International Journal of Enhanced Research in Science, Technology & Engineering
ISSN: 2319-7463, Vol. 5 Issue 12, December-2016

A Study on Associated Challenges to Clustered Communication in Sensor Network

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ABSTRACT

A sensor network is mainly applied to the real time scenario with real time constraints. Clustering is one such architecture applied in sensor network to utilize the network limitations and to improve the communication strength. In this paper, the challenges associated to the clustered communication are explored. These challenges occur at different stages of network including the localization, coverage identification etc. The fundamental and the architectural problems are recognized in this paper.

Keywords: Clustered Communication, Coverage, Localization, Architectural

I INTRODUCTION

Clustering is a fundamental issue in a WSN, which determines how well a phenomenon of interest[4].The Clustering concept is the measure of the Communication Optimization of the sensing function and is subject to a wide range of interpretations due to a large variety of sensors and applications. The goal of Clustering is to have each location in the physical space of interest inside the feeling range of at least one sensor. Additionally the Clustering formulations try to discover the weak points, i.e. the dots which are least covered by the sensors in a sensor field and suggest future localization and reconfiguration schemes for improving the Clustering performance. More often than not the Clustering involves the two basic ideas [5]:

- The evaluation of Clustering performance when the sensors are deployed in the observing area.
- The advance of the Clustering performance when the sensor network cannot effectively meet the application prerequisites.

Clustering characterizes the observing quality provided by a sensor network in a specified neighborhood. Different applications require different level of sensing Clustering. While or so applications may simply need that every location in a region be observed by multiple sensors, and distributed Clustering and classification requires even higher levels of Clustering. The reporting requirement for a sensor network also depends on the number of errors that must be supported. The reporting requirement may also change after a mesh has been deployed, for example, due to changes in application modes or scenario conditions. Each sensor node is able to sense the phenomenon in a definite sensing area. Any level in the sensing area of a sensor is said to be hidden by the detector. The sensing area of a detector is commonly taken to be a disk with the sensing element located at the heart. The radius of the saucer is sent for the sensing range of the detector. Looking at the Clustering concept, different problems can be devised, based on the field of study to be covered (area or discrete targets) and on the objective of the problem (maximizing network lifetime or minimizing the number of dynamic sensors.

Clustering Problems are fundamental and crucial in designing a wireless sensor web. The Clustering Problem of the WSN is to encompass the whole area or a set of specific targets within where we would wish to scrutinize in an unremitting period by deploying abundant sensors randomly. It is caused by three chief reasons: not enough detectors encompass the whole Region of Interest (ROI), limited sensing range and random localization. As the sensing components are operated using limited power supply some of them pass out, resulting in inadequate senses to fully cover the ROI.A sensor's sensing range is restricted to a certain radius due to which sensor cannot cover the region outside its sensing range which results to the Clustering problem. The Clustering problem has been studied extensively, especially when combined with Clustering

and energy efficiency. Depended on the Clustering objectives and applications, they can be roughly classified [6] on the basis of what is to be given over, namely Clustering, Clustering and Barrier Clustering.

- Clustering Problems: there exist a set of predetermined targets which need to be observed (covered) in a fixed deployed area. Due to the limited battery energy of deployed sensors, Clustering problem is focusing on designing effective scheduling methods to draw out the time for observing these targets.
- Region Cover Problems: In an interested area we have to ascertain that every detail of the whole arena can be observed by at least one sensor. The Clustering problem is to maximize the time for observing the whole region.
- Barrier Clustering Problems: Given a barrier we want to insure that every object move across the roadblock will be discovered by the deployed sensors.

Among these problems, Clustering problem has already received wide attention in past years. On the other hand other two problems have started to draw attention recently. Our study focuses on Clustering problems in a sensor network. Reporting is in general associated with energy-efficiency and network Clustering, two important properties of WSN. Various methods have been offered to resolve the above Clustering problems. Our research focus on the following considerations: evaluating and improving Clustering performance for Clustering, while maximizing the network lifetime.

II LITERATURE SURVEY

Lot of work is already done, in the area of Clustering by different researchers in the form of localization methods. More or less of the work defined by earlier researchers is defined hereunder

Author [1] discussed the types of Clustering problem, according to different criteria. They studied the types of the Clustering problem, according to the localization of the nets, the characters of observing areas or objects, the sensing models of sensors and hence along. To better the Clustering performance an method is also offered in this report. Using the mobility of sensors, the method can move redundant sensors to uncovered area. Although on that point are some limits of energy and node hardware, the method is still efficient in practice. Author [2] review the common schemes used in solving Clustering problems in WSN. They went over the researches done in maximizing Clustering of WSN by sensor positioning. The strategies reviewed are categorized into three groups based along the approaches used, namely; force based, grid based or computational geometry based approach. Theory and concepts along with the lessons of the methods proposed using these approaches were introduced. The reviewed strategies each have their own benefits or prices.

Author [3] addresses the Clustering in the context of static wireless sensor nets. Static WSNs that is, the sensors do not move once they are deployed. Reporting is in general associated with energy-efficiency and network Clustering, two important properties of WSNs. They classified Clustering as Clustering, point Clustering and barrier Clustering. Various Clustering models and sensor localization methods are also delineated in the report. Author [4] presented the energy efficient Clustering problems in the context of static wireless ad-hoc sensor networks. Wireless Ad-hoc Sensor Networks (WASN), is characterized by an.Ad-hoc or random sensor localization method, where the sensor location is not known a priori. This characteristic is required when individual sensor placement is infeasible. Energy-efficiency is an important issue in WASN, because battery resources are defined. Mechanisms that conserve energy resources are extremely desirable, as they possess a direct impact on network lifetime. Author [5] presented the survey of the Clustering problem in sensor network. Besides this just about basic design considerations that are held into account for Clustering in WSN are also reported in the report. They identified the two main challenges, namely, maximizing network lifetime and network Clustering. The various troubles that are related to Clustering in WSN are also delineated. Brief summary and comparison of existing Clustering schemes is also offered.

Several methods are offered by the researches in order to optimize the problem. Disjoint and Non-Disjoint approaches are utilized to generate the cover bands which are applied to cover specific objectives. In Disjoint sets there is no convergence between the bands, the sensing elements are allowed to participate exclusively in single cover sheet. This attack does not increase the network time effectiveness. In Non-Disjoint approach the sensor may take part in more than one cover sets. This plan of attack increases the network lifetime if the proper scheduling method is applied. Author [6] examined the network lifetime issue of the Clustering problem. So they studied the maximum lifetime Clustering problem. In their work this problem is scaled down to minimum weight sensor Clustering problem, which is to determine the minimum total weight of sensors to pass over a given area or a collapsed set of objectives with a dedicated set of weighted sensors. In this report they presented a polynomial time approximation method for this trouble. Author [7] maximize the network lifetime for Clustering problem by organizing the sensors into maximum disjoint set covers and these are activated in turn. Author [8] centered on one of the major issues of Clustering problem on sensor network that maximizes the network lifetime,

which can be resolved by selecting minimum working sensors that will handle all the objects. The primary aim is to find out the Clustering ratio of all objects which have been significantly improved in comparison with the basic ant colony method. The Clustering problem has been optimized by making it energy efficient using modified ant colony method.

Author [9] proposed an energy-balance heuristic distributed method based on energy utility of sensors. The Clustering problem with adjustable sensing ranges is transformed into the hi-hop local Clustering problem with adjustable sensing ranges. Secondly, he took the central constraint of network lifetime by introducing the definition of key target, design the energy utility function based on the ratio of Clustering contribution to the energy consumption cost and demonstrate the adaptive adjustment mechanism of waiting time. The simulation indicates that the proposed method can prolong greatly the network lifetime and has lower computational complexity and communication complexity, full scalability and stability. Author [10] investigated lifetime optimization for Clustering in wireless sensor network with Communication Optimization requirements in this approach a column corresponding to feasible solution is brought forth. Author [11] proposed a heuristic greedy optimum Clustering method to maximize network lifetime for Clustering. Firstly, they analyzed the energy model for Clustering and presented the definition of key target and the Clustering priority of key target. Then a strategy for sensor selection in which the sensing element with more energy utility is prior chosen as active sensor is planned. Then the method is aimed based on minimizing the energy use of key target and maximizing energy efficiency of sensors. The method is highly effectual and good scalable [12] [13].

III CLUSTERING CHALLENGES

There are various elements that must be taken when preparing a plan for Clustering in a sensor networks. Many of these will be dependent upon the particular application that is being spoken. The capacities of the sensors that are being used must also be looked at. Most researchers focus on a single localization model, but there are papers that seek to get a more general method that can be applied in many types of localization.

A) Network Placement

A sensor network localization can usually be categorized as either a dense localization or a sparse location. A dense localization has a comparatively high number of sensors in the given field of interest while a sparse localization would have fewer clients. The dense localization model is applied in places where it is really important for every event to be detected or when it is important to take in multiple sensors cover an expanse. Sparse deployments may be employed when the monetary value of the sensors make a dense localization prohibitive or when you desire to achieve maximum Clustering using the bare minimum number of detectors. In most of the work studying Clustering it is presumed that the sensors are stable, they remain in the same position once they are deployed. Sensor network sensors are deployed in an area by either putting them in predetermined locations or taking in the sensors randomly located. In deterministic localization the position of each node and topology of the network is predetermined. Sensors can be added or deleted in order to adjust the density of the sensors and improve the Clustering effect of the network. Deterministic sensor placement can be applied to small to medium senor network in a friendly scenario.

In random localization, the exact position and the no. of sensors can't be engineered or predetermined.. In this sensors are distributed within the field stochastically and independently it is usually for dangerous or abominable such as battleground and foe military and disaster application or in hospitable areas where network size is large. The sensors have to be randomly deployed into the susceptible area, where they recognize the targets, observe them and send the observation data back to the sink via Multi-hop communications. Dropping sensors from a plane would be an example of random placement.

B) Sensor Devices

The collection of sensors that are selected for a sensor network can be either a homogenous or heterogeneous group of sensors. A homogenous group is a group in which all the sensors have the same capabilities (like same sensing range, communication range). A heterogeneous group is the one in which some sensors are more powerful than the other sensors. Group of more powerful sensors known as section heads would gather data from the less powerful sensors several methods for best Clustering using homogenous sensors are presented in [7]. Any method which will work for a heterogeneous network will also work with homogenous network.

C) Energy Restriction

The most important factor to be considered in the development of a Clustering scheme is that of energy constraints. Since sensors are battery powered having limited energy capacity. Energy presents a big gainsays for network designers in hostile

scenario where it is impossible to access the sensors and recharge their batteries. When the energy of a sensor reaches a certain threshold level, the sensor will become defective and will not be able to function properly, which will affect the network performance up to a great extent. Therefore it becomes very important to conserve energy and prolong battery life.

D) Architecture

Clustering is an important issue in WSNs which concerns with delivering the sensed data from the source sensor to the destination (sink node) via radio transmissions. Clustering refers to network Clustering and hence requires that all sensors in the network are connected to each other. For maintaining Clustering with Clustering each active sensing node must be connected to the Base Station(sink) i.e. there must exists a route traversing through all active sensors and base station. Clustering has inverse relationship with Clustering. While Clustering can be increase by not placing the sensors too close to each other the Clustering requires the sensors not to be placed too far apart. As sensors are low-cost sensors with constrained resources, each sensor node has only limited communication range compared with the size of the observed area. Multi-hop communications are necessary when a sensor cannot reach the sink node directly. Two sensors are called neighbors if they are within each other's communication range. The sensors and the communication links between each pair of neighbors build the network topology, which is required to be connected by the Clustering requirement.

D) Communication Method

The Clustering methods proposed are either centralized or distributed and localized. . In a centralized Clustering method the observing schedule is first calculated on the base station and it is then sent to the sensors for execution..The method is run on one or more sensors in a centralized location usually near the data sink and information from all sensors need to be transferred to the central node the advantage of this approach is that it requires very low processing power from the sensors, which usually have limited processing capabilities.

In distributed Clustering methods, a number of sensors perform the required calculations cooperatively and then these sensors circulate the scheduling information to the rest of the sensors. the Clustering method is executed based on the information from only some sensors(e.g., neighboring sensors within a constant number of hopes) in WSN and the decision is made locally as the decision process is decentralized.Localized method implies that many or the entire node run the method separately on the information each has gathered. These schemes may require some processing by the sensors involved, but they scale better to accommodate larger networks.

CONCLUSION

In this paper, the exploration to Clustering is defined. The paper discusses, various issues associated with different challenges and characterization relative to Clustering.

REFERENCES

[1] GholamAli Yaghoubi," Clustering Issue in Wireless Sensor Networks by Using Depth-First Search and Genetic Method", 2010 International Conference on Computational Intelligence and Communication Systems 978-0-7695-4254-6/10 © 2010 IEEE (pp 377-381)

[2] Nauman Aslam," Distributed Clustering and Clustering in Three Dimensional Wireless Sensor Networks", "IWCMC'10, June 28– July 2, 2010, Caen, France. Copyright © 2010 ACM 978-1-4503-0062 - 9/10/06 (pp 1141-1145)

[3] Yinian Mao," Coordinated Sensor Localization for Improving Secure Communications and Sensing Clustering", SASN'05, November 7, 2005, Alexandria, Virginia, USA. ACM 1595932275/05/0011 (pp 117-128)

[4] Chi-Fu Huang," The Clustering Problem in a Wireless Sensor Network", WSNA'03, September 19, 2003, San Diego, California, USA. Copyright 2003 ACM 1-58113-764-8/03/0009 (pp 115-121)

[5] Ashwinkumar Badanidiyuru," Approximating Low-Dimensional Clustering Problems", SCG'12, June 17–20, 2012, Chapel Hill, North Carolina, USA. ACM 978-1-4503-1299-8/12/06 (pp 161-170)

[6] Vikram P. Munishwar," Clustering Management for Mobile Targets in Visual Sensor Networks", MSWiM'12, October 21–25, 2012, Paphos, Cyprus. ACM 978-1-4503-1628-6/12/10 (pp 107-115)

[7] Vijay Chandrasekhar," Localization in Underwater Sensor Networks — Survey and Challenges", WUWNet'06, September 25, 2006, Los Angeles, California, USA. ACM 1-59593-484-7/06/0009 (pp 33-40)

[8] Muzammil Hussain," Distributed Localization in Cluttered Underwater scenarios", WUWNet'10, Sept. 30 - Oct. 1, 2010, Woods Hole, Massachusetts, USA ACM 978-1-4503-0402-3

[9] Melike Erol," Localization with Dive'N'Rise (DNR) Beacons for Underwater Acoustic Sensor Networks", WUWNet'07, September 14, 2007, Montréal, Québec, Canada. ACM 978-1-59593-736-0/07/0009 (pp 97-100)

[10] M Bala Krishna," Computing Methodologies for Localization Techniques in Wireless Sensor Networks", International Conference and Workshop on Emerging Trends in Technology (ICWET 2011) – TCET, Mumbai, India ICWET'11, February 25–26, 2011, Mumbai, Maharashtra, India. ACM 978-1-4503-0449-8/11/02 (pp 1024-1028)
[11] Diba Mirza," Real-time Collaborative Clustering for Underwater Networked Systems", WUWNet'12, Nov. 5 - 6, 2012 Los Angeles, California, USA. ACM 978-1-4503-1773-3/12/11
[12] Sangbo Seo ," A New Energy Efficient Data Transmission Method for Underwater Wireless Sensor Networks",CSTST 2008, October 27-31, 2008, Cergy-Pontoise, France. ACM 978-1-60558-046-3/08/0003 (pp 675-681)
[13] Liangjie He," Implementation and Emulation of Distributed Sectioning Protocols for Wireless Sensor Networks", IWCMC'07, August 12-16, 2007, Honolulu, Hawaii, USA. ACM 978-1-59593-695-0/07/0008 (pp 266-271)
[14] Santosh Kumar," Barrier Clustering With Wireless Sensors", MobiCom'05, August28–September 2, 2005, Cologne, Germany. ACM 1-59593-020-5/05/0008 (pp 284-298)