ISSN:0975-9646

Energy Efficient Data Gathering by Mobility Sink in Wireless Sensor Networks

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***Abstract*— This paper concentrates on a method which paves way for the mitigation of energy used during sensor to sensor communication and data transfer in WSN surroundings. The mobile sink routing and data accumulation technique is proposed which is grouped based on Expectation-Maximization (EM). It allows the retrieval and acceptance of the information maximization problem. We use time slotted timer scheduling to collect information from mobile sink. The best range of clusters can help with the minimization of the energy consumption. With EM, the sensor that is in the head position helps to collect data from its neighbors in a multichip way. The request to fetch information from various sources floods because of the inefficiency in the energy handling. In WSN, all at once when all nodes communicate and broadcasts information to the surrounding nodes, wastage of energy happens. To scale back the energy involved, we use cluster based grouping in timely manner. The HMAC (Hash Based Authentication) sends encrypted information to other nodes. The information processing is done by the sink node, which gathers the info thus saving the energy which is wasted throughout communication.**

Keywords—HMAC; Expectation-Maximixation;Mobile sink; energy; nodes;

I. INTRODUCTION

The data communication across the nodes in the WSN network faces with high traffic intensity and high information measure while transferring in the problem statement. The WSN tends to communicate by sending data across the nodes from the base station where the sensor nodes reverts back with the solution. This process is extremely energy consuming and requires all sub networks within the limited communication range. The sensors in one arena may not be available to be accessed in the other neighboring arenas. Thus, communication becomes a plot of challenge for the nodes. Accumulating knowledge or data from various nodes is tedious task. Wireless transfer of data constantly requires the maximum energy for the sensors to draw out information. The information that is processed by the sensors may not be important and the head sensor always requires high amount of energy to get the information from the alternative sensors.

The data transmission protocols in the WSNs, which includes the cluster-based protocols are prone to variety of security attacks and they cannot achieve optimization or reduction in the energy involved. Data compression techniques needs huge volume of storage capacity and high machine power and are ineffectual to deal with the divided network in the system. And additionally it causes request flooding problem. Using centralized cluster algorithm does not help in the decrease of energy consumption since it uses greedy formula. Mobile sink may fail at times to collect data from all nodes where sensors are connected and as a result of it we may have the communication variation.

Considering the above scenario, in this paper, we propose a model that works based on EM based sensing which collects data from the neighboring sensors in multi-chip fashion. We aim at debilitating the distance involved in the wireless communication (Sensor to sensor distance). The energy consumed by the sensors is directly corresponding on the communication distance between the two sensors. The information that is being subjugated and received by the sensors are temperature, humidity and the Greenhouse gas level. The buffered memory is held responsible for collecting the information from sensors. By EM, while clubbing with collection of data in multichip fashion, the head sensor node is accountable for increase in the knowledge request every 10 seconds, which stores it in the buffered memory.

II. RELATED WORKS

A. Energy optimization using mobile observer:

The data collector or the observer of the system is fixed on the path which exists within the communication range is fixed with deadlines for the data transfer [1]. These deadlines when crossed can result in the data loss. When sensor networks which cannot tolerate the data loss comes into the point of communication, the mobile network ensures there's no apparent data loss.

B. Increasing the throughput in WSN:

Using timeslot, control over the power involved, rate of transfer of data and few new algorithms, this existing system [2] focusses on achieving the right

optimal throughput among the machines that are interconnected in the system. The scheduler is used to allot time slots which determines which job is to be performed next, tuning the transmission of data across the nodes in the WSN.

C. Estimation and simplification of the GAP downside:

By increasing the number of bins, the algorithm that has been proposed concentrates on mitigating the estimation of combinations [3] with which the runtime deduction is taking place in the WSN.

D. Using Time-Slotted Algorithms:

The differences between the scheduling algorithm and the algorithms that do not work based on the timed slot are brought to front by this work. The marginal increase [4] in the run time while the communication between the sensor networks takes place are more in the strategy based algorithm than in the time slotted algorithm.

It is found that in all the works that has been carried out till date, we have the following two issues that has to be addressed with immediate priority.

- Energy consumed due to the distance between one sensor and the other. When the sensors are placed at higher distance from each other, more energy is needed to access the data.
- The node based communication needs the mobility sink or buffered memory to store the data.

III. EXISTING SYSTEM

The simulcasting of the data in the wireless sensor networks is through the sensors which are distributed as nodes in various adjacent places. The head nodal sensor and the branch sensors communicates with the base station sensors. Each time when a message is simulated, the energy that is consumed by the network goes to the peak. Abiding to the limited communication [5] range, the sensors are divided into sub-clusters. The limited communication range also increases the need of energy because “more the distance more the energy is needed to communicate”. The data generated by one single sensor in the distributed cluster of WSN is not vital. The collection of data by all the sensors are needed to gather information which is again energy expensive.

Problem Definition:

- Each sensor requires a lot of energy to relay the data generated by surrounding sensors.
- Increasing the traffic overhead and bandwidth requirements of the sensor networks.
- Redundancy of sensory data.
- Static Base station.

IV. PROPOSED SYSTEM

A modified mobility sink routing and data gathering mechanism through network clustering based on modified Expectation- Maximization (EM) technique is used to overcome a data collection maximization problem. The mobility sink is used to collect data from each cluster head based on time slot scheduling technique. An optimum cluster groups are framed for reducing the energy consumption. In EM technique, the sensor head collects data from its neighboring sensor in a multi-hop fashion. Data request flooding crisis take place due to the energy inefficiency that occurs when all sensor nodes relays data request messages to their successive neighboring node points simultaneously. This wastes energy of the power source especially in high density Wireless sensor network. To address this problem, time slot scheduling mechanism is implemented to collect data in every cluster using a mobile sink in a specifically timed manner. For security, the sensor head sends data to the sink in a encrypted format using HMAC (Hash Based Message Authentication Code) algorithm. In addition, the data query process is done by the sink node, which is use to get the useful information from Collected data. A modified mobile sink routing and data detection mechanism through network clustering based on modified Expectation-Maximization (EM) technique is used to overcome a data collection maximization problem. The mobility sink is used to collect data from each cluster head based on time slot scheduling technique. An optimum cluster groups are framed for reducing the energy consumption. In EM technique, the

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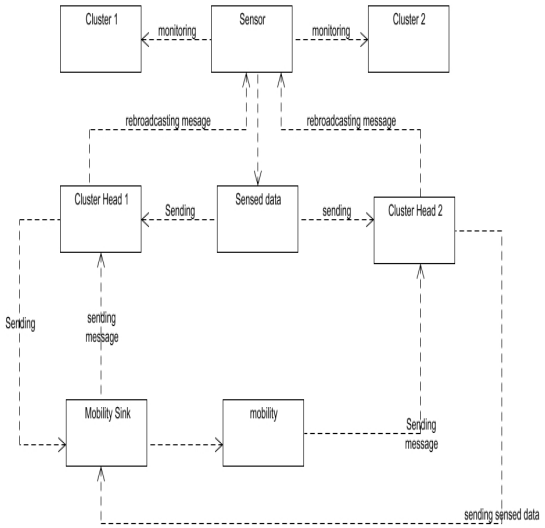
V. WORK FLOW OF THE SYSTEM



VI. IMPLEMENTATION

The implementation of the proposed work is done in four phases namely Sensor distribution and node formation, Cluster-based data accumulation, Time-Slotted data gathering in the mobility sink, Data traversal and accessing. The four phases are explained and carried out as follows:

1. Distributed Senor Network Formation:

   A graphical structure is formed which shows all the sensors and clusters in our network. Then we will create multiple clusters and multiple sensors in our network. A group of created sensors are kept as a cluster. Each cluster have one sensor head and is selected based on the powerful memory management and efficient battery performance which is assumed in our simulation. Then sinking node is created outside the cluster network. Each sensor has a separate sensor id. Each sensor has its own coverage. Each sensor finds its neighbor sensor if they have coverage at the same location. Each sensor has a memory. The data sensed by each sensor are temperature, humidity, and co2 level. The sensed data are stored in its buffered memory.

2. Cluster-Based Data Accumulation:

   Using EM technique the sensor head collects the data from its neighbor sensor node in a multi-hop procedure. Our proposal aims to minimize wireless communication distance, since the energy consumption is proportional to the square of the wireless communication distance. Data sensed are the temperature, Humidity, CO2 level in our case. The sensor head is responsible for sending data request for every 10 seconds to its neighbor sensor for collecting data from its neighbor.

3. Secure Data Gathering by mobility sink via time slot scheduling:

   The Mobility Sink orders the cluster head to collect the data from its neighbors then shares the public key which will be generated by using the HMAC (Hash based message authentication code).The mobility sink gets around the cluster. Once the mobility sink enters the cluster coverage, the sink send request message to the cluster head and collects data. This process is done to all the clusters in the Wireless sensor network. Once sink gets the data, the sensor head clarifies its memory, and sends the data request to collects data from its neighbor again. Moreover, we focus on the Data request traffic collision crisis to obtain the desired cluster range. This problem wastes energy, particularly in the high density Wireless sensor network. To reduce this problem, we must choose an optimal number of clusters in a low connectivity network.

4. Data Querying/Traversal Process:

   In this module, the data querying process is done by the sink node. The collected information in the sink contains huge amount of data. The data collected by the sink are temperature, humidity and co2 level. Once a sink has collected all the required data from the cluster network, the query process is done in the mobile sink node itself which provides us with useful sensory information such as maximum and minimum environmental condition over a particular regional location.

VII. CONCLUSION

In this paper we have discussed and simulated a sensor to sensor energy usage problem which arises during the transmission and communication of the broadcast messages. We have formulated and sorted the downside issue using the mobility sink and time-based recess which clubs with Estimation Maximization technique for the data transfer across the sensors in various arenas. Mitigating the distance between the sensors and ensuring the minimal use of energy for information broadcasting are the two main objectives that we have dealt with in the paper. The adaptation of the already existing system and open restriction towards the non-uniformly timed algorithms have created the best optimal solution that is operational at lowest power level.

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