International Journal of advancement in electronics and computer engineering (IJAECE)
Volume 5, Issue 6, Oct. 2016, pp.1041-1044, ISSN 2278 -1412

Analysis Report on Efficient Coverage and Connectivity Preservation with Load Balance for Wireless Sensor Networks

Bharti Yaduwanshi [1], Ayoush Johari [2]
[1]Mtech Scholar, Lakshmi Narain College of Technology & Science, Bhopal, bhartisarni@rediffmail.com, India;
[2], Assistant Professor, Lakshmi Narain College of Technology & Science, Bhopal, ayoush.lncts@gmail.com, India;

Abstract *– In this paper develop a unique maximum connected load-balancing cover tree (MCLCT) rule to realize full coverage further as BS-connectivity of every sensing node by dynamically forming load-balanced routing cover trees. Such a task is especially developed as a maximum cover tree drawback that has been proved to be nondeterministic polynomial complete. The planned MCLCT consists of 2 components: 1) a coverage-optimizing recursive heuristic for coverage management and 2) a probabilistic load-balancing strategy for routing path determination.*

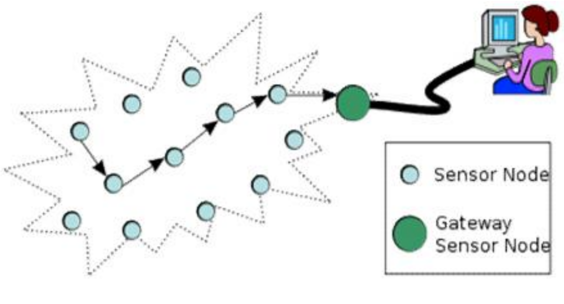
Keywords*: Wireless sensor networks, coverage/connectivity preservation, scheduling, lifetime Maximization,*

I. Introduction

This Wireless sensor Networks (WSNs) are formed by connected wireless sensor nodes that each is compact and has the power of sensing, processing, and storing environmental data still as communication with totally different nodes. High fault tolerance, strong ability, and comprehensive sensing coverage are the most merits. These choices enable wireless sensor networks to be applied to a spread} of vary of applications, e.g. home health care, battleground surveillance, machine observance, environmental monitoring, and so on.

Wireless sensor networks consist of large number of low cost devices to gather information from the diverse kinds of physical phenomenon. Numerous applications have been proposed and discussed including military surveillance, structural monitoring, and habitat monitoring [1], [2], [3]. For these sensor network applications, most research has discussed problems in a deployment of large number of low-cost homogeneous devices. However, it is often feasible to consider the deployment of heterogeneous devices with different capabilities.[4] Sensing coverage represents both the spatial extent and the degree to which the target phenomenon can be observed. Sensing coverage area is the spatial extent of network covered by sensors, which indicates the breadth of sensing coverage. On the other hand, sensing coverage degree means the number of sensors that cover a target object, which implies the depth of sensing coverage. It also reflects the density of sensor nodes as well as the reliability of monitored data from sensors in a certain area. For example, if two deployments have the same size of covered area but have different coverage degrees, the higher coverage degree deployment can extract more fine spatial information from the field.

Wireless sensor networks (WSNs) consist of tiny devices which are equipped with processing, transceivers, storage resources and batteries. Wireless sensor networks are deployed in open and in discreet environment. The collected information is sent through wireless links using multiple hops to a sink which can use it locally, transmit to other networks through a gateway. A node in sensor network consists of memory, battery and transceiver. The memory stores data, battery provides energy, and the transceiver receives and sends data. There are two types of WSN, homogeneous WSN and heterogeneous WSN. Heterogeneous WSN have the following advantages: (1) Prolonging network lifetime (2) Improving reliability of data transmission (3) Decreasing latency of data transportation. One of the important issues in sensor networks is power supply that is constrained by battery size which cannot be enhanced. Thus, an optimal use of the sensor energy has a great impact on the network lifetime.



International Journal of advancement in electronics and computer engineering (IJAECE)
Volume 5, Issue 6, Oct. 2016, pp.1041-1044, ISSN 2278 -1412

Fig 1 Typical multi-hop wireless sensor network architecture

II. Theory

Wireless technologies have revolutionized the world of communications. It started with the use of radio receivers or transceivers to be used in wireless telegraphy early on; and currently the term wireless is used to explain technologies like the cellular networks and wireless broadband web. Though the wireless medium has limited spectrum alongside a few different constraints as compared to the guided media, it provides the only means that of mobile communication. Wireless ad hoc networking is used for random and rapid deployment of a large variety of nodes, that could be a technology with a large range of applications like tactical communications, disaster relief operations, health care and temporary networking in areas that aren't densely populated. A mobile ad-hoc network (MANET) consists of mobile hosts equipped with wireless communication devices. The transmission of a mobile host is received by all hosts inside its transmission vary because of the broadcast nature of wireless communication and omni-directional antennae. If 2 wireless hosts aren't among the transmission range in ad hoc networks, different mobile hosts placed between them will forward their messages that effectively build connected networks among the mobile hosts within the deployed space. one in all the first objectives of wireless device networks is to produce full coverage of a sensing field as long as possible. Many tasks—such as object tracking and battlefield intrusion detection—require full coverage at any time. With the restricted energy of sensor nodes, organizing these nodes into a maximal variety of subgroups (or referred to as set cover) capable of monitoring all discrete points of interest so alternately activating them may be a prevailing way to give higher quality of surveillance. Additionally to maximizing the amount of subgroups, a way to guarantee the connectivity of sensor nodes (i.e., there exist links between the base station (BS) and sensor nodes) is additionally critically necessary whereas achieving full coverage..

II.1. Main A.Maintaining the Integrity of the Specifications

The template is used to format your paper and style the text. All margins, column widths, line spaces, and text fonts are prescribed; please do not alter them. You may note peculiarities. For example, the head margin in this template measures proportionately more than is customary. This measurement and others are deliberate, using specifications that anticipate your paper as one part of the entire proceedings, and not as an independent document. Please do not revise any of the current designations.

III. Method

In this paper planned the relay node that is responsible for deliver packets for all the nodes among the cover set. The relay node can at first be closer to center. once routing it'll chosen supported probability of maximum coverage and energy levels. Within the planned MCLCT algorithmic rule the multiple routes are discovered for delivering the packets and also the routes can have highest residual energy.

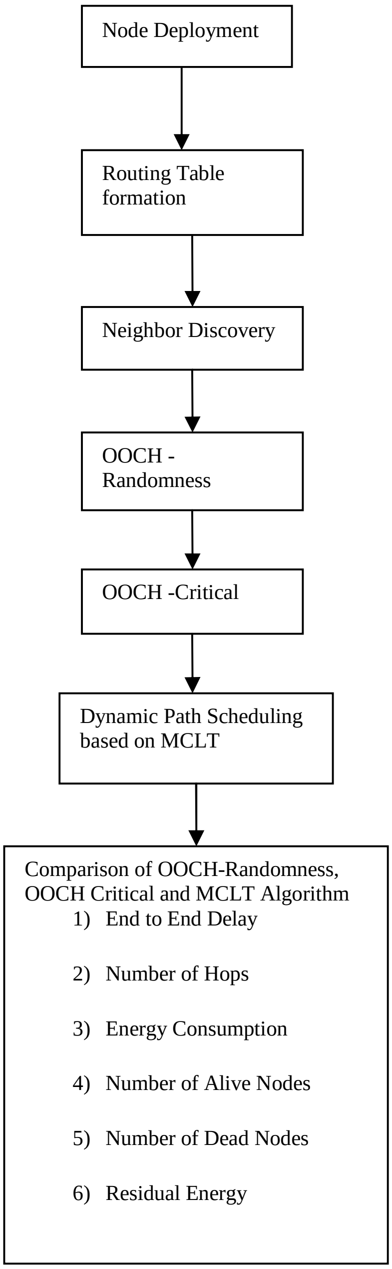


Fig 2 Flow diagram of Dynamic Path Scheduling Algorithm

A. Node Deployment

The Node Deployment is the algorithm which is used to place the nodes in the network.

B. Neighbor Nodes in the Network

This Module is used to determine the NEIGBOR Nodes in the Network. These are the set of nodes which are within the transmission Range.

C. OOCH Randomness Routing

The OOCH Randomness algorithmic rule discovers multiple routes from supply node to destination node. The two level neighbors are found by finding the set of nodes over double the coverage area. Every of the neighbor acts like source node. The route is discovered by the method of flooding. Throughout route discovery method the next forward node is chosen supported that node sends a REPLY 1st. Among the multiple routes the route that has the minimum end to end delay is chosen because the best route.

D. OOCH –Critical

The OOCH-Critical algorithmic rule works in a very similar fashion as that of OOCH-Randomness. The OOCH Randomness makes use of 2L number of neighbors whereas the OOCH important makes use of 1L set of neighbors.

E. Maximum Connected Load-Balancing Cover Tree (MCLT) Algorithm

The planned MCLCT consists of 2 sub strategies: a coverage-optimizing recursive (COR) heuristic and a probabilistic load-balancing (PLB) strategy. The COR heuristic aims at finding a maximum variety of disjoint sets of nodes, which may be achieved by one in all the sensor nodes (such because the sink node). In every disjoint set, the nodes are able to monitor all the DPOIs along. That is, the COR heuristic focuses on dealing with the full coverage preservation issue. Moreover, the PLB strategy is used to work out the suitable path from every node to the BS when the disjoint sets are initiated. for every possible transmission path from a given node to the candidate parent nodes, the PLB strategy can assign totally different probabilities so as to a lot of uniformly distribute the load.

The MCLT algorithmic rule finds the neighbor nodes. If neighbor nodes has destination it stops the method otherwise notice the forward node based on most probable coverage and high energy. The method is repeated till destination is reached.

IV. Result

This figure 3 shows the Comparison between OOCH Critical, OOCH Randomness and MCLD on route discovery. In this figure X level shows the number of iteration and Y level shows the route discovery time in mj. In this figure blue line shows the OOCH randomness algorithm result, red line shows the OOCH critical algorithm result and gray line shows the MCLD algorithm result. In this best result is MCLD algorithm result.

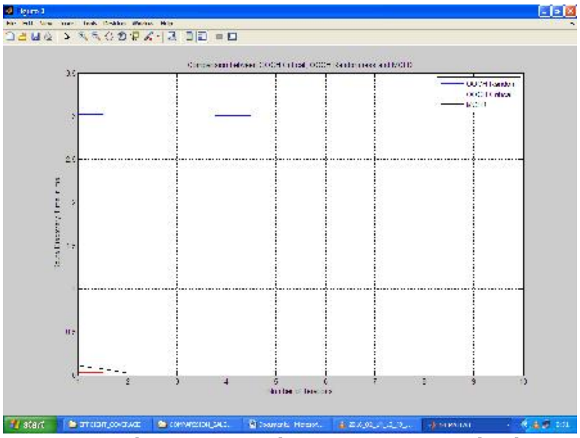


Fig 3 Comparison b/w OOCH Randomness, OOCH critical and MCLD on route discovery time

This figure 4 shows Comparison between OOCH Critical, OOCH Randomness and MCLD on number of hops. In this figure X level shows number of iterations and Y level shows number of hops. In this figure blue line shows the OOCH randomness algorithm result, red line shows the OOCH critical algorithm result and gray line shows the MCLD algorithm result. In this best result is MCLD algorithm result.

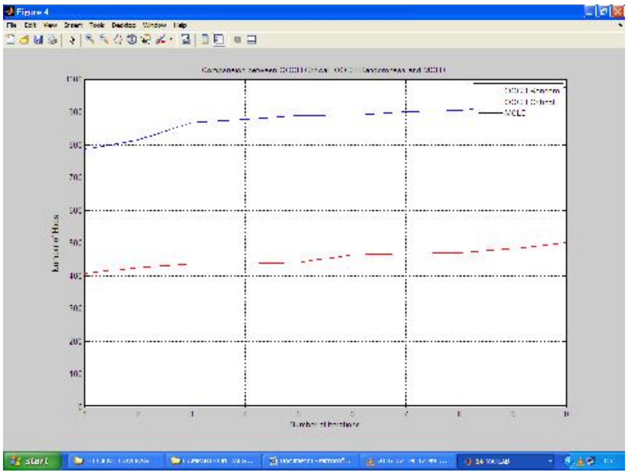


Fig 4 Comparision b/w OOCH Randomness, OOCH critical and MCLD on number of hops

This figure 5 shows Comparison between OOCH Critical, OOCH Randomness and MCLD on energy consumed. In this X level shows number of iterations and y level shows energy consumed in mj. In this figure blue line shows the OOCH randomness algorithm result, red line shows the OOCH critical algorithm result and gray line shows the MCLD algorithm result. In this best result is MCLD algorithm result.

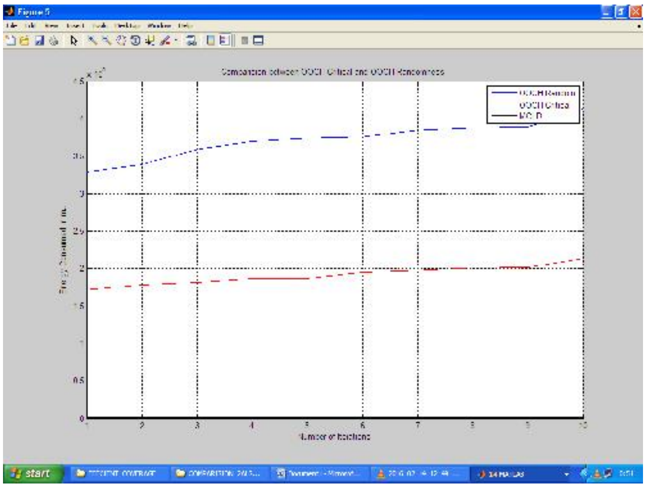


Fig 5 Comparision b/w OOCH Randomness, OOCH critical and MCLD on energy consumed

V. Conclusion

In the planned MCLCT, 2 algorithms are utilized, and that they are a COR heuristic and a PLB strategy. The COR heuristic is able to rapidly find a maximum number of cover sets consistent with the global data of WSNs. every cover set includes a small number of sensing nodes. Afterwards, the PLB strategy dynamically determines the simplest parent node to relay sensed information using local data among neighbor nodes whereas achieving even energy consumption of nodes. By doing thus, energy-efficient operation will be achieved by the MCLCT.

References

[1] Chia-Pang Chen, Subhas Chandra Mukhopadhyay, Cheng-Long Chuang, Maw-Yang Liu, Joe-Air Jiang "Efficient Coverage and Connectivity Preservation With Load Balance for Wireless Sensor Networks" IEEE sensors journal, vol. 15, no. 1, january 2015.

[2] Jae-Joon Lee, Bhaskar Krishnamachari, C.-C. Jay Kuo "Impact of Heterogeneous Deployment on Lifetime Sensing Coverage in Sensor Networks" Los Angeles, CA 90089-2564, USA.

[3] Hai Liu, Xiaowen Chu, Yiu-Wing Leung, Rui Du "Minimum-Cost Sensor Placement for Required Lifetime in Wireless Sensor-Target Surveillance Networks" IEEE transactions on parallel and distributed systems.

[4] Wendi B. Heinzelman, Anantha P. Chandrakasan, Hari Balakrishnan "An Application-Specific Protocol Architecture for Wireless Microsensor Networks" IEEE transactions on wireless communications, vol. 1, no. 4, october 2002.

[5] Rahul Amin, Jim Martin, Juan Deaton, Luiz A. DaSilva, Amr Hussien, Ahmed Eltawil "Balancing Spectral Efficiency, Energy Consumption, and Fairness in Future Heterogeneous Wireless Systems with Reconfigurable Devices," IEEE journal on selected areas in communications, vol. 31, no. 5, may 2013.

[6] M. A. Khan, H. Hasbullah, and B. Nazir, "Multi-node repositioning technique for mobile sensor network," AASRI Procedia, vol. 5, pp. 85–91, Oct.2013.

[7] Krause, R. Rajagopal, A. Gupta, and C. Guestrin, "Simultaneous optimization of sensor placements and balanced schedules," IEEE Trans. Autom. Control, vol. 56, no. 10, pp. 2390–2405, Oct. 2011.

[8] D. Yang, S. Misra, X. Fang, G. Xue, and J. Zhang, "Two-tiered constrained relay node placement in wireless sensor networks: Computational complexity and efficient approximations," IEEE Trans. Mobile Comput., vol. 11, no. 8, pp. 1399–1411, Aug. 2012.

[9] H. M. Ammari and S. K. Das, "Centralized and clustered k-coverage protocols for wireless sensor networks," IEEE Trans. Comput., vol. 61, no. 1, pp. 118–133, Jan. 2012.

[10] M. Ashouri, Z. Zali, S. R. Mousavi, and M. R. Hashemi, "New optimal solution to disjoint set k-coverage for lifetime extension in wireless sensor networks," IET Wireless Sensor Syst., vol. 2, no. 1, pp. 31–39, Mar.