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Clustering BasedMinimizing EnergyUtilization in WirelessSensor Network With Mobility

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ABSTRACT

Wireless Sensor Network (WSN) is a latest emerging technology during in last decades, a lot of researchers doing effort to find a low cost and low power way out for wireless sensor network. WSN can connect information world with physical world together. Energy is the main constraint of wireless sensor networks (WSNs) due to irreplaceable and limited power sources of the sensor nodes. Clustering is the most popular topology control method to reduce energy consumption and improve scalability of WSNs. a distributed fault-tolerant clustering algorithm is proposed called DFCA which uses a cost function of the CHs for the formation of cluster. We also present a distributed run time recovery of the sensor nodes from the faulty cluster due to sudden failure of the CH.

KEYWORDS : WSN, DFCA, Clustering, Energy Consumption.

INTRODUCTION

Wireless sensor network

Wireless sensor systems (WSNs) have increased huge consideration for their extensive variety of uses, for example, ecological observing, military reconnaissance, medicinal services, catastrophe administration and so forth. WSNs comprise of hundreds or a great many small, self-ruling and low power sensor hubs which are haphazardly or physically conveyed in a target territory. All the sensor hubs gather neighborhood data, process them and send it to a remote base station (BS), called sink. The real limitation of the sensor hubs is their constrained and imperative force sources. Vitality utilization for the sensor hubs is the most difficult issue for the long run operation of WSNs.

A Wireless Sensor Network Mobile interchanges and remote systems administration innovation has seen a third time headway. In innovative headways furthermore in application requests different classes of correspondence systems have joined like Cellular systems, Ad hoc Networks, Sensor Networks and Mesh Networks. Cell system relies on foundation. Impromptu systems are comes in the classification of remote systems that sort out multi jump radio handing-off when the hubs are alertly and self-assertively found.

Clustering Protocol

Clustering Protocol (CP) a straightforward yet proficient grouping convention. It is accepted that every portable hub knows its area. Different strategies like GPS, Time Difference of Arrival, Angle of Arrival and Received Signal Strength Indicator have been proposed to empower a hub to recognize its relative area. As of late, an extent free practical arrangement has been proposed for the same reason. To "choose" the transmitting hubs, we augment the Covering Problem, which manages covering an area totally utilizing least number of circles. The key preferences of our convention are: a) With CP the quantity of bunches obliged scales with thickness of the system; i.e., the quantity of groups needed does not increment with the thickness; b) CP has low correspondence overhead while execution is practically identical to different conventions; c) In CP, a hub does not have to know areas/locations of all its neighbors and subsequently CP does not force any data transmission overhead, for example, hi messages; d) Behavior of CP in extensive systems has been displayed and it is demonstrated that CP performs well even in exceptionally huge systems. Due to the aforementioned focal points, CP is extremely appropriate as a productive grouping convention for Sensor Networks.

The fundamental motivation behind proficient group head determination in various leveled steering is to keep up effective vitality usage and information total towards sink. Bunching procedure is generally the vitality keep up of sensors which is close to the cluster head.

1.3 Applications of Wireless Sensor Network

Process Management

The common application of WSN is area monitoring. In area monitoring, the WSN is deployed upon an area where some phenomenon is to be monitored. The use of sensors detects enemy intrusion is mil; a civilian example is the geo-fencing of gas or oil pipelines. Area monitoring is most important part.

Health care monitoring

First device are used on the body surface of a human and also just at close proximity of the user. The implantable medical devices are those which are inserted within the human body. There are also many other application like body position measurement and location of the person, overall monitoring of ill patients in hospitals and at homes. Body-area networks can collect information about an individual's health, fitness, and energy expenditure.

Environmental/Earth sensing

In monitoring environment there is so much application, examples of which are given below. They share the extra challenges of harsh environments and reduced power supply.

Air pollution monitoring

Wireless sensor networks have been deployed in several cities to monitor the concentration of dangerous gases for citizens. These can take advantage of the ad hoc wireless links rather than wired installations, which also make them more mobile for testing readings in different areas.

Forest fire detection

A network of Sensor Nodes can be installed in a forest to detect when a fire has started. The nodes can be equipped with sensors to measure temperature, humidity and gases which are produced by fire in the trees or vegetation. The early detection is crucial for a successful action of the firefighters; thanks to Wireless Sensor Networks, the fire brigade will be able to know when a fire is started and how it is spreading.

Landslide detection

A landslide detection system makes use of a wireless sensor network to detect the slight movements of soil and changes in various parameters that may occur before or during a landslide. Through the data gathered it may be possible to know the occurrence of landslides long before it actually happens.

LITERATURE SURVEY

Muhammad Arshad1 et al [1] describes Mobile Wireless Sensor Network (MWSN) is one of the rising and emerging technologies for various application of NWGN. The enormous concerns of these networks are energy efficiency and data aggregation within the network. The aim of data aggregation is that eliminates redundant data transmission and enhances the lifetime of energy in MWSN. In this paper, we propose, analyze and validate efficient cluster head selection scheme in Mobile Data Collector based routing protocol for data aggregation, which is based on multi-hop routing strategy. Moreover, our approach is better than traditional LEACH in terms of energy con-

sumption of sensor nodes and enhances the network lifetime due to less energy consumption during data transmission.

Akyildiz, I.F et al [2] describes advancement in wireless communications and electronics has enabled the development of low-cost sensor networks. The sensor networks can be used for various application areas (e.g., health, military, home). For different application areas, there are different technical issues that researchers are currently resolving. The current state of the art of sensor networks is captured in this article, where solutions are discussed under their related protocol stack layer sections. This article also points out the open research issues and intends to spark new interests and developments in this field.

Arshad, M et al [3] Ubiquitous communication networks is a keystone for New Generation Network (NWGN). Mobile Wireless Communication Networks (MWSN) is a viable solution to accomplish the requirements of NWGN. Due to mobility of sensor nodes, the data reliability and end-to-end delay with energy efficiency in the network is an enormous concern. Various real-time and delay sensitive applications enforced to use both environments mobile and fixed sensor nodes, whereas the others claims an entire mobile sensors environments in network. Packet loss ratio and end-to-end delay happened because of the nodes mobility which is directly impact to degrade the quality of service, network lifetime and energy consumption. This paper enlightens a comprehensive comparison between single and multi hop inter-cluster routing strategy from cluster head to base station. Moreover, the performance of multi hop routing is calculated and compared with single hop LEACH routing strategy. The simulation results reveal that multi hop routing strategy is to increase the sensor nodes throughput and network lifetime but not efficient approach for delay sensitive and data reliable applications.

Qin Wang; Hempstead et al [4] describes realistic power consumption model of wireless communication subsystems typically used in many sensor network node devices is presented. Simple power consumption models for major components are individually identified, and the effective transmission range of a sensor node is modeled by the output power of the transmitting power amplifier, sensitivity of the receiving low noise amplifier, and RF environment. Using this basic model, conditions for minimum sensor network power consumption are derived for communication of sensor data from a source device to a destination node. Power consumption model parameters are extracted for two types of wireless sensor nodes that are widely used and commercially available. For typical hardware configurations and RF environments, it is shown that whenever single hop routing is possible it is almost always more power efficient than multi-hop routing.

Amundson, I et al [5] over the past decade, wireless sensor networks have advanced in terms of hardware design, communication protocols, resource efficiency, and other aspects. Recently, there has been growing interest in mobile wireless sensor networks, and several small-profile sensing devices that are able to control their own movement have already been developed. Unfortunately, resource constraints inhibit the use of traditional navigation methods, because these typically require bulky, expensive, and sophisticated sensors, substantial memory and processor allocation, and a generous power supply. Therefore, alternative navigation techniques are required. In this paper we present Trip Nave, a localization and navigation system that is implemented entirely on resource-constrained wireless sensor nodes.

Md Azharuddin et al [6] main problem of WSN is to reduce energy consumption and limited power sources of the sensor nodes. To reduce the energy consumption clustering is the main method and increase the scalability. in a cluster based WSN, cluster heads (CHs) consume more energy due to extra work load owing to data collection, data aggregation and their communication to the base station. So that efficient cluster formation is very challenging by considering the energy consumption of the CHs. This is also very difficult with the fault tolerant issue of WSNs as the sensor nodes are prone to failure. In this work we introduced a distributed fault-tolerant clustering algorithm called DFCA which uses a cost function of the CHs for the formation of cluster. We also present a distributed run time recovery of the sensor nodes from the faulty cluster due to sudden failure of the CH. The experimental results demonstrate the strength of the proposed algorithm.

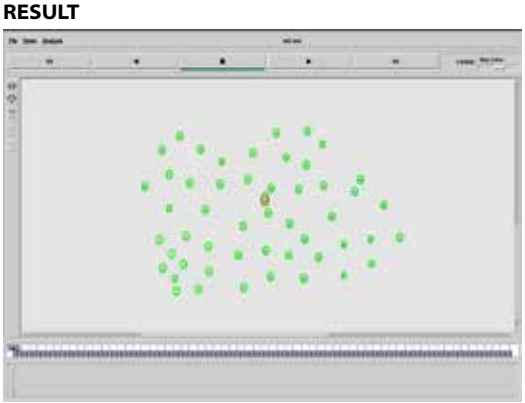
PROBLEM FORMULATION

Energy is the main constraint of wireless sensor networks (WSNs) due to irreplaceable and limited power sources of the sensor nodes. Clustering is the most popular topology control method to reduce energy consumption and improve scalability of WSNs. However, in a cluster based WSN, cluster heads (CHs) consume more energy due to extra work load owing to data collection, data aggregation and their communication to the base station. Therefore, efficient cluster formation is very challenging by considering the energy consumption of the CHs. This is also complimented with the fault tolerant issue of WSNs as the sensor nodes are prone to failure. In this paper, Author propose a distributed fault-tolerant clustering algorithm called DFCA which uses a cost function of the CHs for the formation of cluster. We also present a distributed run time recovery of the sensor nodes from the faulty cluster due to sudden failure of the CH. The experimental results demonstrate the strength of the proposed algorithm. We can remove this fault by using back up cluster or we can set the root information as a prefix.

METHODOLOGY

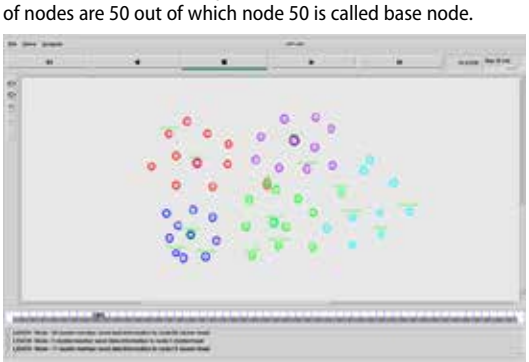
Wireless scenario is generated by initializing all the scenario parameters which includes Queue type IEEE standard, Number of nodes, Protocol to be used, Antenna Type etc. In Second Phase Leach protocol is installed and cluster formation is done on the basis of LEACH. Node with the highest energy is elected as a cluster Head. Nodes in a cluster Communicate in Hierarchy like cluster head communicate with sub-cluster head & sub cluster head communicate with cluster member in the end all cluster heads communicate with base station. As cluster communicates in hierarchy, Node are working like a back nodes. Because if sub cluster head fails than data is recover through cluster member & if cluster heads fails than sub cluster is act like a recovery node.In this phase failure information is finding out by calculating the energy of the nodes. The node with the highest residual energy will be cluster head for the next round. In the end parameter analysis is done on the basis of Quality of service parameters (QOS) like Lifetime, PDR (Packet Delivery Ratio), delay, Throughput etc.

RESULT



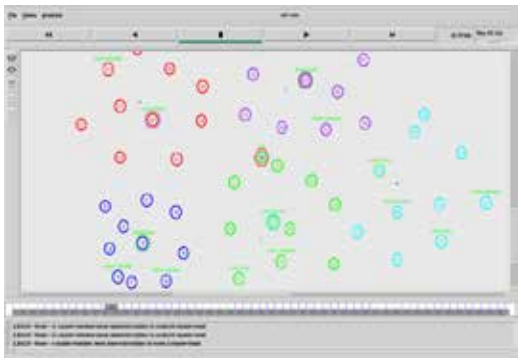
Scenario 5.1: Initialization of nodes

This scenario is used to represent the initialization of nodes. Numbers of nodes are 50 out of which node 50 is called base node.



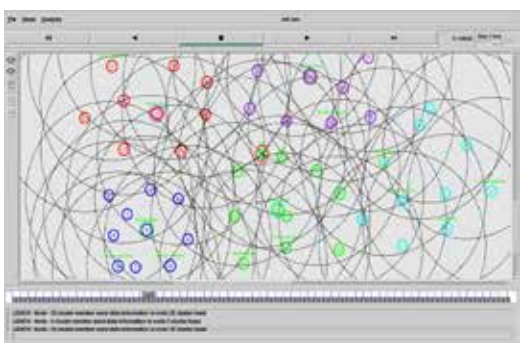
Scenario 5.2: Initialization of cluster head & base station

This scenario is use to represent the Cluster Heads. Number of cluster head is 5. Base station (node 50) takes the back up of all the data.



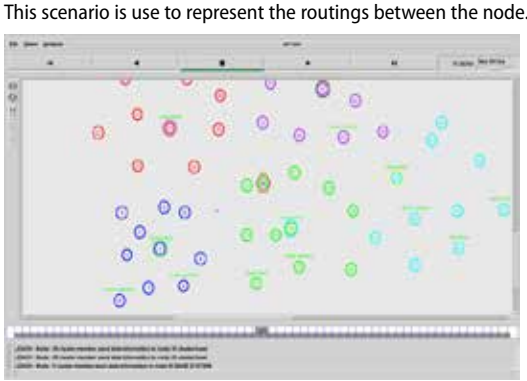
Scenario 5.3: Transmission of data

This scenario is use to represent the Transmission of data. All the members of cluster send data to the cluster head.



Scenario 5.4: Routing

This scenario is use to represent the routings between the node.



Scenario 5.5: Transmission b/w cluster heads & base station

This scenario is use to represent the Transmission of data b/w the cluster heads & the base stations. All the cluster heads send data to the base station i.e node 50.

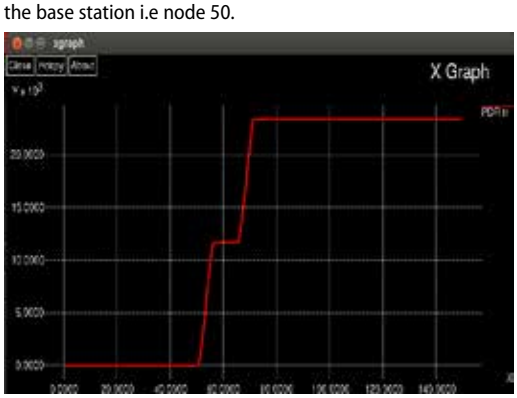


Fig 5.6 Packet Delivery Ratio

In this X-axis represent the Time and Y-axis represent the Bytes send over the network. This figure is use to represent the Packet Delivery Ratio. Packet Delivery Ratio is defined as the number of packet deliver with respect to time.

Fig 5.7 Packet Delivery Ratio with time

In this X-axis represent the Time and Y-axis represent the Bytes send over the network. This figure is use to represent the Packet Delivery Ratio for the VANET. Packet Delivery Ratio is defined as the number of packet deliver with respect to time.

Fig 5.8 Throughput

This figure is use to represent the Lifetime of a node. Lifetime is defined as the total time in which node can survive without any disturbance.

Fig 5.9 Throughput

This figure is use to represent the Throughput. Throughput is defined as the number of packet delivered successfully over the network.

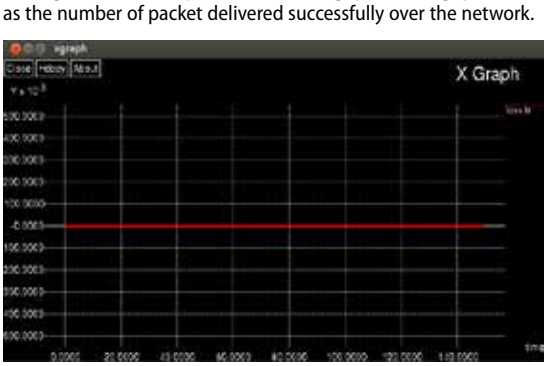


Fig 5.10 Packet Loss

This figure is use to represent the Loss of packets. Loss is defined as the number of packet loss when we transfer packets over the network

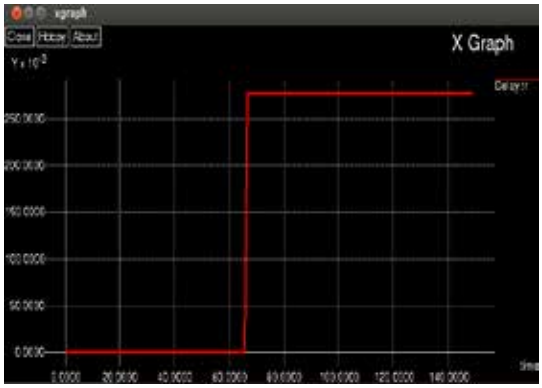


Fig 5.11 Packet Delay

This figure is use to represent the Packet Delay. Packet Delay is defined as the Delay between packets during transmission.

CONCLUSION

A wireless sensor network is a gathering of specific transducers with a correspondences foundation for observing and recording conditions at diverse areas. Generally checked parameters are temperature, humidity, weight, wind direction and velocity, enlightenment force, vibration power, sound force, force line voltage, substance focuses, pollutant and basic body capacities. WSN is used for sensing the information from environment.These sensor having sensor range and sense the information from particular area. Various protocols were purposed for proper utilization of energy in mobile wireless. Leach was a basic protocol that was used as energy model in WSN. In this paper various approaches were described that were used for MWSN.M-Leach is used in mobile wireless sensor network and multi-hop leach protocol used for energy consume in a single hope for defining energy consume in a single hope .By receiving various protocol the conclusion occur that mobile leach is best protocol for MWSN**.**

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