# Design Analyze and Implement Wireless Sensor Network Performance

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**Abstract -** *Wireless sensor networks (WSN), sometimes called wireless sensor and actuator networks (WSAN) are spatially distributed autonomous sensors to monitor physical or environmental conditions, such as temperature, sound, pressure, etc. and to cooperatively pass their data through the network to a main location. The more modern networks are bi-directional, also enabling control of sensor activity. The development of wireless sensor networks was motivated by military applications such as battlefield such as industrial process monitoring and control, machine health monitoring, and so on. These Sensor Nodes communicate with each other through various protocols. The problem of the conventional method is, during gathering of sensed data each node transmits its sensed data directly to the base station for which it will deplete its power quickly. In hierarchical structure higher energy nodes are used to aggregate and send the information whereas low energy nodes are used to sense the data. Enhanced PEGASIS is an energy efficient routing protocol which improves network lifetime and calculate distance between the nodes Example- LEACH, TEEN, APTEEN. Parameters on which Enhanced PEGASIS are node lifetime, energy consumption/dissipation, residual energy and distance between the nodes. Area monitoring is a common application of WSNs. In area monitoring, the WSN is deployed over a region where some phenomenon is to be monitored. A military example is the use of sensors detects enemy intrusion; a civilian example is the geo-fencing of gas or oil pipelines the medical applications can be of two types: wearable and implanted. Wearable devices are used on the body surface of a human or just at close proximity of the user. The implantable medical devices are those that are inserted inside human body.*

***Key Words*: APTEEN, Bi-directional, Clustering, LEACH, TEEN, WSAN**

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## 1. INTRODUCTION

The Wireless Sensor Network (WSN), a specialized network, consists of two main components: Sensor Nodes and Base Station. The nodes monitor various environmental conditions such as temperature, pressure, sound and share (wirelessly) the information obtained with either the base station or amongst various nodes. WSN is foreseen to be appropriate solutions to many applications in fields of defense, industry monitoring, health monitoring, etc.

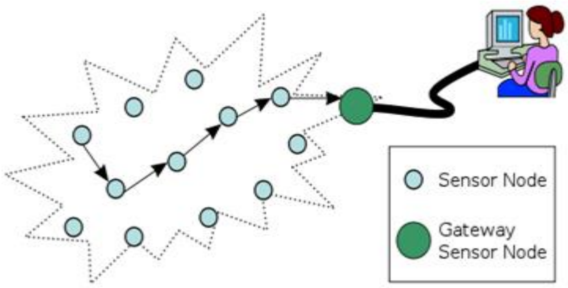


Fig 1.1

A military example is the use of sensors detect enemy intrusion; a civilian example is the geo-fencing of gas or oil pipelines The medical applications can be of two types: wearable and implanted. Wearable devices are used on the body surface of a human or just at close proximity of the user. The implantable medical devices are those that are inserted inside human body. There are many other applications too e.g. 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. There are many applications in monitoring environmental parameters, examples of which are given below. They share the extra challenges of harsh environments and reduced power supply.

## 1.1 EXISTING SYSTEM

In the previous system the PEGASIS (Power-Efficient Gathering in Sensor Information System), is near optimal chain-based protocol for extending the lifetime of network. In PEGASIS, each node communicates only with a close neighbors, performing a chain, elect a leader from the chain who collects the data from the neighbors to be transmitted to the base station. As a result the average energy spend by each node per round is reduced and to lower the bandwidth requirement. By using certain algorithm we can propose the shortest path of transmission of data to the base station. As a result less power consumption can be achieved to increase efficiency and life time of the network.

Emphasis has been done on the cluster-based routing protocols in wireless sensor networks. Based on observations, it has been concluded that in PEGASIS protocol the cluster head election procedure depends on residual energy and threshold value. Once the cluster head selection process is completed then the data transmission procedure takes place. Primarily, the PEGASIS protocol is very much useful in disaster management field.

## 1.2 PROPOSED SYSTEM

### TECHNIQUE

In our protocol a network field consist of base station, selection of chain leader and cluster head. Based on residual energy and distance chain leader and cluster head are elected.

### INITIALIZATION PHASE

The 'N' nodes in the network and are denoted by numbers starting from 1 to N. The nodes are at first distributed randomly in the play field, The destination node/sink node initiate session by broadcasting hello packet to all node in the domain, the hello packet contains details of base station such as the coordinate values(x,y) to declare its base station location and distance between each node in the network, all nodes which are in the range and alive will receive the hello packet, so the coordinate of the sender(sink node) will entered to the routing entry corresponding to that node. And each node will memorize the coordinates of the BS.

### CHAIN LEADER SELECTION PHASE

After the event detection, the node which is more closed to the particular event become Chain leader at a time, Then the Chain leader node will broadcast the interest packet to all nodes which are not beyond its position from the base station, the interest packet request every received node to declare its node id, location and residue energy value, those alive node will respond back the packet to the Chain leader and un alive node will be noted as the dead node. Then the source node will be compare the its residue energy value with the rest, and the node with high residue will be selected as the leader node at a time

### CHAIN HEAD SELECTION PHASE

The data gathering process begins once the Cluster head selected and the nodes becoming the starting point for the chain formation. In every data gathering cycle each node in the network forms a data packet of its own. Chain formation is a bottom-top approach.

### DATA TRANSMISSION PHASE

For every data gathering cycle a cluster head is elected among all the nodes within the shortest path to Cluster head, during a data gathering cycle each node in the network receives a data packet from its neighboring node fuses it with its own data packet and transmits it to its other neighbor in the selected path, until it reach the Cluster head node which will transmit to the Chain leader which will further transmit it to base station and complete the cycle.

### ANALYSIS

Evaluating performance and observing the number of node involve during the chain formation through simulation result obtain .Simulation are conducted using network simulator frame work with more than x nodes deployed on the network field, the wireless channel is used because the nodes deployed on the network are communicating based on the wirelessly based on the distance and the transmission range, residual energy.

## 2. LITERATURE

Several clustering protocols that have been researched and implemented by other researchers. For detailed understanding on their methods and techniques, refer to the reference page at the end of this thesis report to search for the papers or text or even websites published.

**Energy-Efficient Communication Protocol for wireless Micro-sensor Networks**

In communication protocol, which can have significant impact on the overall energy dissipation of these networks.Based on our finding that the conventional protocol of direct transmission, minimum transmission energy, multihop routing and static clustering may not be optimal for sensor network. The research propose leach, a clustering based protocol that utilizes randomized rotation of local cluster base stations (clusterhead) to evenly distribute the energy load among the sensors in the network.

Drawback:
All nodes die at same time and Transmission nodes used to base station is more.

**An Application-Specific Protocol Architecture for Wireless Micro sensor Networks**

In the paper, authors have developed and analyzed low-energy adaptive clustering hierarchy (LEACH), a protocol architecture for micro sensor networks that combines the

ideas of energy-efficient cluster-based routing and media access together with application-specific data aggregation to achieve good performance in terms of system lifetime, latency, and application-perceived quality.
The results show that LEACH can improve system lifetime by an order of magnitude compared with general-purpose multihop approaches

Drawback:
Increases inter-cluster interference and criteria for clustering

**PEGASIS: Power-Efficient Gathering in Sensor Information Systems**
PEGASIS stands for power-efficient gathering in sensor information system. This is a chain based protocol that provide improvement aver leach algorithm. Pegasis protocol requires formation of chain which is achieved in two steps:-

- Chain construction
- Gathering data

Drawback:
Excessive delay, Bottleneck application and Equal level of energy

**Energy Management in wireless sensor network using PEGASIS**
In this research paper, PEGASIS (Power-Efficient Gathering in Sensor Information System), a near optimal chain-based protocol for extending the lifetime of network. In PEGASIS, each node communicates only with a close neighbor, performing a chain, elect a leader from the chain who collects the data from the neighbors to be transmitted to the base station. As a result the average energy spend by each node per round is reduced and to lower the bandwidth requirement. By using certain algorithm we can propose the shortest path of transmission of data to the base station. As a result less power consumption can be achieved to increase efficiency and life time of the network.

Drawback:
Heterogeneous network and Hybrid network analysis.

## 03. CONCLUSIONS

Wireless Sensor Networks are categorized into proactive and reactive sensor networks. In Proactive sensor networks, nodes at regular intervals switch on their sensors and transmitters, sense the atmosphere and transmit the data on hand with them. Wireless Sensor Network nodes are battery supplied which were implemented to carry out a specific assignment for a comprehensive period of time may be years. If WSNs nodes are more powerful or mains supplied devices in the surroundings, it is useful to utilize their computation and communication resources for complex algorithms .The purpose of this project is to eliminate the overhead of dynamic cluster formation, limiting the number of transmission to Base Station (BS) per round. As a result less power consumption can be achieved to increase efficiency, life time of the network and useful in disaster management field.

- To apply clustering algorithm
- To be energy aware and location aware
- To do the computations well in advance

Result Parameters

**Energy consumption**

In the below figure, 10 nodes scenario is considered for studying the energy consumption. On x axis there are number of nodes and on y axis are energy consumption in joules.

Energy consumption = Final energy – Initial energy (joules)

Energy consumption is the energy calculated before transmission of packets and after the end of simulation.

As the number of nodes increases energy also increases respectively

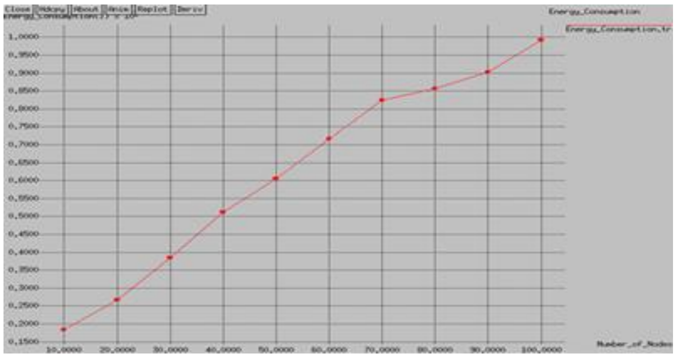

Fig 1.2

**Network lifetime**

In the below figure, 10 nodes scenario is considered for studying the network lifetime. On x axis there are number of nodes and on y axis are network lifetime in seconds.

Network lifetime is directly proportional to Energy consumption

Network lifetime is time till the nodes remains active for a specific simulation time.

As the number of nodes increases the time increases which leads to increase in network lifetime

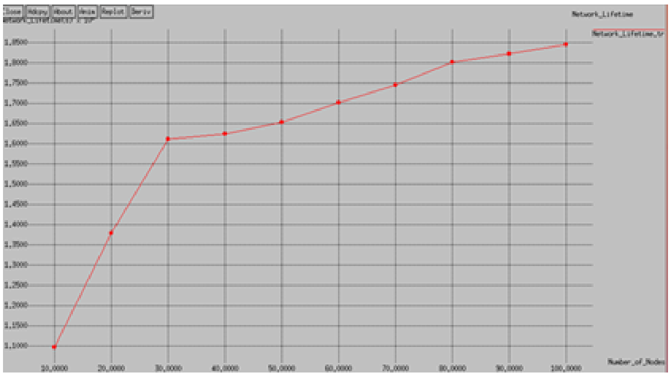

Fig 1.3

**Packet delivery ratio**

In the above figure, 10 nodes scenario is considered for studying the packet delivery ratio . On x axis there are number of nodes and on y axis packet delivery ratio in percentage.

Packet delivery ratio = number of packets delivered / total number of packets * 100 (%)

Packet delivery ratio is the number of packets delivered within a specific transmission time.

As the number of nodes increases packet delivery ratio also increases respectively.

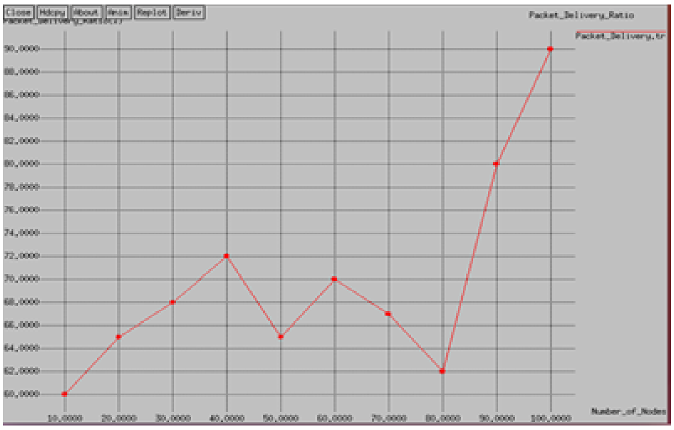

Fig 1.4

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