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Energy Efficient Protocols Used in Wireless Sensor Networks

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Abstract- Wireless Sensor Networks play an important role in sensor communication because they have the ability to real time monitoring and controlling the physical environment from remote locations. Though a networked sensor has the advantage to improve the accuracy of information obtained from the network, communicating information between the networked sensors consumes more energy than processing the same. These networks are unattended after deployment sensor nodes are battery operated often limiting need energy. This demands contemporary architecture approach and communication algorithms to utilize the limited energy source efficiently in order to extend the network lifetime. There is a need for designing proper energy efficient communication protocols to increase the lifetime of the network greatly.

Key word: **WNS, LEACH, FZ-LEACH, MRP.**

1 INTRODUCTION

A Wireless Sensor Network of spatially distributed autonomous sensors to guide rail or concurrent conditions, such as heat, robust, compressing. And to collectively pass their data through the network to a major neighborhood. Effective extra current structures are bidirectional also permissive control of sensor life. The development of wireless sensor networks was prompted by military uses such as battlefields and monitoring, but today such networks are used in many industrial and consumer applications.

2 MODELING OF SENSOR NODE

In sensor networks, the components of the sensors completely depend on the purpose of the deployment. A tiny electronic infrastructure comprising of a sensing unit, computing unit and communication elements along with a network administrative intelligence to work in a given environment is termed as a sensor node.

Even though the miniaturization process and battery energy are the major design goals of the WSNs, both hardware modeling and software modeling are generally included in designing the sensor nodes.

A Hardware Modeling

A basic sensor node comprises five main hardware components Controller, Memory, Sensors and actuators, Transceiver and Power supply unit. Apart from the listed essential parameters needed for a WSN.

The Location finding System, Power generation system, Mobilizer and Actuator are found to be optional.

The general hardware architecture of the sensor node is shown in Figure 1.2

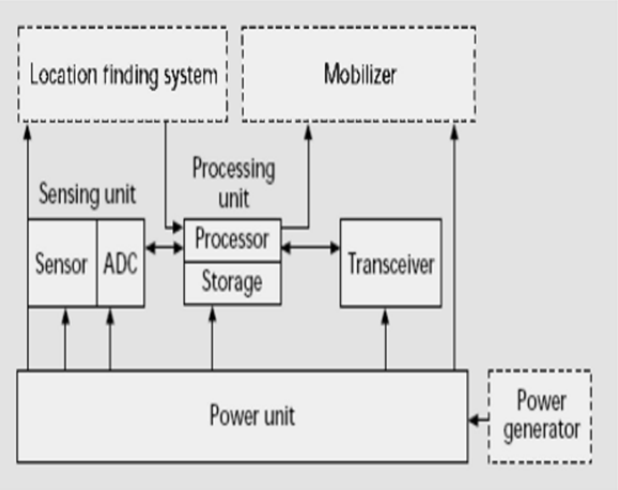


Figure 1.1 Sensor node architecture

B Software Modeling

There are five basic software subsystems present in WSN: Operating system (OS), sensor driver, communication processor, communication driver and data processor.

Applications

Due to the advancement in technology in the past decade such as microelectronics, sensing, analog and digital signal processing, wireless communications and networking, the wireless sensor network technology has a significant impact in the twenty-first century.

Usage of multiple sensors deployed in an ad-hoc manner provides more information and awareness about the environment and its working for the user at the other end. That is, WSNs enable the reliable monitoring of a variety of environments such as applications that include home security, machine failure diagnosis, chemical, biological detection, medical monitoring, and surveillance. Few other applications are ranging from environmental sensing to vehicle tracking, from perimeter security to inventory management, and from habitat monitoring to battlefield management. Furthermore, WSNs are also deployed outdoors in large sensor fields to detect and control the spread of wildfires, to support precision agriculture and to detect structural faults. Few of these applications are field experiments, few are commercial products, and few are advanced research projects that use sensor networks as a tool.

3 PROBLEM STATEMENTS

The energy consumed for transmission is much higher than that for data processing. Hence; there is a need for designing proper energy efficient communication protocols to increase the lifetime of the network greatly. While there are many ways in which protocols are beneficial to the applications, quality of service in WSNs can be evaluated by the metrics such as Energy efficiency, Latency, Security, Fault tolerance and Scalability and flexibility.

4 EXISTING METHOD COMPARISON

Low Energy Adaptive Clustering Hierarchy is a structure of sensor network and used for delivery packets end-user wants to senses remotely monitors the environment. In this method the data from the individual nodes that are sent to a base station that is located far from the sensor network through which the end-user can access the data.

- 100's - 1000's of nodes
- Maximize distance coverage
- Use uniform, battery-operated nodes

This protocol such as direct transmission, minimum transmission energy, multi-hop routing, and clustering all have drawbacks that don't allow them to achieve all the desirable properties. LEACH includes distributed cluster formation, local processing to reduce global communication, and randomized rotation of the cluster-heads.

Together, these features allow LEACH to achieve the desired properties. Initial simulations show that LEACH is an energy-efficient protocol that extends system lifetime.

LEACH

The LEACH protocols are used in wireless sensor network and its cluster requires lower energy consumption and it maintains clusters in order to improve the lifetime. LEACH is a hierarchical protocol in which most nodes transmit to cluster heads, and the cluster heads aggregate and compress the data and forward it to the base station.

The node is a stochastic algorithm at each round to determine whether it will become a cluster head in this round. LEACH assumes that each node has a radio powerful enough to directly reach the base station or the nearest cluster head, but that using this radio at full power all the time would waste energy.

Properties:

- Cluster based
- Random cluster head selection each round with rotation. Or cluster head selection based on sensor having highest energy
- Cluster membership adaptive
- Data aggregation at cluster head
- Cluster head communicates directly with a sink or user

5. PROPOSED WORK

In our proposed system used the wireless ad hoc sensor networks. The wireless sensor network commonly used one Base Station. We are using an energy efficient clustering algorithm the source node is to send all data into the base station (BS). BS only to identify the correct destination node also sends data to the network. In our network the groups of node are interconnected. The interconnected nodes are called the clustered node. So it's using the clustering routing protocol.

Then Each Clustering network has one cluster head node. The cluster head node is to be collecting information in to BS. If any internal or external attack occurs means the BS and clustering head to stop the data transmission. If source to a base station at the time of data transmission any attack will occur means is called internal attack. Base station to destination during the data transmission any error or attack will occur means is called external attack. Then, using the clustering routing protocol to choose or find another path for data transmission. Using this path without packet loss all data will send into the correct destination.

Most clustering schemes in the literature fall into the following three categories:

- Identifier-based clustering,
- Topology-based clustering, and
- Energy-based clustering.

The factor of scalability is considered important while designing a sensor network.

Single gateway architecture is not scalable when the number of sensors increases and is spread over a large area since usually sensor nodes cannot communicate to a very large distance. Moreover, in single tier architecture, as the node density increases, there is more chance that gateway is overloaded. This overloading can cause inefficient communication and large latency. To cope with these problems cluster-based or hierarchical routing is utilized in wireless sensor networks to perform energy efficient routing. There are different types of protocols used in wireless sensor networks.

- LEACH
- V-LEACH
- FZ-LEACH

FZ-LEACH

Far- Zone (FZ) proposed is a group of sensor nodes, which are placed at locations where their energies are lesser than a threshold. The FZ algorithm can be divided into two parts.

First parts include CH selection and cluster formation algorithm. The second part includes formation of Far Zone. In FZ CH are selected randomly. A zone is formed with the cluster head based on Minimum Reachability Power (MRP) known as FZ after the selection of CH. The criterion for arising of FZ is only when MRP is less than Average MRP. The formation of FZ is done only after the formation of clusters. All nodes in the FZ can communicate through Zone header rather than CH. Then the CH passes the data to the base station. In WSN, the situation arises for large size clusters and hence FZ-LEACH is important to utilize the less power.

MTE

In Minimum Transmission Energy (MTE) each sensor mote sends its data to the nearest sensor node. Each sensor mote will have n transmits and n-receives. This process of sending data to nearest node will be repeated till attaining the desalinated Base station (BS). Thus a sensor node nearest to the BS communicates n times and receives n-l times for the node located at distance ill. If energy dissipated in a nearest node reaches threshold, then the

node is considered as dead. Thus the node near to BS making continuous process of transmitting data soon leads to death. The nearest node to the BS acts as a router for the other sensor nodes. The comparison graph in this paper shows that nodes alive for every round decrease.

Working Model

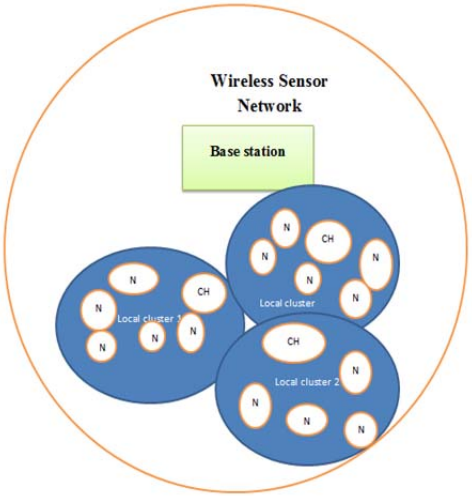


Figure 5.1 WSN architecture

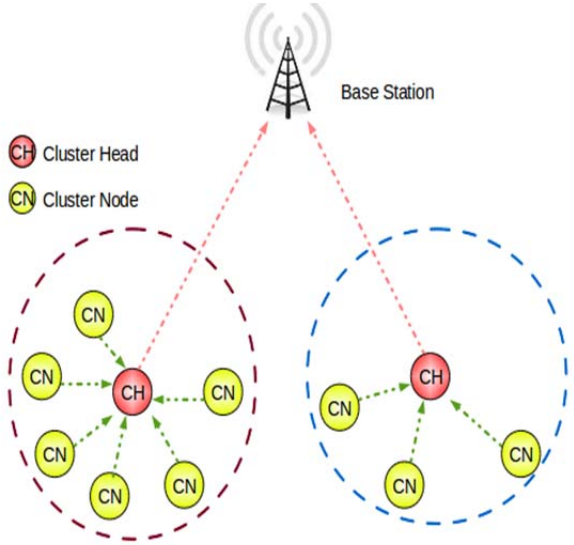
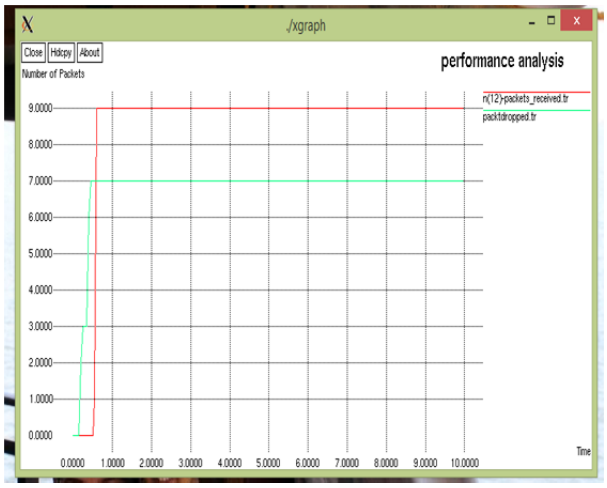


Figure 5.2.1 Cluster architecture

6 PERFORMANCES



7 CONCLUSIONS

Sensor networks area has received increasing attention among researchers as available micro electro-mechanical systems and wireless communications are now capable of supporting this technology. Over the past few years a variety of clustering schemes targeted specifically at the sensor network have been proposed. Each of these algorithms represents a category of clustering schemes. The cluster formation consumes much less energy than the regular data transmission. This paper has focused on cluster based energy efficient protocols. It will be helpful for future researchers working in WSN lifetime.

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