sink will generally consume more battery power than others; consequently, these nodes will quickly loose out their battery energy and reduces the network lifetime of the WSN. The lifetime of the wireless sensor network is major concern that impacts the application of the sensor network..Sink relocation is an emerging network lifetime improvement method, which avoids consuming too much battery energy for a specific group of sensor nodes. The project uses moving strategy called energy-aware sink relocation (EASR) for mobile sinks in WSNs. The proposed method uses information related to the residual battery energy of sensor nodes to adaptively adjust the transmission range of sensor nodes and the relocating scheme for the sink. In wireless sensor network it is important to reduce the transmission overhead in the network by aggregating the each node information at the intermediate node before transmitting to the sink node. This will reduce the transmission overhead in the network so that network lifetime will be improved.

Keywords: Sink relocation, continuous aggregation, Energy aware sink relocation

INTRODUCTION

The longevity of wireless sensor networks is a major issue that impacts the application of such networks. While communication protocols are striving to save energy by acting on sensor nodes, recent results show that network lifetime can be prolonged by further involving sink mobility.

WSN consists of small-sized sensor devices, which are equipped with limited battery power and are capable of wireless communications. When a WSN is deployed in a sensing field, these sensor nodes will be responsible for sensing abnormal events (e.g., a fire in a forest) or for collecting the sensed data (temperature or humidity) of the environment. In the case of a sensor node detecting an abnormal event or being set to periodically report the sensed data, it will send the message hop-by-hop to a special node, called a *sink node*.

The applications of WSNs are broad, such as weather monitoring, battlefield surveillance, inventory and manufacturing processes, etc. In general, due to the sensory environments being harsh in most cases, the sensors in a WSN are not able to be recharged or replaced when their batteries drain out of power. The battery drained out nodes may cause several problems such as, incurring coverage hole and communication hole problems. Thus, several WSN studies

have engaged in designing efficient methods to conserve the battery power of sensor nodes, for example, designing duty cycle scheduling for sensor nodes to let some of them periodically enter the sleep state to conserve energy power, but not harming the operating of the sensing job of the WSN[6] designing energy-efficient routing algorithms to balance the consumption of the battery energy of each sensor node [9]; or using some data aggregation methods to aggregate similar sensory data into a single datum to reduce the number of transmitted messages to extend the network lifetime of the WSN [9]. The other energy conserving approach is to use mobile sensors to adjust their locations from a region with a high level of total battery energy of nodes to a low energy region [7]. Although this approach can extend the network lifetime of a WSN, the relocation of sensor nodes will also expand their battery energy.

Data fusion or aggregation has emerged as a useful paradigm in sensor networks. The key idea is to combine data from different sensors to eliminate redundant transmissions, and provide a rich, multidimensional view of the environment being monitored.

LITERATURE SURVEY

Several research works have proposed mechanisms for the sink relocation policy [4]–[9] and aggregation**.**

.**Luo and Hubaux [4]** proposed a Joint sink Mobility and Routing strategy (JMR) for data collection in a WSN. The JMR uses a circular trajectory at the periphery of the WSN. JMR uses a circular trajectory at the periphery of the WSN .The sink will use a constant velocity to circle the trajectory. There are two approaches, fast mobility and slow mobility, for exploiting sink mobility to improve network lifetime. They are distinguished by the relationship between the moving speed of a sink and the tolerable delay of the data delivery. On one hand, a sink can "transport" data with its movements if its speed is high enough to produce a tolerable data delivery delay [2]–[4], and hence spare nodes from the traffic forwarding load. This is the fast mobility approach, as the sink should move sufficiently fast.

Marta and Cardei [5] proposed a multiple sink relocation scheme with multiple pre-determined hexagon trajectories. Each trajectory has a mobile sink constantly relocating itself along the hexagon path. As a sink passes through a sensor node, then the sensor can relay the sensed data to the mobile sink. This category of sink relocation scheme is easy to implement and the sensor node can easily predict the sink's position due to the fact that its moving velocity is constant and the trajectory is predetermined. However, this category of relocation scheme does not adapt to taking the current residual battery energy of sensor nodes into consideration, which is important information, and it might give better performance results for relocation methods.

Sun et al. [6] proposed a mobile sink relocation scheme to drive the sink to the next position by taking the conditions of nearby nodes' residual battery energy. The method firstly partitions the nearby sensing region of the sink into 8 fan shaped sectors. The sensor node with the maximum residual battery energy is called the Move Dest .The sector containing the MoveDest is called the Dest sector. If the residual battery energy of a sensor node is below a given threshold, then this node is called a quasi-Hotspot A sector containing at least one quasi-Hotspot is called a miry sector otherwise, it is called a clean sector .The next new relocating position of the sink will be primal based on the intersection point between the line from the current position of the sink to the MoveDest and the border of the given transmission range (Move Dist. Limit) Then, based on the possible state (miry or clean) outcomes of the two neighboring sectors of the Dest sector, the new sink relocating position will be slightly minor adjusted accordingly.

Sun et al. [7] proposed two autonomous sink movement schemes, the One-step and the Multi-step moving schemes. The methods firstly compute a position for the destination of moving, which can be determined by the total residual battery energy of the sensor nodes. When a moving destination is determined, the One-step moving scheme will drive the sink to directly move to the destination despite the distance. For the Multi-step moving scheme, the sink will relocate its position iteratively from one intermediate moving destination to the other, and the distance of each relocating step will be limited to the transmission range of the sink. For each of the relocating steps, the determination criteria for selecting an intermediate moving destination are as follows. At first, the sink collects the residual battery energy from each sensor node within the communication range of the sink. Then, it choose the sensor node in the direction heading to the moving destination and within the transmission range of the sink, such that it has the maximum residual battery energy value among the sensor nodes. Set the intermediate moving destination to be the position of the chosen node and to relocate the sink to this position. Along this way, the mobile sink will relocate itself from one intermediate moving destination to the other and finally it will reach the moving destination.

PROPOSED METHODOLOGY

The project proposes a moving strategy called energy-aware sink relocation (EASR) for mobile sinks in WSNs. The proposed mechanism uses information related to the residual battery energy of sensor nodes to adaptively adjust the transmission range of sensor nodes and the relocating scheme for the sink. In the proposed approach considered a sink relocation scheme called the Energy-Aware Sink Relocation (EASR) method, which incorporates the routing method and the topology control method as well. The EASR will consider the current residual energy of the each node to determine the maximum capacity path. This improves the lifetime of the limited resources of the wireless sensor network.MCP(Maximum capacity path) is the routing protocol to find the maximum capacity path to determine the next preferred location to move the sink based on the current residual energy of the each node. The continuous aggregation will reduce the transmission overhead to the sink in the network. The EASR and MCP together will improve the lifetime of the limited network by conserving limited resources.

CONCLUSION

The decreasing speeds of battery energy of sensor nodes will significantly affect the network lifetime of a WSN. Most of the systems have aimed to design energy-aware routings to conserve the usage of the battery energy to increase the network lifetimes. In order to improve the network lifetime the system proposes a sink relocation and continuous aggregation reduce the transmission overhead.

REFERENCES

[1]. A Network Lifetime Enhancement Method for Sink Relocation and Its Analysis in Wireless Sensor Networks by Chu-Fu Wang, Jau-Der Shih, Bo-Han Pan, and Tin- Yu Wu-june 2014.

[2]. N. Jain and D. P. Agrawal, "Current trends in wireless sensor network design," *Int. J. Distrib. Sensor Netw.*, vol. 1, no. 1, pp. 101–122, 2005.

[3] H. R. Karkvandi, E. Pecht, and O. Yadid-Pecht, "Effective lifetime-aware routing in wireless sensor networks," *IEEE Sensors J.*, vol. 11, no. 12, pp. 3359–3367, Dec.2011.

[4]. J. Luo and J. P. Hubaux, "Joint mobility and routing for lifetime elongation in wireless sensor networks," in Proc. IEEE Inf. Commun.Conf., vol. 3. Mar. 2005, pp. 1735–1746.

[5]. M. Marta and M. Cardei, "Improved sensor network lifetime with multiple mobile sinks," *J. Pervas. Mobile Comput.*, vol. 5, no. 5,pp. 542–555, Oct. 2009.

[6] . Y. Sun, W. Huangfu, L. Sun, J. Niu, and Y. Bi, "Moving schemes for mobile sinks in wireless sensor networks," in *Proc. IEEE IPCCC*, Apr. 2007, pp. 101–108.

[7]. L. Sun, Y. Bi, and J. Ma, "A moving strategy for mobile sinks in wireless sensor networks," in *Proc. 2nd IEEE Workshop Wireless Mesh Netw.*, Sep. 2006, pp. 151–153.

[8]. Y. Bi, L. Sun, J. Ma, N. Li, I. A. Khan, and C. Chen, "HUMS: An autonomous moving strategy for mobile sinks in data-gathering sensor networks," *EURASIP J. Wireless Commun. Netw.*, vol. 2007, pp. 1–15,Jun. 2007.

[9]. J. Wu and S. Yang, "SMART: A scan-based movement assisted sensor deployment method in wireless sensor networks," in *Proc. IEEE Inf. Commun. Conf.*, Mar. 2005, pp. 2313–2324.

[10]. S. Ji, R. Beyah, and Z. Cai, "Snapshot/Continuous Data Collection Capacity for Large-Scale Probabilistic Wireless Sensor Networks,"Proc. IEEE INFOCOM, pp. 1035-1043, Mar. 2012.

