ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 4, Issue 6, June 2015

A Survey on Node Deployment for Sensing Mobile- Node in WSN

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Abstract: Wireless Sensor Networks (WSN) is one of the upgrading technologies to afford a service to the network users. WSN is used to sensing the node to transfer the data among the network sensor nodes. While transferring the data in the sensor node they were faced many issues occurred due to the reasons of power failure, noise volatility, which harmfully influence the coverage of the WSNs. These problems were occurred due to the coverage problem among the nodes and also node deployment is also a major issue in WSN. To solve this problem many approaches where proposed like Dense sensor node deployment, Battery-powered sensor nodes, Self-configurable, Severe energy, computation, and storage constraints. They were provided some of the drawbacks to sensing the node in the network. In this survey we analyzed various authors' techniques and also we analyzed how to sense the node in the network.

Keywords: WSN, Mobile Sensing node, Node Deployment, Data transfer and Energy conservation.

I. INTRODUCTION

WSN is an improvement level of advancement technologies in Wireless network; it has to afford it in an efficient data transfer method to the user. A network has to permit the rapid development for wireless communications. Wireless sensor networks (WSNs) are composed of small, battery-powered sensor nodes which embrace sensor(s), a processor, and a communication path [1]. With the help of mutual work of sensor nodes, it is probable to create smart environments. Although WSN can be used for civilian applications like the environment, health, or structure monitoring, one of the most common WSN application areas is military. The sensing electronics measure ambient condition related to the environment surrounding the sensor and transforms them into an electric signal. Allowing such a signal divulges some properties about objects located and/or events happening in the vicinity of the sensor. A huge number of these throwaway sensors can be networked in many applications that necessitate unattended operations. A Wireless Sensor Network (WSN) contains hundreds or thousands of these sensor nodes. These sensors have the capacity to communicate either amongst each other or directly to an external base-station (BS). A greater number of sensors allows for sensing over larger geographical regions with greater accuracy [2]. Wireless Sensor Networks (WSNs) squeeze massive amounts of sensor nodes which make up the networks for monitoring the spread of process and promote data about the targets or result of consequence back to the end-users. To transferring the data, network should provide better communication method among WSN and should provide sensing the node between the networks. In WSN, sensing the node is a crucial factor to transfer the data among the nodes. While sensing the node coverage is a major problem due to failure, power, or noise instability. The importance of this involvedness arises when a WSN needs to be established in unapproachable and sometimes polluted area. In those areas, there are many elements such as temperature that needs to be recorded very accurately to avoid an explosion. Each detonation can increase the pollution in the atmosphere, which could be worse in a windy weather.

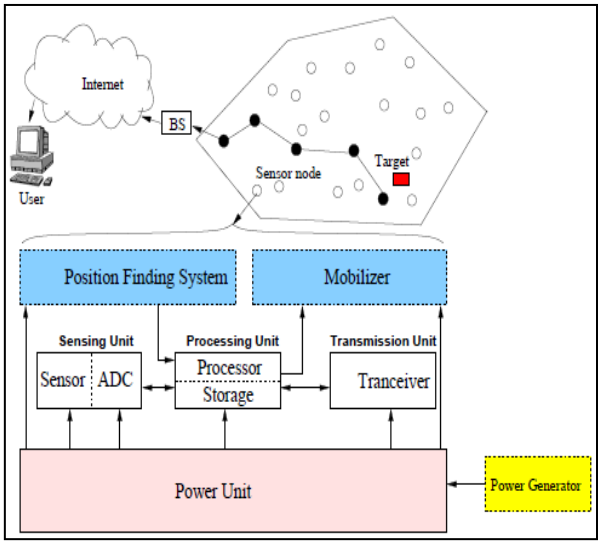

Fig 1: Sensor node components

In such areas, sensors are aimed to be deployed randomly. However, there is no guarantee that the nodes are uniformly distributed after random deployment [3]. The possibility of covering the sensing field whereas they are not overlapped and being within communication range of each other to be fully connected will be decreased. In addition, maintaining coverage is vital as sensor nodes fail due to battery drain or environmental causes or even noise influences [4]. Several ideas where introduced for solving this issues in the wireless sensor networks. Some approaches have benefited, but some provide not a better presentation. For this issue nodes have to provide a better

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sensing node among the network. The aim of this survey is to present a comprehensive study of various researchers' approaches and their limitations for solving this coverage problem in WSN. As a result, the quality of collected data is influenced. To develop a coverage optimization scheme in WSNs is an essential factor.

II. LITERATURE REVIEW

In WSN, sensing the node is an essential factor to transfer the data among the nodes. While sensing the node coverage is a major problem due to failure, power, or noise instability. Several ideas where introduced for solving this approach in the wireless sensor networks. Some approaches have benefited, but some provide not a better performance. This section provides a comprehensive study of various researchers' approaches and their limitations for solving this coverage problem in WSN.

Carlos E. Otero [5] studies the WSN network that provide on stochastic deployment, deliverance of large-scale WSN, which shows a major difficulties in the application of Wireless Sensor Networks (WSN) technology. When deploy in a stochastic method, the WSN has the greatest dispute of guaranteeing satisfactory operational effectiveness leading deployment. From this paper they present a method for stochastic deployment of WSN. This method used the simulation, statistical analysis, and the Analytical Hierarchy technique to afford an approach that helps decision makers establish the best exploitation strategy between challenging alternatives. This method can be used to make straightforward the decision-making progression and afford decision-makers the capability to believe all factors implicated in the WSN consumption difficulties. This approach is extensible and can be effortlessly personalized to embrace numerous excellence factors to additional evaluate deployment approach and recognize the one that best assemble applications necessities.

H.W. Rabiner et al [6] studied various approaches and proposed a classic clustering algorithm based on Low-Energy Adaptive Clustering Hierarchy (LEACH) for WSNs. It is a cluster-based protocol used for randomized rotation of local cluster heads to uniformly share the energy load between the sensors in the network. By using this LEACH, it reduces the communication energy for transmitting the data. Hence it has prolonged lifetime network and static clustering algorithms. By using this static clustering, where data are collected from parallel areas or nodes and transfer it into sink nodes, then it share the task among the nodes to reduce the overload of a single nodes in WSN. On the other hand H.W. Rabiner et al approach have some drawbacks; here no guarantee about the total no. of cluster head nodes, if failed occurs in one cluster node means further nodes are unable to transfer the data to the next nodes and this approach is not suitable for multi-hop networks.

Chen, Yuequan et al [7], studied the prolonging lifetime problem of with the increasing no .of data transfer in networks. To discovering the topology and maintaining the cluster head and switching the path are the most important one in networks. If the data are send in the primary path can dissipated at any time because it consume more energy, and if it want to re-select the path is difficult one to choose the alternative path. This can increases the energy consumption problems.

S.P. Shaktawat et al[8], A Wireless Sensor Network (WSN) is a group of a densely distributed sensor nodes that monitors physical environmental information and send data to one or many base stations (BS) through wireless links. Node deployment is a fundamental issue which is to be solved in Wireless Sensor Networks (WSNs). Node deployment can be random or deterministic in nature. A proper node deployment scheme not only reduces the network cost but also increases degree, coverage and lifetime of a WSN with the reduction in delay. In this paper an overview of existing node deployment schemes are discussed then different parameters that enhance the efficiency are also highlighted. On the basis of that a new deployment scheme is proposed in which sensing area is divided into small circles and nodes are placed at the center and at the ends of the diameter. This pattern has two-coverage and has a degree of four. Simulation results show that proposed pattern uses fewer nodes and provides better coverage and degree than other schemes such as triangle, square and hexagon. In addition to this it is an efficient energy saver which provides minimum delay as compared to other schemes.

Salarian, et al [9] analyze the exchanging of data in networks have to provide a better node for transferring the data between the nodes. Here better node can have an effective one to providing a service between the nodes. Here this is one of the worst factors. For transferring the data in cluster nodes, any one of the nodes have an efficient energy to transfer the data. Reducing energy consumption in WSN communications has involved increasing alertness recently. For this the author proposed the sink mobility in WSN for energy conservation. The Mobile sink trajectory is random to gather information of significance sensed by the sensor nodes. Accumulating efficient data by overwhelming less energy can improve the network performance. And also fixed path node can progress the energy efficiency of single-hop but not in multi-hop and limited paths may cause communication problem to transfer the data.

In [10], Low-Energy Adaptive Clustering Hierarchy (LEACH) has been proposed. LEACH consists of two segments. In first, it is in the set-up phase, sensors may elect a local cluster head randomly among themselves, so that the network may balance energy dissipation across the whole network. After the heads are selected, they advertise to all sensor nodes that they are the new cluster heads. Once the nodes receive the advertisements, each of them decides to which head it would belong. Secondly, in the steady phase, sensors sense and transmit data to the sink through their cluster heads. After an assured period of time the network resume the set-up phase again. LEACH adopts multi hops to communicate, which makes it more realistic than Direct Communication (DC) method.

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However, LEACH is a mechanism that one-level clusters are formed by sensors which volunteer to become the Cluster Heads.

III. PROBLEMS OF NODE COVERAGE IN WSNs WHILE DEPLOYMENT

a. Coverage

Coverage is one of the important issues in WSN and it is associated with energy saving to communicate with each other node in the network, connectivity and network reconfiguration. In WSN applications, it measures the full and fractional coverage to communicate with the neighbor node. In absolute coverage, at this point every point in the sensor field must be covered by at least one sensor without departure any uncovered area. In some cases for e.g. temperature and pressure sensing environment, partial coverage can be consider which is similar to full coverage because in such cases reading at one point is similar to the surrounding area. So to enlarge coverage optimization scheme in WSNs. Network has to improved protocol, which is a set of energetic coverage protection (DCP) schemes that can be implementing on individual sensor nodes having familiarity of their local neighborhoods. They assert that efficiency of energy consumption in maintaining sensor nodes' coverage in WSNs to be used to solve the problem of coverage.

b. Energy Consumption

Energy is the most critical issue in WSN therefore it is required to utilize energy consumption in different ways. While transferring the data from one to other node energy consumption helps to share the data among the nodes. While transferring the data from one o other node, each and every node in the network must save the energy and also here sharing of node may save the energy. The covered design of distinguishing wireless sensor node have to provide the energy in better manner, this consists of a sensing subsystem together with one or more sensors with related analog to digital converters (ADC) for data realization, a allowance subsystem as well as a micro-controller unit (MCU) and memory for local data dispensation, a radio subsystem for wireless data communication and a power supply unit.

c. Delay

Delay in network occurred because of large amount of packets send in the network in same by all other node in the network. And also it may occur because of deadlock occurrence of asynchronous of data transfer in the network. Delay is also an important restriction in WSN. Node deployment method involves in the network delay in many aspects. If the distance among two nodes is more, than the time holdup robotically get improved. On the other hand if distance is less than time holdup is also receiving reduced. Delay and energy are also associated with each other, if delay is more than energy consumption also maximize and vice-versa. Therefore a proper node deployment scheme ultimately resolves all above conflicts.

d. Node deployment

In WSN node deployment is reliant and affects the routine of the routing protocol. The deployment can be whichever deterministic or randomized. Both are used to deploy the node in the network. In establishing deployment, the sensors are manually positioned and data is routed during pre-determined paths. However, in arbitrary node deployment, the sensors nodes are sprinkled randomly produce an infrastructure in an ad hoc manner. If the consequential allotment of nodes is not standardized, best clustering becomes compulsory to permit connectivity and facilitate energy efficient network operation. Inter-sensor communication is usually within short broadcast ranges because of energy and bandwidth limitations.

e. Connectivity

High node compactness in sensor networks prevents them from organism entirely inaccessible from each other. Therefore, sensor nodes are predictable to be exceedingly connected. This, nevertheless, may not avoid the network topology from being variable and the network size from being reduction due to sensor node failures. In totaling, connectivity depends on the, possibly random, allocation of nodes.

f. Data Aggregation:

Since sensor nodes may produce significant redundant data, similar packets from multiple nodes can be aggregated so that the number of transmissions is reduced. Data aggregation is the combination of data from different sources according to a certain aggregation function, e.g., duplicate suppression, minima, maxima and average. This technique has been used to achieve energy efficiency and data transfer optimization in a number of routing protocols. Signal processing methods can also be used for data aggregation. In this case, it is referred to as data fusion where a node is capable of producing a more accurate output signal by using some techniques such as beam forming to combine the incoming signals and reducing the noise in these signals.

g. Fault Tolerance:

Some sensor nodes may unsuccessful or be barren due to lack of power, and some time physical damage, or environmental nosiness. The breakdown of sensor nodes should not influence the all other task of the sensor network. If many nodes it fails, MAC and steering protocols must contain arrangement of new links and routes to the data collection base stations. This may necessitate aggressively regulate transmit powers and signaling rates on the existing links to decrease energy consumption, or rerouting packets during regions of the network where more energy is available. Therefore, multiple levels of joblessness may be required in a fault-tolerant sensor network.

IV. CONCLUSION

From this survey we analyze the various authors' approach of the WSN. It mainly used for sensing the node to transfer the data among the network. Users of the WSN were face many issues they were occurred due to the reasons of power failure, noise volatility, and these problems were occurred due to the coverage problem and also node deployment in WSN. For these issues this survey shows different authors approaches and the

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International Journal of Advanced Research in Computer and Communication Engineering
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advantage and disadvantage of their approach. Many approaches like dense sensor node deployment, Battery-powered sensor nodes, and Self-configurable, Severe energy, computation, and storage constraints. By using this approach we analyzed how to sense the node in the network, avoid the problem of coverage, deployment of node in network and provide a better sensing node among the network. This survey helps to various authors to solve or avoid the problems in WSN.

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BIOGRAPHIES

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