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An Approach of Mobile Sensor Network for Target Coverage and Network Connectivity with Minimum Movement: A Review

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ABSTRACT*:* Wireless Sensor Network (WSN) is the collection of mobile nodes without the requirement of any centralized access point. The important issues of Wireless Sensor Networks are coverage of interest points and network connectivity. A group of specified points of interest in the randomly deployed Mobile Sensor Networks (MSNs) is covered by Target Coverage (TCOV). The ability of the sensors nodes to collect data and report data to the sink node is defined as Network Connectivity (NCON). This paper focuses on the challenges of the Mobile Sensor Deployment (MSD) problem and investigates how to deploy mobile sensors with minimum movement and energy consumption to form a WSN that provides both target coverage and network connectivity.

KEYWORDS: Wireless Sensor Network (WSN); Target Coverage (TCOV); Network Connectivity (NCON); Mobile Sensor Networks (MSNs); Mobile Sensor Deployment (MSD).

I. INTRODUCTION

Wireless Sensor Network is an arrangement of autonomous and well disturbed which may or may not have an additional facility of mobility. The nodes are deployed and relocated on their own due to the mobility of sensors. Sensors also get their own location and get placed at the target area after initial distribution. Wireless Sensor Networks are currently used in many applications including environmental monitoring and object tracking [3].

Target Coverage and Network Connectivity are the two main challenging issues and practically important issues of WSNs. To cover a set of specified points of interest in the deployment region of a WSN is the aim of Target Coverage. It guarantees that every target is covered by at least one mobile sensor. Network Connectivity is important for sensors to collect the data and report data to the sink node, in a WSN. It guarantees that there must be sufficient routing paths between sensors with minimum movement [4].

Sensor's sensing range affects the Target Coverage whereas Sensor's communication range decides the Network Connectivity. Target Coverage and Network Connectivity both affects the performance and quality of the Network [2]. In this paper, we address a practically important problem of minimizing sensor's movement to get both Target Coverage & Network Connectivity in Mobile Sensor Networks and also low energy consumption.

II. LITERATURE SURVEY

V. Blessy Johanal Selvarasi and A. Aruna Devi, "Sensor Deployment and Scheduling using Optimization", April 2016. In this paper, Network lifetime is extended by using this method of deploying at optimal locations such that it achieves maximum theoretical upper bound. Then scheduling them so as to achieve the theoretical upper bound and also minimum number of sensor nodes remain active at any time instant. Network lifetime is extended by using this method of deploying at optimal locations such that it achieves maximum theoretical upper bound and then scheduling them so as to achieve the theoretical upper bound [1].

D.Prasad, "Enhancing Target Coverage and Network Connectivity of Mobile Sensor Networks", January 2016. In this paper the issue of Target Coverage (TCOV) and Network Connectivity (NCON) in Mobile Sensor Networks

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(MSNs) are taken into consideration. To solve TCOV problem, two algorithms are proposed: Basic algorithm and TV Greedy algorithm. TV Greedy algorithm achieves less movement than basic algorithm because it selects the sensor which is very close to target to achieve that target. Hence, the proposed scheme overcomes the issue of TCOV & NCON in MSNs & increase the network lifetime [2].

Zhuofan Liao, Jianxin Wang, Shigeng Zhang, Jiannong Cao and Geyong Min, "Minimizing Movement For Target Coverage and Network Connectivity in Mobile Sensor Networks", July 2015. In this paper, the Mobile Sensor Deployment (MSD) problem is divided into two sub-problems, Target COVerage (TCOV) problem and Network CONnectivity (NCON) problem. For the TCOV problem, it is NP-hard. For a special case of TCOV, an extended Hungarian method is provided; for general cases, two heuristic algorithms are proposed based on clique partition and Voronoi diagram, respectively. For the NCON problem, first propose an edge constrained Steiner tree algorithm to find the destinations of mobile sensors, then use the extended Hungarian to dispatch rest sensors to connect the network [3].

Sonali Karegaonkar and Archana Raut, "Improving Target Coverage and Network Connectivity of Mobile Sensor Networks", April 2015. In this paper, in addition to Basic algorithm and TV-Greedy algorithm, LWZ compression algorithm is applied while sending data from sensor node to sink node, hence the computation speed of transmission is maximized. Simulation result obtained validates the performance of the proposed algorithm. Hence the issues of TCOV and NCON in MSNs are successfully overcomes and increase the network lifetime [4].

Navjot Singh and Amandeep Singh, "Improved methods in node mobility & relocation for network lifetime in Wireless Sensor Network: Review of selected techniques", April 2015. Network connectivity, throughput, load balancing and energy conservation are the primary requirements in a Wireless Sensor Networks (WSNs) whenever sensors are deployed in a dense and harsh environment. As these sensors are battery- operated, so it is very crucial to use this limited energy in an efficient way for data sensing, processing and communication across the network. Some mobile nodes having higher energy must be placed & relocated in a suitable way to prolong the network lifetime and connectivity. This paper points out some researches made in the field of WSN's, which had contributed in prolonging overall network lifetime and effective energy utilization [5].

Mr. Mayur C. Akewar and Dr Nileshsingh V. Thakur, "A study of Wireless Mobile Sensor Network deployment", August 2012. In this paper, fundamental problem of deployment in mobile sensor network is discussed. The issues of mobile sensor network deployment are investigated in detail. It further discusses the types of algorithm and different ways of deployment like deterministic, random and incremental deployment along with self deployment. Different approaches for mobile sensor network deployment are discussed in detail with their comparisons. Modeling of deployment problem with other real world problem is also discussed [6].

E. Mathews and C. Mathew, "Deployment of mobile routers ensuring coverage and connectivity," 2012. In this paper, two new localized and distributed algorithms for creating an ad-hoc mobile router network has been discussed that facilitates communication between the agents without restricting their movements. The first algorithm, agent-assisted router deployment, is used in scenarios where a proactive pre-deployment is not feasible due to the limited speed of the routers compared to the speed of the agents and the second one self-spreading is used in scenarios where the proactive pre-deployment is feasible. The algorithms have a greedy deployment strategy for releasing new routers effectively into the area and a triangular deployment strategy for connecting different connected components created from different base stations [7].

III. OBJECTIVES

Our aim is to focuses on the challenges of the Mobile Sensor Deployment (MSD) problem and investigates how to deploy mobile sensors with minimum or no movement at all to form a Wireless Sensor Network that provides both target coverage and network connectivity. As sensor movement consumes much more energy than sensing and communication do, the movement of sensors should be minimized to increase the networks' lifetime. So, we aims on minimum movement and energy consumption of moving sensors in Wireless Sensor Network.

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IV. PLANNING OF WORK

In the planning of work, firstly sensor nodes should be deployed in such a way that they cover the complete area. We prefer to have static nodes. Then divide the complete area into the zones. Each zone will have a zone header. Zone headers should be at a convenient distance from each sub nodes. Then we will select a source and a destination. Information will transfer from sub-nodes to headers and then from headers to headers, finally to the destination. A lot of energy will be saved, thus increasing network's lifetime.

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REFERENCES

1. V. Blessy Johanal Selvarasi and A. Aruna Devi, "Sensor Deployment and Scheduling using Optimization", International Journal of Science Technology & Engineering (IJSTE), Volume 2, Issue 10, April 2016.
2. D.Prasad, "Enhancing Target Coverage and Network Connectivity of Mobile Sensor Networks", International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE), Vol.4, Issue 1, January 2016.
3. Zhuofan Liao, Jianxin Wang, Shigeng Zhang, Jiannong Cao and Geyong Min, "Minimizing Movement For Target Coverage and Network Connectivity in Mobile Sensor Networks", IEEE Transactions on Parallal Distributed System, Vol.26, No. 7, July 2015.
4. Sonali Karegaonkar and Archana Raut, "Improving Target Coverage and Network Connectivity of Mobile Sensor Networks", International Journal of Science and Research (IJSR), Vol.4, Issue No. 4, April 2015.
5. Navjot Singh and Amandeep Singh, "Improved methods in node mobility & relocation for network lifetime in Wireless Sensor Network: Review of selected techniques", Zenith International Journal of Multidisciplinary Research, ISSN 2231-5780, Vol. 5(4), April 2015.
6. Mr. Mayur C. Akewar and Dr Nileshsingh V. Thakur, "A study of Wireless Mobile Sensor Network deployment", International Journal of Computer Networks & Wireless Communication (IJCNWC), Vol.2, No.4, August 2012.
7. E. Mathews and C. Mathew, "Deployment of mobile routers ensuring coverage and connectivity," Int. J. Comput. Netw. Commun., Vol.4, No.1, pp.175-191, 2012.

BIOGRAPHY

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