Study On A Rendezvous-Based Cluster Formation And Data Transmission In WSN Using Data Collector Technique

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Abstract-A wireless sensor networks is a collection of sensor nodes(SN) that are organized to collaborate data. To retrive the sensor readings effectively from the sensor nodes, mobile sinks are placed at the vehicles like buses which provides ideal infrastructure. In the wsn each node has their own battery life, so care should be taken for the energy management. In the exisisting systems for the data retrival either involves single hop or multi hop transfer of data with in the reachable range have high buffering overhead, processing overhead and reduces network life time. We made survey to overcome from this issues, in our survey we are using clustering technique. By making cluster structures we can reduce the buffering overhead and processing overhead. In the cluster structure we need to identify cluster head(CH) and Rendezvous nodes(RN).Rendezvous nodes are identified based on the energy of nodes. Cluster Head consists all the necessary informations like routing information of their member nodes and it also performs data filtering. Then the filtered data will sent to the Mobile Sinks with the proper energy management through RN's. So this technique is well suited to improve the network lifetime and network connectivity.

Key terms- Wireless Sensor Network, Clustering technique, Rendezvous Node.

1. INTRODUCTION

Due to the recent technological advances in miniaturization, low-power circuit design, and efficient wireless capability, wireless sensor networks (WSNs) have emerged as a promising technology with numerous and various applications. A WSN is a multi hop wireless network with tens, hundreds, or thousands of sensors being deployed over an area of interest. These sensors measure and monitor ambient conditions in the surrounding environment. Typical sensing tasks are heat, pressure, light, sound, vibration, temperature, pollution and so on.

Applications for wireless sensor networks fall in three major categories:

- *Periodic sensing*: Sensors are always monitoring the physical environment and continuously reporting measurements to the sink, such as in weather monitoring applications.
- *Event-driven*: Sensors operate in a silent monitoring state and are programmed to notify about events, such as the presence of objects in intrusion detection, target tracking, or military applications.
- *Query-based*: The generated data reports are made available within the sensor network, and sensors react to the queries of the sink by returning the corresponding requested measurements and events.

Before monitoring the environment, sensor nodes must be able to discover nearby sensors and organize themselves into a network. After that, sensor nodes begin to sense the field and forward data to a mobile sink.

They can be roughly classified into the following categories; first, in a sensor network, which contains a large number of sensor nodes and a observer, the observer must be reachable by all the sensor nodes. Data packets are sent to the observer by one or more hops of forwarding. In such a network, all data traffic flows to the observer. Thus, sensors close to the observer consume much more energy than sensors at the margin of the network. As a result, after these sensors fail, other nodes cannot reach the observer and the network becomes disconnected even though most of the nodes can still survive for a long period. In order to improve the scalability, here we introduce mobicluster protocol for randomized cluster forming and cluster head selection. However, they assume that all sensor nodes in the network are homogeneous and have the same computational and communication capability. Thus, every sensor node has to be powerful enough to communicate with other nodes within the cluster.

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Furthermore, in such a network, every sensor has to perform all the functions by itself, such as finding routing paths, obtaining its location information scheduling the packet transmission, and so on. Thus, the network architecture with one static observer is only suitable for a small network.

The second type of architecture introduces a hierarchy to the network. By adding a small number of powerful cluster heads, the network can be divided into clusters. In such a network, sensor nodes are organized into clusters and form the lower layer of the network. At the higher layer, cluster heads collect sensed data from sensors and forward the data to outside observers. Such two-layer hybrid networks are more scalable and energy efficient than homogeneous sensor networks.

The third type of sensor networks introduces mobile data observers to collect the data dynamically. A mobile data observer could be a mobile robot or a vehicle equipped with a powerful transreceiver. The mobile data observer starts a tour from the base station, traverses the network, collects sensed data from nearby nodes while moving. The moving path and the direction of the mobile observer can be random or planned. When the mobile observer moves into the transmission range of some sensors, the sensors send the data to the observer through. Other sensors, which are too far away from the moving path of the mobile observer, can upload the data through the relaying of other sensor node namely rendezvous node. By introducing the mobility of the observer, the energy consumption for transmitting the packets can be reduced significantly, and sensor nodes can be made simpler and less expensive.
The Fig 1 shows the cluster technique for data aggregation, here all the nodes of the WSN is partitioned into small clusters and each cluster has its CH. Sensory data is collected from the neighbour nodes with in the cluster(intra cluster) or inter cluster and finally these data delivered to Mobile Sinks(MS) within the reachable radio range.

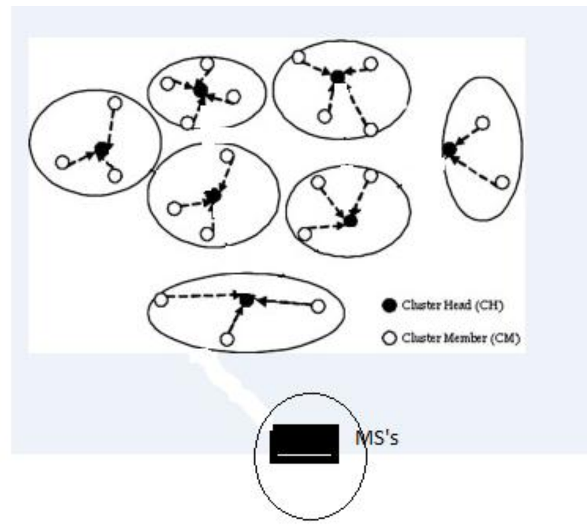

FIG 1: Cluster technique for data aggregation

Our moto is to reduce the network overhead and increase the network lifetime with security.

2. RELATED WORK

In WSN data aggregation is one of the major issue, the conventional techniques like Data Mule Scheduling(DMS) and other techniques required to visit all the sink nodes to collect the data[2][3][4]. Here it requires only single hop communication with the limited energy consumption. The main drawback of this is latency, here it has high data delivery delay. To overcome from this issue multi hop communication techniques like A Greedy Mobile Base station Protocol, adaptive sink mobilty and control sink mobilty was used. In this it visits some locations of the WSN and MS(s) gathers the data from the SN(s). The main drawback of this is energy management. Here it consumes high energy due to multi hop communication. Here the SNs need to constantly update the MSs location by this it increases routing overhead. To overcome from this issue MobiCluster Protocol is developed. In this Rendezous nodes are used for the information retrival. Here SNs send first their data to a certain number of nodes (RNs) which buffers the received data and send them to MS when MS is within their transmission range[5],[6][7],[8],[9] or when they receive a query from MS asking for buffered data[10].
The rendezvous based solution targets application that involve monitoring of isolated urban areas (e.g urban

parks, building blocks) with respect to environmental parameters, surveillance, fire detection, etc. in such environments, MSs may be mounted upon city buses that repeatedly follow a predefined trajectory with a periodic schedule.

In rendezvous based solution ,a MS is used to collect data from groups of SNs. During a training period, all the WSN edge nodes located within the range of MS routes are appointed as RNs and build paths connecting them with the remainder of sensor nodes. Those paths are used by remote nodes to forward their sensory data to RNs; the latter buffer sensory data and deliver them to the MS when it reapproaches in range. The movement of mobile robots is controllable which is impractical in realistic urban traffic conditions. Most importantly, no strategy is used to appoint suitable nodes as RNs while selected RNs are typically associated with uneven numbers of SNs[1]. The existing system is facing some security issues.

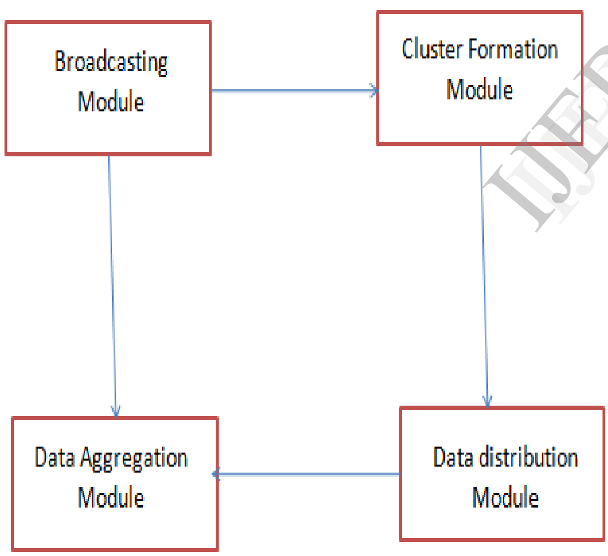

Fig 2 Block Diagram of Existing System

2.1.Broadcasting module

Runs at all nodes. First mobile sinks periodically broadcasts BEACON messages which are used by sensor nodes for determining a number of parameters important for the protocol operation. Each node senses the neighboring nodes and broadcast the packets.

2.2. Data aggregation module

Takes place at two nodes namely rendezvous node and cluster head. Data accumulated at individual sensor nodes are sent to local cluster heads. Cluster head performs data filtering and forward the data towards remote cluster head. Finally all data from cluster heads are aggregated at rendezvous node.

2.3. Cluster formation module

The large-scale deployment of wireless sensor networks and the need for data aggregation necessitate efficient organization of the network topology for the purpose of balancing the load and prolonging the network lifetime. Clustering has proven to be an effective approach for organizing the network. Besides achieving energy efficiency, clustering also reduces channel contention and packet collisions.

2.4. Data distribution module

MobiCluster protocol involves the delivery of data buffered to RNs to mobile sinks (MS). Data delivery occurs along an intermittently available link; hence, a key requirement is to determine when the connectivity between an RN and the MS is available. Communication should start when the connection is available and stop when the connection no longer exists. The MS acknowledges each received data packet to the RN so that the RN realizes that the connection is active and the data were reliably delivered.

3. PROPOSED SYSTEM

Existing approaches involve either single-hop transfer of data from SNs that lie within the MS's range or heavy involvement of network periphery nodes in data retrieval, processing, buffering, and delivering tasks. These nodes run the risk of rapid energy exhaustion resulting in loss of network connectivity and decreased network lifetime. Our proposed protocol aims at minimizing the overall network overhead and energy expenditure associated with the multihop data retrieval process while also ensuring balanced energy consumption among SNs and prolonged network lifetime. This is achieved through building cluster structures consisted of member nodes that route their measured data to their assigned cluster head (CH). CHs perform data filtering upon raw data exploiting potential spatial-temporal data redundancy and forward the filtered information to appropriate end nodes with sufficient residual energy, located in proximity to the MS's trajectory.

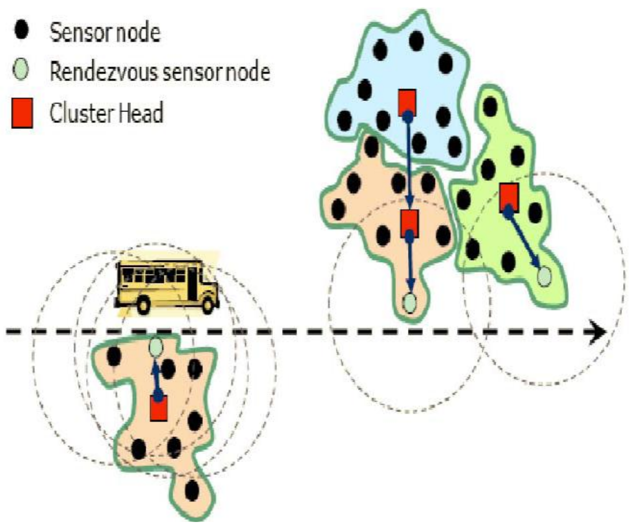

FIG 3. PROPOSED SYSTEM ARCHITECTURE

Mobile sinks are mounted upon public buses circulating within urban environments on fixed trajectories and near-periodic schedule. Namely, sinks motion is not controllable and their routes do not adapt upon specific WSN deployments. Our only assumption is that sensors are deployed in urban areas in proximity to public transportation vehicle routes. Also, an adequate number of nodes are enrolled as RNs as a fair compromise between a small number which results in their rapid energy depletion and a large number which results in reduced data throughput. Finally, SNs are grouped in separate clusters. Raw sensory data are filtered within individual clusters exploiting their inherent spatial-temporal redundancy. Thus, the overhead of multihop data relaying (interclustering traffic) to the edge RNs is minimized (As shown in FIG 3). Given that the communication cost is several orders of magnitude higher than the computation cost, in-cluster data aggregation can achieve significant energy savings.

CONCLUSION

This survey is on energy management, as we know in wsn each node has its own battery life. So optimal use of energy improves the network life time and data throughput. We made a survey to propose a protocol that should able to provide balance energy expenditure with proper security. Balanced energy consumption can be achieved by using cluster formation technique. This protocol helps to improve both network connectivity and network lifetime. This protocol is well suited for the WSN.

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