A Survey on Data Collection in Wireless Sensor Network with Mobile Elements

V.Shrinithi
PG student ,Department of Computer Science & Engineering,
Vivekanandha College of Engineering for Women, Tiruchengode, Tamil Nadu, India

R.Rohini
Assistant Professor, Department ofComputer Science & Engineering,
Vivekanandha College of Engineering for Women, Tiruchengode,Tamil Nadu, India

Abstract: **Wireless sensor networks are the networks which can sense, analyze and then communicate the data. The data collection at sensor nodes consumes a lot of energy but sensor nodes are energy constraints. Most of the WSN architectures consist of stationary nodes which are heavily deployed over a sensing area. In recent times, several WSN architectures based on mobile elements (MEs) have been proposed. The usage of Mobile elements resulted in a newer mode in order to minimize and provide a energy consumption in wireless sensor networks (WSN). Most of them develop mobility to deal with the problem of data collection in WSNs. The scheduling of mobile elements need to address the traverse pattern and also the time of data collection from respective sensor nodes. Wireless Sensor Network with MEs and provide a complete arrangement of their architectures, based on the role of the MEs. Mobile element trajectory control scheme to reduce the sensed data collection delay against obstacles. It will reduce the data collection delay and balance the energy consumption in WSN.**

Keywords : Mobile Elements, Trajectory, Data Collection, Sensor nodes,Latency.

I.INTRODUCTION

A Wireless Sensor Network (WSN) consist of independent sensor which is spatially distributed to monitor physical or environmental conditions such as temperature, echo, weight etc. The development of WSNs was encouraged by military applications. However, WSNs are used in civil applications, including environment, traffic and habitat monitoring, healthcare and home. A sensor node consists of battery, analog to digital converter, sensing device. All the components have their own role. Due to all these components there are some factors that affect the design of sensor networks, these factors include fault tolerant, availability and production cost.The main challenges in the sensor networks are limited battery power and buffer overflow. An analysis and performance of the various existing methods for data collection in sensor networks has been performed. Implementation of all the basic ME Scheduling algorithms is performed to analyze their characteristics. Then, rendezvous-based system is implemented and its performance is determined. The main aim is to analysing these algorithms for sensed data collection using an enhanced ME-based approach, which minimize the loss in the system, improves the performance of the WSN and besides enhancing the lifetime of the network.

Due to all these restrictions we are proposing a scheme Mobile Element Trajectory Control, which will reduce the data collection delay and balance the energy consumption in WSN. Data collection is the fundamental functions of WSN. In that, the sensed data is collected at all or some of the sensor node and forwarded to the central Base Station (BS) for further processing. The Mobile Element can act as mechanical carriers collect data from all the nodes and transfers to the BS. The problem of scheduling the mobile element such that none of the buffers overflow is termed as the Mobile Element Scheduling problem.

The aim of scheduling algorithms is that there should be no delay of the sensed data, practical solutions will concentrate on minimizing the data collection delay. Because, when there is an increase in the number of sensor nodes, obviously the data collection delay will increase. To reduce the sensed data collection delay against obstacles, Mobile Element Trajectory Control schemes are handled.

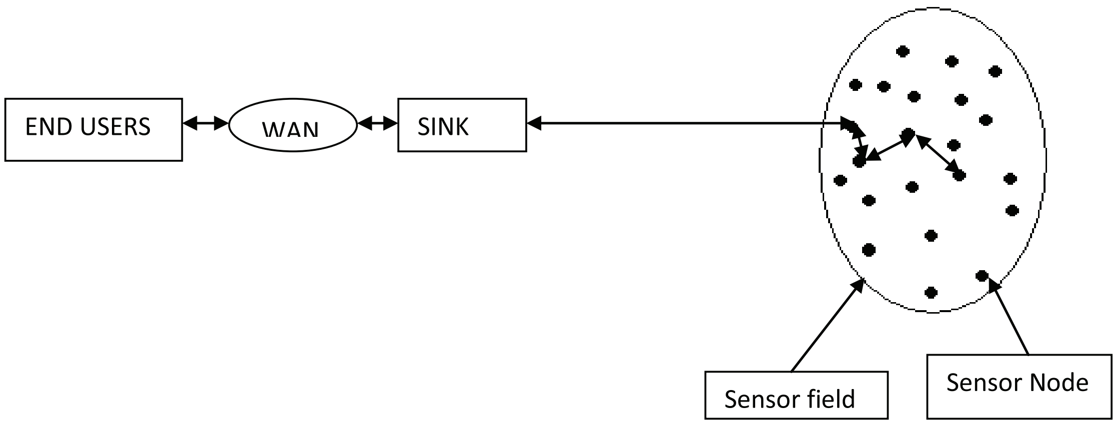

Fig 1. wireless sensor network

II. APPLICATION

WSN are mainly used in Military, Environmental monitoring, Health applications, Monitoring of weather conditions, Traffic monitoring etc.One of the most important applications of wireless sensor networks is Data Collection. Data collection is a primary task in wireless sensor networks. In data collection where the sensed data are collected at sensor nodes and forwarded to a central base station for further processing. In many applications of wireless sensor networks, the data collection is a intelligent choice due to the constraints in communication bandwidth and the energy budget. The key idea of data collection approach is to divide a sensor network into clusters, and determine local data correlations on each cluster head. By using battery powers and wireless infrastructure, sensor nodes can be very small and easily attached at specified locations and without disturbing the surrounding environments. It makes WSN a competitive approach for data collection comparing with its wired counterpart.

III.LITERATURE SURVEY

A. Energy Efficient Data Collection

Chong Liu, Kui Wu, Jian Pei proposed energy efficient data collection framework [1] for the spatiotemporal correlation among sensing data. In this, the whole network is divided into several sub-regions with each covered by a cluster of nodes. The clusters are based on the sampling data, and scheduling is based on the cluster is much more accurate than scheduling based purely on the sensing range of sensor nodes. It can efficiently save the energy without losing surveillance reliability. With PLAMLIS algorithm the data restoration accuracy is improved and the energy consumption decreases.

B. Distributed Algorithm for CDS

Khaled M. Alzoubi Peng-Jun Wan Ophir Frieder proposed a distributed algorithm for minimum connected dominating

set [2]. It provides improvement in approximation factor is 6.91 which is due to the refined analysis of the relationship between the size of a maximal independent set and a minimal CDS in the unit disk graph. Each node first broadcasts to its neighbors and the entire set of its neighbors, and after receiving the adjacency information from all neighbors it declares itself as dominator, if and only if it has two non adjacent neighbors. These dominators form the initial CDS. And the dominator declares itself as a dominatee if it is locally redundant.

C. Opportunistic Routing in WSN

Lachlan L.H Andrew proposed Opportunistic source coding and oppotunistic routing protocol for correlated data gathering in WSN [3]. It improves data gathering effiency by exploiting opportunistic data compression and cooperative diversity associated with wireless broadcast. It reduces the power consumption by nearly 32% compared with greedy scheme.

D. Cluster Based Routing Driven density

Sundeep pattem, Ramesh Govindan proposed cluster based routing driven density, which organizes the nodes into clusters [4], and within each cluster each sensor data is routed to a cluster head, redundant data is suppressed. There were also a number of full transmissions.

E. Steiner Minimum Tree with Minimum number of Steiner Points

Feng Wang, and Jiang chuan Liu proposed steiner minimum tree with minimum number of steiner points. The minimum number of relay nodes to connect all sensor nodes becomes to use minimum number of steiner points and to connect all the given vertices. The main idea of approximation algorithm is to conduct the minimum spanning tree algorithm on the given vertices and insert an intermediate stage when the remaining edges between the given vertices are longer than the communication range. In the inserted stage, a steiner point (with three edges) is added to connect three connected components into one. If the steiner point can connect each component with one edge whose length is equal to the communication range. Otherwise if an edge longer than the communication range being selected by the algorithm, and minimum number of steiner points are also added on the edge to break it into smaller ones with length less than or equal to the communication range.

IV.DISCUSSIONS

The number of papers that we have reviewed for wireless sensor network in data collection techniques has different strong and weak points about data collection delay and energy consumption. All the data collection algorithms have to comply with a few basic requirements. The thing that are needed as follows

A. Data Collection

Data collection is the fundamental functions of WSN. In Data Collection, the sensed data is collected at all or some of the sensor node and forwarded to the central Base Station (BS) for further processing.

B. Energy

The energy is an important parameter in are source limited network such as the WSN as the lifetime of battery is very much limited.

C. Sink

Sink is the destination of the information. It collect the data sensed by the sensor node either directly or indirectly. It connect the sensor network to the user via the internet or other networks and it is responsible for signaling and traffic handling.

D. Latency

Latency is defined as the transport delay in receiving the data from the actual time in the real time network. Latency refers to the “Time Delay” measured in milliseconds, between the initial input and output. Latency requirements depends on the applications.

E. Power

The power utilized in a sensor network is consumed as sensors are performing sensing, processing and message tasks. Due to limited energy the nature of the sensor nodes, network life is dependent on the efficient use of the energy.

V. MOBILE ELEMENTS

Mobile Element can act as the mechanical carrier which move around in the sensing field, collecting the data from sensor, transmitting them to the base station. The usage of Mobile elements resulted in a newer mode in order to minimize and provide a energy consumption in wireless sensor networks (WSN). At the same point, due to the inherent and slower movement of mobile elements makes the data collection latency to become higher. Hence the scheduling of mobile elements need to address the traverse pattern and also the time of data collection from respective sensor nodes. Many research works have been conducted on the approximation and usage of heuristic algorithms has been applied with the help of traveling salesman problem using neighborhoods.

A progressive optimization approach that combine-skip-substitute (CSS) scheme to obtain optimal solutions within small range of lower bound. It also consider realistic multi-rate features of wireless communication to minimize the data collection latency with multi-rate CSS (MR-CSS) scheme. Using this, the Mobile Elements (ME) to communicate with further-away sensor nodes at lower data rate and reduce their tour length. The progressive approach finds shortest tour to collect amount of data from all sensor nodes in shortest time using wireless communication with uniform and fixed communication range.

VI. DATA COLLECTION IN WSN WITH MEs

Data collection is the fundamental functions of WSN. In that, the sensed data is collected at all or some of the sensor node and forwarded to the central Base Station (BS) for further processing. In this we will outline the different phases of the data collection process and the main issues involved. The description can be easily completed, where sensor nodes are also mobile. In general, a contact happens when two or more nodes are in their mutual communication range. Theamount of time the nodes are in contact is defined as the contact time. The dashed circle in Figure 2 Since nodes cannot be involved unless they are in contact, and discovery as the

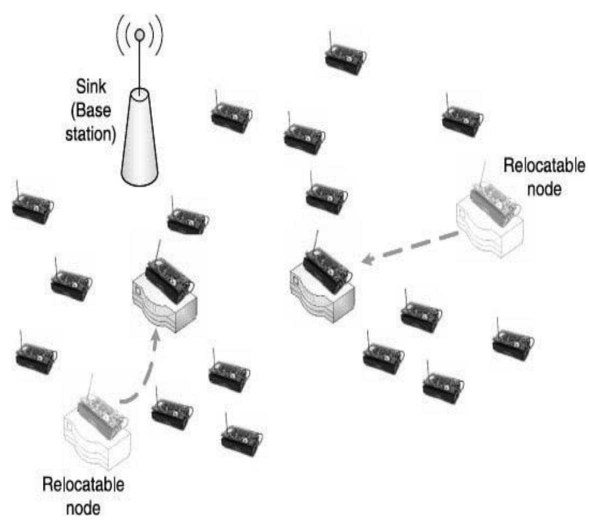

Fig 2: Data collection in WSN-MEs

process which allows a node to detect a contact, that is the presence of an ME in its communication range. On the other hand, we define data transfer as the message exchange between nodes which are in contact. The definition of data transfer covers only single-hop transmissions, which involve two or more nodes, where at least one is mobile,and the residual contact time as the amount of time which is actually used for data transfer during a contact. The residual contact time is shorter than the contact time, since a node has to determine the presence of an ME before starting the message exchange. Finally, we indicate as routing the process of data forwarding in the direction of an ME, that is the selection of the path or the sequence of pair-wise message transmissions to the intended destination.

VII. PROPOSED WORK

In our Approach Mobile Element Trajectory control scheme to reduce sensed data collection delay against obstacles in wireless sensor network are used. It will reduce the data collection delay and balance the energy consumption in wireless sensor network. The trajectory control scheme partition the deployment area with fixed cell decomposition where the beacon trajectory is divided into global and local trajectory. Using depth-first-search shortest global trajectory is approximated whereas the local trajectory is obtained by greedy strategy.

Use of smaller cell size leads to longer beacon trajectory and more localizable sensor nodes. Mobile beacon assisted localization algorithms are evaluated with multiple simulation scenarios. Simulation indicates that mobile element trajectory control decreases the delay cost, maintain better accuracy with beacon-based localization method and consider both local and global trajectories of the mobile element.

Main objective is follows:

A. Mobile Element Obstacles in Sensor Networks
B. Global and Local Trajectory Control
C. Path Plan for Obstacle Avoidance

A. Mobile Element Obstacles in Sensor Networks

Cell decomposition partition a given region into disjoint sets. In a deployment area of sensor network is configuration space. Each element of disjoint sets after decomposition is called cell. The cell decomposition method classified as exact and approximate.

Exact cell decomposition is to decompose the configuration space into a collection of non-overlapping cells to the union of all the empty cells exactly equal configuration space. Approximate cell decomposition is to construct a collection of non-overlapping cells to the union of all the empty cells approximately covers configuration space. If all cells have equal size it is fixed cell decomposition. Otherwise, adaptive cell decomposition.

B. Global and Local Trajectory Control

Deployment area is modeled by connectivity graph after cell decomposition and Global trajectory-planning present the shortest path traversing all vertices of connectivity graph. Greedy method make path containing less backtrack. After visiting a vertex next vertex to visit one with most adjacent and non-visited vertices and the Vertex with minimal degree is the vertex to visit firstly and degree of vertices adjacent to current visiting vertex is decreased by 1. If current visiting vertex has no non-visited neighbors the algorithm backtracks to its parent vertex. Otherwise selects non-visited neighbor with minimal degree to visit .

C. Path Plan for Obstacle Avoidance

Unknown nodes in configuration space are useless nodes (cannot provide useful information). others are useful nodes with decrease of cell size. The number of empty cells and localizable unknown nodes increase rapidly. So, Trajectory is short to save energy of ME against obstacles.

VIII. CONCLUSION

we conclude that our paper has reviewed a number of data collection technique and all these techniques provide the decrease in data collection but these were not still so a lot of efficient. The Mobile Element Trajectory control scheme used to reduce the data collection delay and also balance the energy consumption. The Data collection delay will be reduced precisely. So, if we use Mobile Element Trajectory control scheme, we can avoid data collection delay and also balance the energy consumption in wireless sensor network.

REFERENCES

[1] "An Energy Efficient Data Collection Framework for Wireless Sensor Networks by Exploiting Spatiotemporal Correlation" Chong Liu, Student Member, IEEE, Kui Wu, Member, IEEE, and Jian Pei

[2] "New Distributed Algorithm for Connected Dominating Set in Wireless Ad Hoc Networks" Khaled M. Alzoubi Peng-Jun Wan Ophir Frieder Department of Computer Science, Hawaii International Conference on System Sciences – 2002

[3] Tao Cui, Lijun Chen, Tracey Ho, Steven H. Low, and Lachlan L. H. Andrew," OpportunisticSource Coding for Data Gathering in Wireless Sensor Networks" DARPA grant N66001-06-C- 2020, Caltech's Lee Center for Advanced Networking.

[4] Sundeep Pattem, Bhaskar Krishnama chari, Ramesh Govindan," The Impact of Spatial Correlation on Routing with Compression in Wireless Sensor Networks." ACM Transactions on Sensor Networks (TOSN), vol. 4, no. 4, p. 24,2008.

[5] K.Ramanan1 and E.Baburaj," Data gathering algorithm for wireless sensor network" International Journal of Ad hoc, Sensor &Ubiquitous Computing (IJASUC) Vol.1, No.4

[6] Liang He, Member, IEEE, Jianping Pan, Senior Member, IEEE. "A Progressive Approach to Reducing Data Collection Latency in Wireless Sensor Networks with Mobile Elements."

[7] Y. Zhuang, J. Pan, and L. Cai, "Minimizing Energy Consumption with Probabilistic Distance Models in Wireless Sensor Networks," Proc. IEEE INFOCOM, 2010.

[8] A. Somasundara, A. Ramamoorthy, and M. Srivastava, "Mobile Element Scheduling for Efficient Data Collection in Wireless Sensor Networks with Dynamic Deadlines," Proc. IEEE 25th Int'l Real-Time Systems Symp. (RTSS '04), 2004.

[9] X. Xu, J. Luo, and Q. Zhang, "Delay Tolerant Event Collection in Sensor Networks with Mobile Sink," Proc. IEEE INFOCOM, 2010.

[10] Konstantinos Kalpakis, Koustuv Das gupta, and Parag Namjoshi, " Maximum Lifetime Data Gathering and Aggregation in Wireless Sensor Networks". August 26, 2002 TR CS-02-12.