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An Energy Efficient Greedy Approach for Multihop Routing to Sink in WSN

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ABSTRACT: The WSN is a class of network, evolved in the past period as a result of the technological advancements in the embedded control and wireless communication technology. In a WSN, the individual nodes that are able to interact with their environment by sensing or controlling physical parameters often have to combine to complete their tasks. Mainly a single node is incapable of doing this, and they use wireless communication to enable this collaboration. The WSNs are powerful in that they are able to support a variety of real world applications. Current research have considered greedy based approach. In which two steps are taken. One is identifying the feasible path. second is optimum path. This optimum path will be having less time and energy to transfer the data. In previous research they have taken LSAA based technique. It is assumption based technique and also considers two tier architecture. In LSAA based technique approximate path will be identified. Rather than the optimum path. So greedy approach is better approach to consider. Have shown better results in both the parameters like time and energy.

KEYWORDS: WSN, Base station, Mobile sink, Static sink, Energy maximization.

I. INTRODUCTION

Wireless sensor networks (WSNs) are most important technology in this century. WSN composed of various nodes called as sensors. WSN is a network in which nodes are deployed at physical area of interest or very close to that area for monitoring that particular area. The locations of sensors need not to be pre-planned. Embedded microprocessors and radio transceivers are combined with sensors nodes. Sensor nodes are used for sensing the data, processing the data and for communication purpose. These deployed sensors are connected with wireless connection. Sensors sense the information of particular area in which they are deployed and forward that information to the common point for further processing on that information. Sensor nodes are used for sensing the data, processing the data and for communication purpose. These deployed sensors are connected with wireless link. Sensors sense the information of particular area in which they are deployed and forward that information to the common point for further processing on that information. Nowadays, WSN become very useful infrastructure to extract the data from environment and also to monitor environmental parameters [*Bahmanyar Esfandiari Far et al., 2014*]. WSN is a platform which is provided to sensor nodes for sensing and monitoring a particular region. There are many applications of WSN like hospitality, environmental monitoring, and homeland security [*Abdul Wahid Ali et al., 2015*].

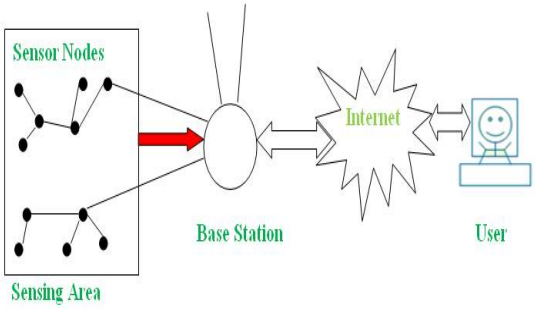

Figure 1.1 A general layout of a wireless sensor network

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Sensor Node Structure:
There are four basic components of sensing node:
1)Sensing-unit
2) Transceiver
3)Processing unit
4) Power unit
Sensing unit consist of one or more sensors and analog to digital converter. When the sensing task is completed the raw data usually in analogous form, which is not understandable by the computer. So ADC converts analog data to digital format. These digital signals then delivered to processing unit. The processing unit is composed of a micro-controller or micro-processor having memory which gives excellent control to sensor node. In local memory the resultant data is cached and according to turn the sensor node transmit the data. Transceiver unit join the node to the network. The power unit consists of a battery for power supply used to operate all other module of network. As the battery is main source of power in sensor node and the secondary supply of power can be harvest from solar panels which can be added to node, it is depend upon the environment in which sensor will deployed [*Jennifer Yick et al., 2008*]. Depending upon the application sensor node consists additional components like global positioning system (GPS) for finding the location information for network. A motor is used for providing movement to sensor node. All these modules should be assembled into a small module with low power consumption and low production cost which is further processed by processing unit.

II. LITERATURE SURVEY

Chaofan Ma *et al. (2015)* In two-tiered Wireless Sensor Networks (WSNs) relay node placement considering resource constraints and high overhead of the relay nodes plays a key role in extending the network lifetime. Therefore, approaches that support fewer relay nodes are desired to cover the WSNs. In this paper, we formulate the relay node placement problem as a Geometric Disc Covering (GDC) problem, and propose a novel local search approximation algorithm (LSAA) to solve the GDC problem. In the proposed LSAA,
Punyasha Chatterjee et al. (2015) proposed a technique for deployment of multi sink in the network. A given bound D is taken for cluster diameter and accordingly a distributed greedy cluster formation algorithm is used to construct predefined number of clusters in the network. The lifetime of network is inversely proportional to diameter of cluster and cost depends upon number of clusters that is sinks. With this approach the cluster diameter less than bound D and the delay of network is reduced.
Francesco Restuccia et al. (2015) proposed a technique for optimizing network lifetime of WSN where the sink mobility is uncontrollable and mobile sinks are randomly deployed with QOS condition. Swarm Intelligence Based Sensor Selection Algorithm optimize lifetime of network and encounters the defined QOS constraint. With the help of SISSA bounds for energy utilization, number of message exchanged and convergence time are derived. SISSA is scalable as well as energy efficient.

III. RESULTS AND DISCUSSION

We consider a network of nodes placing within a 1000m x 1000m area. The performance of our algorithm is evaluated by using the following parameter values
Performance Metrics
Three important performance metrics are evaluated:
Energy Consumed
The energy consumed is the total energy required to transfer the data from source node to the destination node such that energy is battery consumed.
Time Taken
This includes all possible delays caused by buffering during route discovery latency, queuing at the interface queue, retransmission delays at the MAC, and propagation and transfer times.

$$D = (T_r - T_s)$$

Where T_r is receive Time and T_s is sent Time
2. Analysis done using Trace Analyzer
Awk scripts i.e..awk files trace analyzer is used to evaluate trace outputs from simulation. This facet represents that

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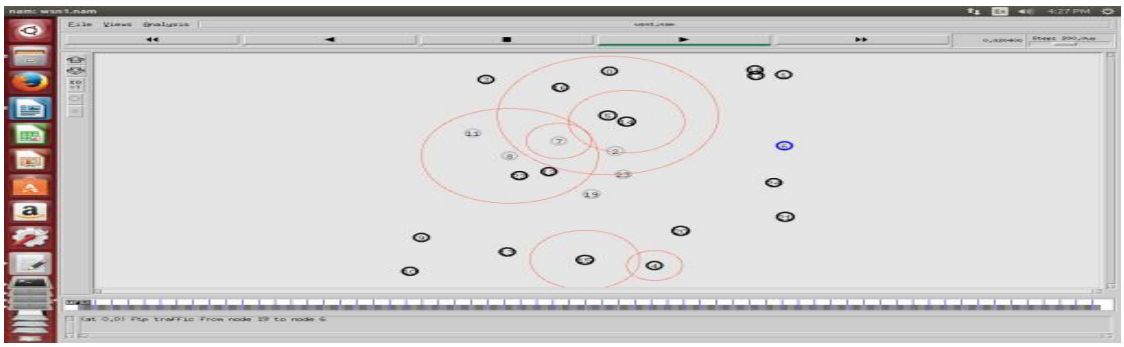
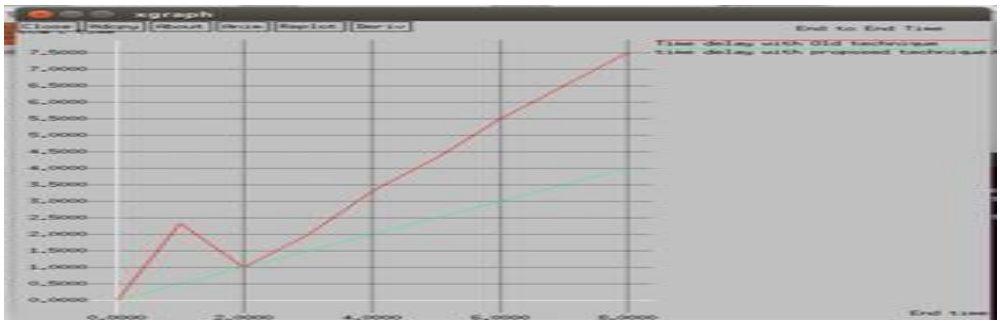
how the effective performance parameters have been analyzed to simulate the protocols.
When files are evaluated using this trace analyzer then an output .xgr file is produced which results in the creation of graphs i.e. xgraphs.

Snapshot of Nam animation



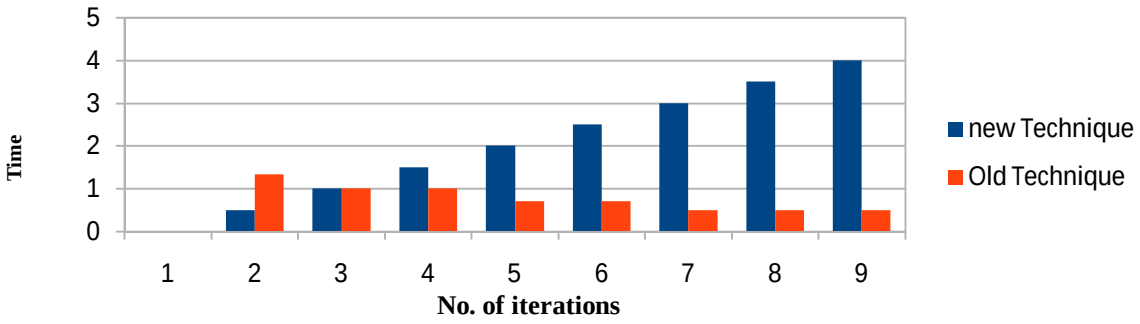
This snapshot denotes 25 wsn nodes. Each node is working stationary. Each time wireless sensor node has to send the data to the base node which it has collected in specific time interval. In our approach sender will identify the set cover. And identify the intermediate relay node to connect to the destination. Each time the relay nodes will be identified or local search with which minimum time and energy should be destroyed. In result increase the life time of the node.

Snap shot of Time Graph



in this snap shot green line represents the line for new proposed technique. And red line show the time delay for old technique which identify the set cover on each occasion and performs the local search. It will take more time for sending the data from source to destination.

Graph for comparison of LSAA and Energy Technique



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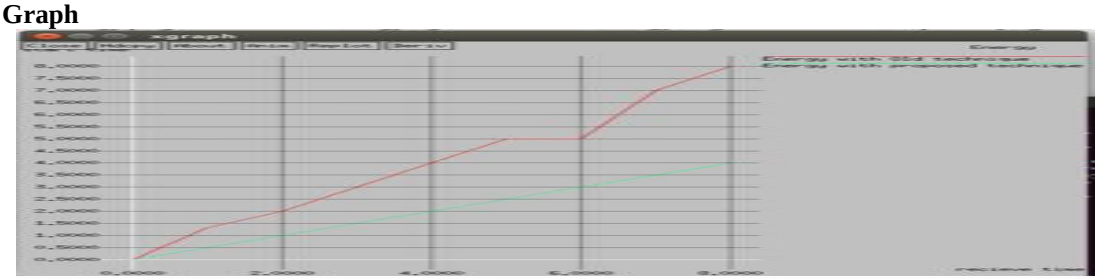
Energy Graph

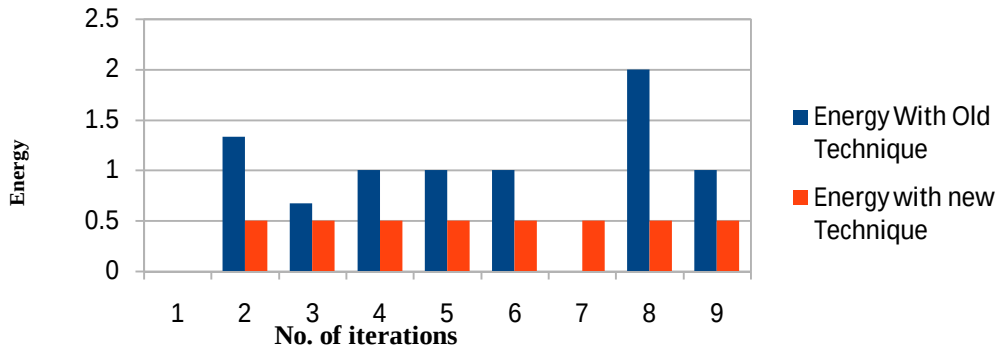


In this snap shot green line shows the energy for new proposed technique and red line show the energy dissipation for old technique. It shows energy required for the old technique to identify the relay node is more compared to new proposed technique.

Table of Energy of old and new Technique

Time	Energy with LSAA technique	Energy with Greedy technique
0ms	0	0
1000ms	1.33	0.5
2000ms	2	1
3000ms	3	1.5
4000ms	4	2
5000ms	5	2.5
6000ms	5	3
7000ms	7	3.5
8000ms	8	4

Graph for Energy of LSAA and Greedy Technique:



Percentage Result Improvement for Energy(j)

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Energy has shown improvement of 44% than the previous technique. Time Units are (per second)

Average Energy Consumed with LSAA Technique	Average Energy Consumed with Greedy Technique
0.88888888	0.44444

Percentage Result Improvement for Time

Time has shown 50% improvement in results than the previous technique.

Average Time Consumed with LSAA Technique	Average Time Consumed with Greedy Technique
2	0.69

IV. CONCLUSION

In current research we have considered greedy based approach. In which two steps are taken. One is identifying the feasible path. second is optimum path. This optimum path will be having less time and energy to transfer the data. In previous research they have taken LSAA based technique. It is assumption based technique and also considers two tier architecture. In LSAA based technique approximate path will be identified. Rather than the optimum path. So greedy approach is better approach to consider. Have shown better results in both the parameters like time and energy.

V. FUTURE WORK

In current research greedy based approach has shown the improvement over to the previous LSAA based results. In future there can be any other optimum technique like PSO or ABC etc. can be taken. Which can be compared with greedy approach

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