Journal of Current Research in Engineering and Science
Bi-Annual Online Journal (ISSN : 2581 - 611X)
Volume7-Issue1, January 2024
Paper: 10

EFFICIENT DISTRIBUTED DATA CLUSTERING ON OPTIMIZED ROUTING TECHNIQUE

[1]R.Vaishnavi, [2]M.Tagini Mythreye, [3]B.Gracelin Sheena, [4]G.Sabeena Gnana Selvi
Department of Computer Science and Engineering,
Sathyabama Institute of Science and Technology, Chennai
[1]vaishnavirajulu@gmail.com,[2]tagini20manikkavelu@gmail.com,[3]gracelinsheena.cse@sathyabama.ac.in,
[4]sabijack3@gmail.com

Abstract - A sensor consists of many tiny individual devices. Each is known as a sensor node and it is battery-powered and they also contain sensors plus data processing and short ranged wireless communications. Much research has been done to connect big numbers of sensors create stronger and scalable wireless sensor networks (WSNs). WSNs aims for an energy efficient, self arranging and scalable and resilient as even individual sensor nodes have limited capabilities. A lot of research has been done to address those problems. The large-scale arrangements of WSNs and the requirement for energy-efficient strategies require systematic configuration about network topologies to balance loads and extend network life. Clustering have shown to provide the necessary adaptable and extend network life. Due to WSN congestion phenomenon, the sensor network let go of connection with the base station, wasting the extant power resources about functioning nodes. This whole project focus to apply a clustering situations and examine the effect of increasing the amount of nodes in the cluster on the cluster head (CH) energy. Sensor nodes can be freely moved from one cluster to different cluster. This project also aims to focus on energy efficient dynamic technology where CH reselects after a certain period of time to save energy. We contrast the efficiency of the algorithm by studying the charts of CH energy levels during the lifespan of network.
Keywords - Wireless Sensor Networks, Network Topology, Clustering, Energy Efficiency.

I. INTRODUCTION

Wireless sensor networks is still in its infancy. But it has come a long way in recent years. WSN is the nationwide network of sensor nodes. These sensor nodes are microcomputers that can acquire, collect, process, transmit and transmit data to information sinks or main base stations. A sensor node has five parts :Sensor unit, processing unit, memory, transceiver, power management unit. The sensor unit collects the needed data and sends to processing unit. The processing unit combines various data into packets. After some time, the user is redirected to sink, there she can access many about her WSN's data. Sensor nodes have many limitations. Sensor nodes are powered by small batteries, which limits their performance. If it expires it should be put back with a brand new sensor node. Due to its limited computational power, it cannot handle large-scale computational problems. Sensor nodes have limited individual capabilities, but work together to perform specific tasks and create an amplified outlook of the physical world. It is broadly adopted due to the robustness, ease of remote deployment, and extensive collection of information useful for applications.

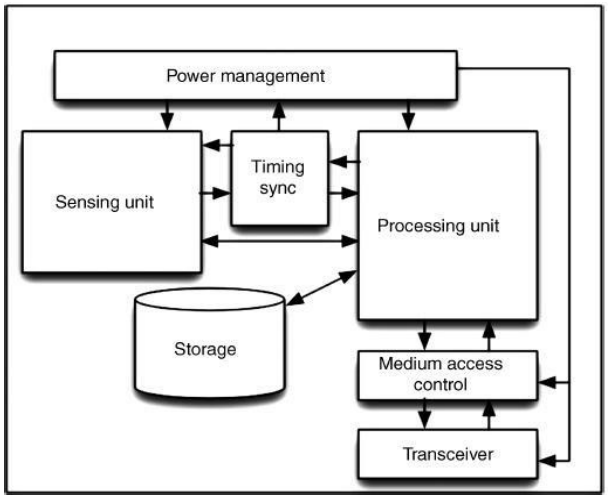


Fig 1.Architecture of a sensor node

Journal of Current Research in Engineering and Science
Bi-Annual Online Journal (ISSN : 2581 - 611X)
Volume7-Issue1, January 2024
Paper: 10

Most applications belongs among this four classes:collection of Environmental data, safety monitor, node tracking, hybrid networks. Various applications include target field mapping, intrusion detection system, weather monitoring syst, security, and tactical surveillance. Noticing of environmental conditions like temperature, motion, sound and light, or the presence of certain objects, and inventory and disaster management. Clustering is a method of dividing WSNs within groups or subparts. The reason for spliting the WSN into clusters is to expand its extensibility and strength. It is highly efficient and consumes more power. Clusters also increase efficiency by managing communication bandwidth through reuse. Cluster systems have several phenomena that differentiate them from the remaining. B. Load balancing and fault toleration, improved conection, and maximized durability. Clustering is therefore a good method for extending network lifespan and managing the resources efficiently.

II. LITERATURE SURVEY

[1] Gracelin Sheena,Snehalatha To accomplish network slicing and data aggregation in WSN, a new EENS-DA model is needed. The EENS-DA model has effectively and plainly issued the required asset to each individual request. Additionally, the EENS-DA model has used methods for tree-based data aggregation and Conv-LSTM-based network slicing. The EENS-DA method better the correctness, efficacy, and privacy protection in network when it comes to data slicing.

[2] Ketki Ram BhakareVarious methods are available to order sensor nodes in wireless communication network and to route the sensed data of the field sensors to a distant base station. Increasing the lifespan of the sensor nodes is the main challenge facing the sensor network. The suggested method operates productively and lowers the energy usage of sensor nodes.

[3] Muattaz ElaneiziThe bottleneck phenomenon in cluster-based sensor networks is discussed in this thesis along with specific research that has been done to increase the network lifespan of wireless sensor networks. On the basis of our shaping of the additional load of the sensor nodes that have straight contact with base station, a transmission tuning algorithm for cluster-based WSNs is suggested. With this approach, a wireless sensor network maintains operation with the fewest amount of active nodes possible, lengthening of the system's useful life.

[4]SaravanakumarInitially, thoroughly analyze fundamental distributed clustering routing protocol LEACH, where we propose a fresh routing protocol and data grouping technique where sensor nodes shape cluster and cluster-head is chosen basedon remaining energy of single node calculation without re-clustering, and node organising scheme is taken in every cluster of WSNs.

[5] Xin Liu , Yunsheng LiuIn this paper, we address energy issues with a real-time routing protocol LNA that is currently in use. The Energy-efficient Real-Time Routingprotocol, which helps energy-efficient real-time data pass on in wireless sensor networks, is a protocol we suggest based on LNA. By reducing the maximum Lateness of all messages, ERTR maximizes the amount of messages that can arrive at the BS in each message have its own due date.

III. EXISTING SYSTEM

The Internet has changed the world a compact place. Companies throughout world are no longer just competing with local competitors to offer different services, they are now competing on a global scale. To fill this void, we provide a way to calculate and foresee WS conduct regarding react time using HMMs. The dependability of systems based on Service Oriented Architecture relies massively on different technologies such as web services, computing environments (CPU, disk, network), and unpredictable Internet. In existing schemes, each node checks the avoidance time associated with sending clustering setup messages by calculating its own threshold. The larger the threshold, the better the cluster formation situation and the shorter the avoidance time. This method distributes the cluster heads very evenly and effectively, but if the avoidance time for each node is too short or the communication connection is not stable enough, unwanted nodes will vote for cluster heads. If the avoidance time for each node is too long, the routing convergence time will also be long.

IV. PROPOSED SYSTEM

This algorithm is an iterative process that preserve the population of possible results for a particular problem. MANET distributes the nodes. Some nodes are enhanced positioned and can be taken the top nodes to

Journal of Current Research in Engineering and Science
Bi-Annual Online Journal (ISSN : 2581 - 611X)
Volume7-Issue1, January 2024
Paper: 10

reach the goal. Begin with a randomly generated population of solutions, known as chromosomes, and apply a fitness function to determine fitness. If the answer is fine, problem is finished, otherwise solution is advanced to give a finer result by executing. GA performance such as choosing, travers and variation.

Eventually, just the powerful or most fit knot get through and remaining are discarded.GA was used to resolve the cluster head selection problem in a dynamic MANET environment. The cluster shaping process ultimately guide to a two-level hierarchy with cluster head (CH) nodes forming upper position and cluster member nodes forming the lower position. Sensor nodes occasionally send data to their parallel CH nodes.

A Cluster Head node aggregates the data then sends it to BS either straightly or via in between communication with remaining CH nodes. But all CH nodes transmit time data over longer spaces than usual nodes, which inevitably consumes power at a higher rate. A common solution for balancing power consumption across all network nodes is to periodically re-elect a recent CH in each cluster (this allows CHs to be re-elected across all nodes over time). rotate roles).

BS is the information processing point for data obtained from sensor nodes and in which end users access data. This is normally considered fixed and far away from the sensor node. A CH node literally acts as a gateway in between the sensor node and the BS. As mentioned earlier, the work of every CH is to carry out functions familiar to every nodes in the cluster, such as collecting data prior to sending it to the BS. In a sense, CH is the sink of cluster nodes and BS is the sink of CH. Besides, this formation formed in between sensor nodes, sinks (CHs) and BSs could be duplicated as much as needed, and more than one layers of multi-level cluster hierarchy (WSN) You can create layers of Communication between members of the cluster is done in such a way that all nodes communicate with CH, which aggregates and passes on data to the sink. Because of the energy, CH is used more frequently than remaining nodes. This makes it more likely to die sooner than other nodes as their energy is fully used. Therefore, CH jobs must be revolve among the cluster members to extend the life span of the nodes of the cluster. This can be done using various parameters. For example, if based on distance, the node nearest to the sink is chosen as CH, so the least power needed to transmit. If based on energy, the node with the highest energy is chosen as CH. This reduces node load by creating another node with higher power than CH when the node's power drops below a certain level.

The WSN simulation is displayed in cluster environment, and the nodes are arranged in a flat terrain and addressed hierarchically. In a plain topography co-ordinates of nodes are in the shape (x, y, 0). A node is added to a specific cluster if it is located within the limits of the cluster for which it is designated. Clusters can be distinguished visually by their corresponding hues. An end node communicates with its CH in a hierarchical addressing scheme as normal, and all CHs transmit with BS, which attach the WSN to the Internet. Therefore, every nodes are originally divided into clusters based on their positions.

The end nodes and their corresponding CH are connected, and each CH piles the data and reports it to the BS later a predetermined amount of time. Sensor points are constantly changing. They travel within or between clusters. The only restriction is that each time a node switches clusters, it must be aware of its recent CH. It is done based on the node's placement within the cluster, as previously stated. It is called "Clustering of the nodes" and it’s over after each limited time interval. Think about a unique circumstance where the CH of one cluster transfers to another.

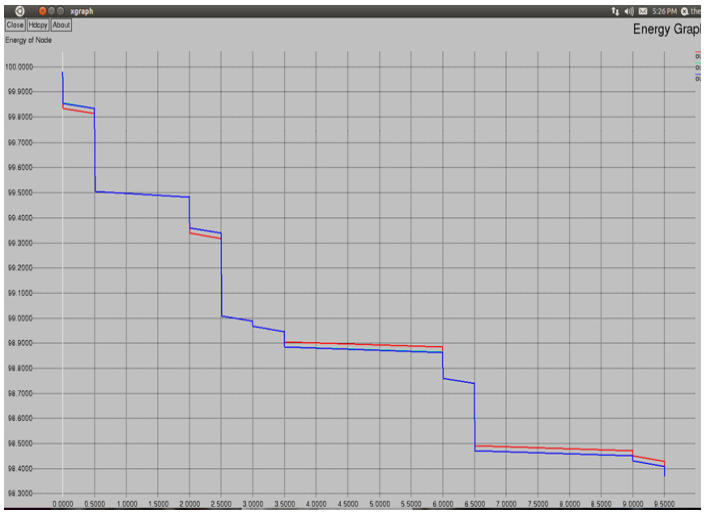
V.PERFOMANCE EVALUATION

There are four clusters in this scenario, based on distance all will elect their own cluster head based on distance.

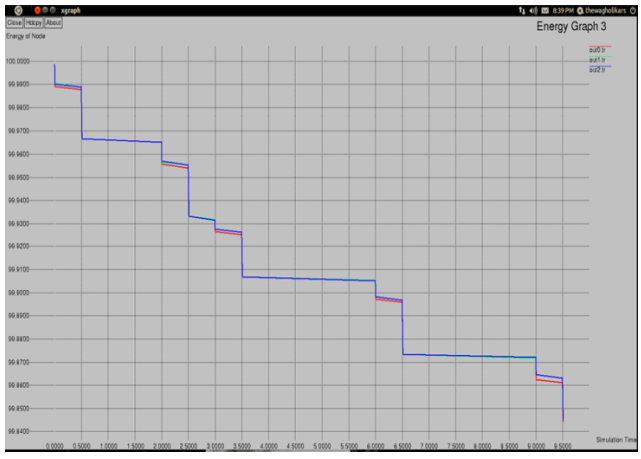
The cluster node nearest to BS is selected as CH. There are roughly5 nodes working under one CH. The data is

Journal of Current Research in Engineering and Science
Bi-Annual Online Journal (ISSN : 2581 - 611X)
Volume7-Issue1, January 2024
Paper: 10

sent to CH from nodes and CH will forward the data to BS. It is known that contrast to another nodes, the CH will consume most of the energy. Xgraph for Scenario 1 is Energy Vs Time graph which shows energy of 3 nodes during the lifetime. The blue coloured line depicts the energy level of CH. It is known that the CH consumes maximum energy. As the amount of nodes below one CH increase, the CH will consume more energy.



In the XGRAPH of Scenario 2 is Energy Vs Time graph from cluster 1 for 3 nodes. The blue line depicts energy level of cluster head. Therefore, energy needed for CH rises and the node may fade faster compared to other nodes.CH in Scenario 2 requires more energy compared to scenario 1.



Scenario 3 The algorithm for CH re-election is implemented. After sometime the CH is re-elected on the basis of its energy. The graph depicts energy levels of those3 nodes which become CH at certain point of time throughout simulation. This Graph depicts that these nodes need less energy than node in Scenario 2. we can conclude that re-election algorithm can be proven useful in energy conservation.

V. CONCLUSION

There are many uses for WSN, and it is crucial for data collection in these applications. However, when dealing with WSN, its limitations must also be considered. We gained knowledge of the internal structure, characteristics, and constraints of sensor nodes, among other things.

Our goal is to address the issue of sensor node battery limitation effectively, though. The findings of the implemented scenarios show that the reselection of CH based on node energy contributes to a longer node life time. We were able to mimic energy conservation in sensor nodes by using an energy-efficient algorithm for cluster head reselection. In addition, we succeeded in managing sensor node movement within and between clusters, grid-based clustering, and distance-based CH selection. Effective security measures are becoming more and more necessary as wireless sensing networks expand. These security issues must be taken into account from the start of system design since sensor networks can communicate with private data and function in hostile, neglected environments. However, sensor network security poses distinct difficulties than conventional network/computer security because of their built-in resource and computational constraints.

REFERENCES

[1] “An Energy efficient Network Slicing with Data aggregation way for WSN”, Gracelin Sheena & Snehalatha, 2021.

[2] “An Energy-efficient Grid based Clustering Topology for a WSN”, Ketki Ram Bhakare, Chandrapur, India, February 2012.

[3] “Prolonging Network Lifespan of Clustered-WSN”,Muattaz Elaneizi, May 2008.

[4] “An energy efficient cluster based node scheduling pact for Wireless sensor networks”, Saravanakumar;2010.

[5] “Energy-Efficient Real time Routing in WSN”, Xin Liu; Tian Bai, 2009.