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An Efficient Multiple Mobile Data Collector Scheme For Clustering Wireless Sensor Network

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Abstract: The wireless sensor network is made up of collection dense sensor node where collection of data from the sensing fields becomes an issue. In the existing system a VELCT (Velocity Energy Efficient Link Aware Cluster Tree) is used to construct a DCT (Data collection Tree) to collect the data from the CH (Cluster Head) and then relay it to the BS (Base Station). But this system fails to balance the energy between the sensor nodes. In the proposed system the EMDC (Efficient Multiple Data Collector) is used to implement multiple mobile data collector to collect the data from the cluster head. The Mobile Data collector called CV (Collector Vehicle) is deployed in multiple numbers to collect the data from the cluster head and then relay it to the base station. This prevents the creation of energy hole in the network and balances the energy between the nodes. The simulation results have shown better results when compared with the existing system.

INTRODUCTION

A wireless sensor network consists of numerous autonomous sensor nodes that are spatially distributed to sense and monitor various changes of the environment surrounding us. Such devices are also capable to communicate in wireless sensor networks and that can also sense, monitor, transmit, receive or process numerous data like pressure, temperature, sound, motion, humidity etc. The WSN is built of nodes from a few to several hundreds or even thousands, where each node is connected to one or more sensors. Each such sensor network node has typically several parts: a radio transceiver with an internal antenna or connection to an external antenna, a microcontroller, an electronic circuit for interfacing with the sensors and an energy source, usually a battery or an embedded form of energy harvesting.

A sensor node might vary in size from that of a shoebox down to the size of a grain of dust, although functioning motes of genuine microscopic dimensions have yet to be created. The cost of sensor nodes is similarly

variable, ranging from a few to hundreds of dollars, depending on the complexity of the individual sensor nodes. Size and cost constraints on sensor nodes result in corresponding constrains on resources such as energy, memory, computational speed and communication bandwidth. The topology of the WSNs can vary from a simple star network to an advanced multi-hop wireless. The propagation technique between the hops of the network can be routing or flooding.

Sensor nodes collect data from the surroundings and communicate the data with other sensor nodes. In flat wireless sensor networks, the data is directly passed from sensor nodes to base station. In cluster based wireless sensor networks, the sensor nodes transmit the data to a cluster head which then relays it to the base station. In a multiple mobile data collector scheme the data is collected by the cluster head and then sent to the CV which then relays it to the BS.

RELATED WORKS

In the literature survey various data collection scheme have been introduced.

The LEACH(Low-Energy Adaptive Clustering Hierarchy)protocol [1] helps in the formation of the cluster and election of the cluster head. The sensor nodes collect the data from the sensing fields and then give it to the cluster head which gives the data to the BS. This system fails because of the energy hole creation. Since the cluster head near by the BS send the data first than the far nodes. Hence the cluster heads nearby drain of out energy.

The CREEC (Chain Routing With Even Energy Consumption)[2] algorithm is used to create a chain of cluster where one cluster head collects the data from the sensor nodes and then send it to nearby cluster head where the data passes through a chain of cluster to reach the BS. This increases the delay in the network as the data have to traverse through a long chain of clusters.

PROBLEM STATEMENT

The Wireless Sensor Network consists of sensor nodes deployed in a large sensing field. The collection of data from the sensor nodes is issue since the sensor nodes are battery powered. The batteries of the sensor nodes are not rechargeable hence the deployed battery power has to be used efficiently. Hence collections of data from the sensor nodes have to be done efficiently.

The implementation of multiple mobile data collector effectively solves this problem. The sensor nodes are deployed in the sensing fields. There are two phases in the multiple mobile data collector scheme.

I. Cluster head formation
II. Collection of data from the CH.

Cluster Head Formation

The sensor nodes once deployed in the sensing field are grouped into clusters. The cluster head is chosen by the BS. The sensor node with highest energy value is chosen as the cluster head. The sensor nodes collect the data from the sensing fields and relay it to the CH.

Collection of Data From CH

Once the data is collected by the CH the data is relayed to the BS. The CV is implemented. The CV chooses a predefined path to reach the CH. The CV travel through the predefined path. The path chosen by one CV is not chosen

by another CV. The CV travel through the path in a random X and Y direction.

CV _interval=10; each 10 sec it changes its movement

Double max_x=node->T->upperX();

Doublemax_y=node->T->upperY();

Max_x and max_y is X and y taken by tcl

Double dx;

Double dy;

Dx=random: uniform (1, max_x); DCN moving least 1 point to max_x and max_y randomly

Dy=random::uniform (1, max_y);

Once the data is ready the CH sends a message to CV the CV which first receives the message collects the data from the CH. The CH knows the presence of the CV by the signal sent by the CV. Once the data is collected by the CV it relays it to the BS. This prevents the energy hole creation and balance the energy between the sensor nodes. Thus it improves the energy consumption and increase the network lifetime.

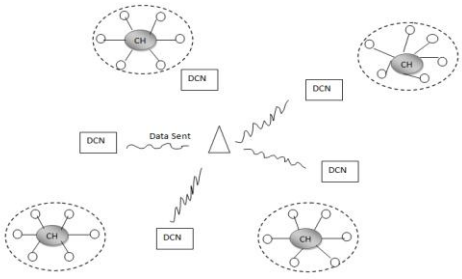

Fig 1: System Architecture

OUTPUT

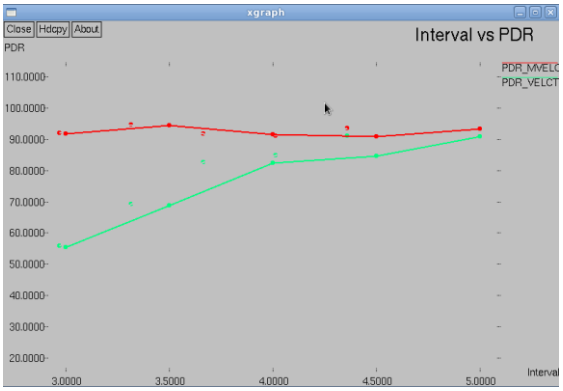

Fig 2:Interval vs Pdr

The Fig2: Interval vs Pdr shows the comparison between the interval and packet drop ratio where the packet drop ratio decreases in the proposed system

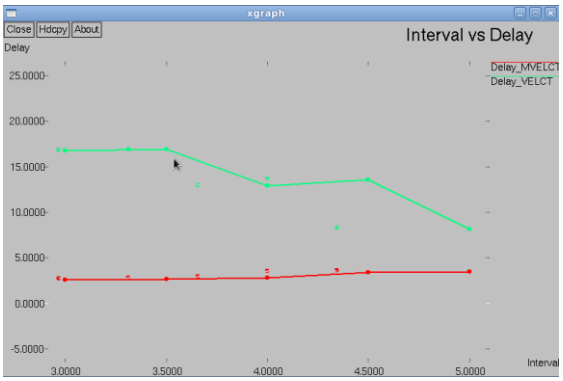

Fig 3: Interval vs Delay

The Fig3: Interval vs Delay shows the comparison between the interval and Delay where the delay decreases in the proposed system.

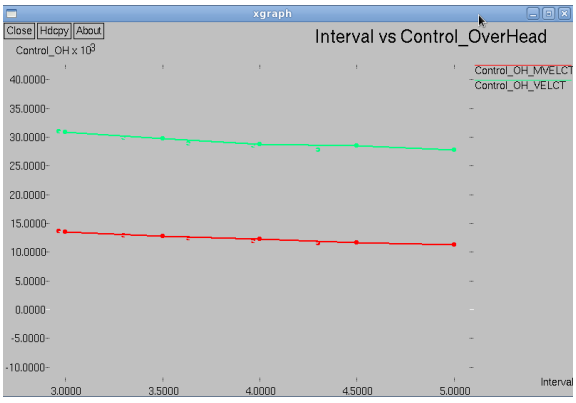

Fig: 4 Interval VS Control_ Overhead

The Fig:4 Interval vs Control Overhead shows the comparison between the interval and control overhead where overhead decreases in the proposed system.

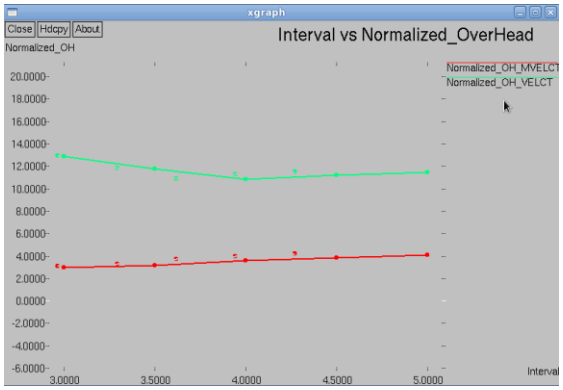

Fig: 5Interval vs Normalized_ Overhead

The Fig: 5 Interval vs Normalized Overhead shows the comparison between the intervals and normalized overhead where the overhead decreases in the proposed system.

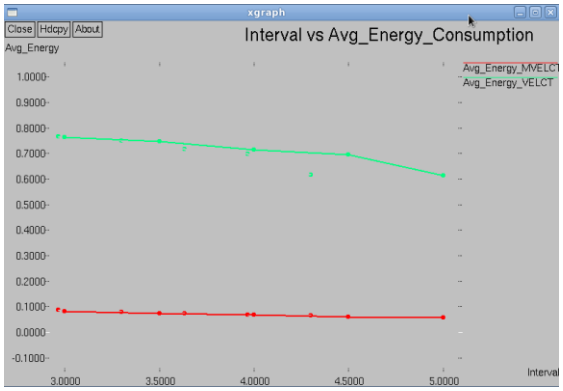

Fig : 6 Interval vs Energy Consumption

The Fig:6 Interval vs Energy Consumption shows the comparison between the interval and energy consumption and the energy consumption decreases in the proposed system.

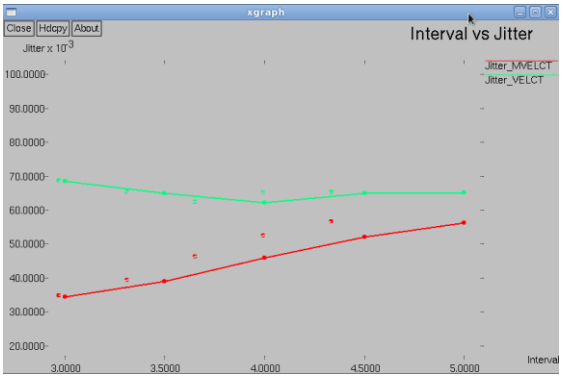

Fig: 7 Interval vs Jitter

The Fig: 7 Interval vs Jitter shows the comparison between the interval and jitter where the jitter decreases in the proposed system.

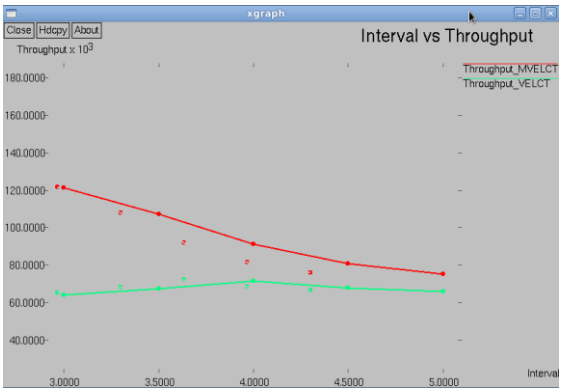

Fig: 8 Interval vs Through put

The Fig: 8 Interval vs Through put shows the comparison between the interval and throughput where the through put increases in the proposed system.

CONCLUSION

The Wireless Sensor Network is collection of dense sensor nodes which is deployed in the field. It is subjected to environmental disturbance. The collection of data from the sensor nodes is a serious issue. Hence maintaining the battery power becomes critical. In the existing system a tree based clustering network is used to collect the data from the senor nodes. In the proposed system multiple mobile collectors is used to collect

the data from the cluster head which balance the energy between the sensor nodes and avoid the formation of energy holes in the network .The simulation and graphical results have shown efficiency.

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