

**ENERGY EFFICIENT LEACH PROTOCOL
WITH ADAPTIVE FILTER IN WSN**

Dissertation submitted in fulfilment of the requirements for the Degree of

MASTER OF TECHNOLOGY

in

COMPUTER SCIENCE AND ENGINEERING

By

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DECLARATION STATEMENT

I hereby declare that the research work reported in the dissertation proposal entitled “ENERGY EFFICIENT LEACH PROTOCOL WITH ADAPTIVE FILTER IN WSN” in partial fulfilment of the requirement for the award of Degree for Master of Technology in Computer Science and Engineering at Lovely Professional University, Phagwara, Punjab is an authentic work carried out under supervision of my research supervisor Mr. Balraj Singh. I have not submitted this work elsewhere for any degree or diploma.

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This is to certify that the work reported in the M.Tech dissertation proposal entitled “**ENERGY EFFICIENT LEACH PROTOCOL WITH ADAPTIVE FILTER IN WSN**”, submitted by **Baljinder Kaur** at **Lovely Professional University, Phagwara, India** is a bonafide record of her original work carried out under my supervision. This work has not been submitted elsewhere for any other degree.

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LIST OF ABBREVIATIONS

WSN: Wireless Sensor Network.

SN: Sensor Node.

CH: Cluster Head.

LEACH: Low Energy Adaptive Clustering hierarchical protocol.

LMS: Least Mean Square.

SNR: Signal to Noise Ratio.

TDMA: Time Division Multiple Access.

CDMA: Code Division Multiple Access.

PEGASIS: Power-Efficient Gathering in Sensor Information Systems.

TEEN: Threshold sensitive Energy Efficient routing protocol.

HEED: Hybrid Energy-Efficient Distributed Clustering.

PRRP: Position responsive Routing Protocol.

CELRP: Cluster based Energy-Efficient Routing Protocol.

ABSTRACT

Wireless sensor network is most used network in today's world. Sensor node is the basic component of sensor network and having resources constrained like less memory, processing and battery power. These sensors are battery operated which means having limited battery capacity. It is important to efficiently use this battery so that network lifetime should be increased. Energy efficiency techniques are used to proper utilize this battery so that lifetime of network should increase and each sensor node participate in network for longer time. Hierarchical routing protocols are energy efficient routing protocols which allows the sensor nodes to communication in energy efficient way. LEACH (Low Energy Adaptive Clustering hierarchical protocol) is clustering based hierarchical routing protocol which helps to reduce the power consumption of sensor nodes by putting these sensor nodes into sleep mode and we will use appropriate adaptive filter which helps to reduce the effect of noise so that noise free data is received to sink. So, this leads to save the energy consumption and accurate data for making accurate decision by the base station for better utilization of the sensor network and fulfil the goal of implementation of the sensor network.

Keywords: Wireless sensor network, sensor node, energy efficiency, LEACH, cluster head, adaptive filter.

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION TO WIRELESS SENSOR NETWORK

A wireless sensor network having sensor nodes and these nodes are deployed over a geographical area also known as sensor area for monitoring physical phenomena like temperature, humidity, vibrations, seismic events etc. from the environment [1]. Sensor network is used for monitoring environment, military, health, home etc. which are very helpful to people.

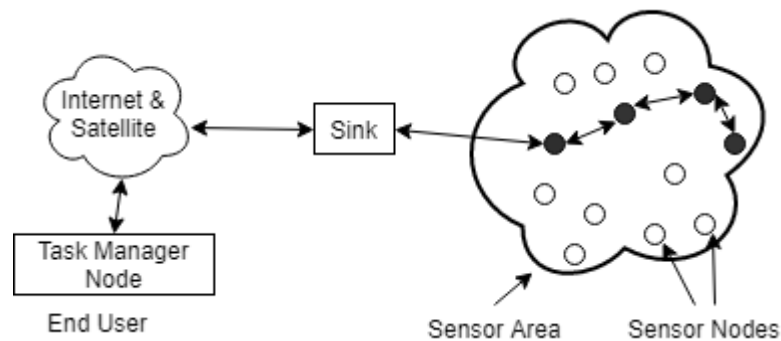


Figure 1.1: Working of WSN

WSN having sensor nodes, sink or base station and end user. Sensor nodes sense the environment and Sink node is data collector which receive all sensor data. This data then pass to task manager node which is operated by user. These sensor nodes are deployed densely inside the real world phenomena or near to it and in hostile environment and required no human intervention [3].

The basic components of sensor node include sensing subsystem for sensing the environment and for data gathering, processor for data processing and communication system for transmitting or receive data. Sensor node may contain application dependent components like location finding system which is responsible for identifying the node location, mobilizer for moving sensor nodes within the sensing area and power generator for power backup. Each sensor node having battery and it is difficult to replace or recharge this battery in hostile environment [5]. This is main reason, to save the power of sensors to maximize the lifetime of the network.

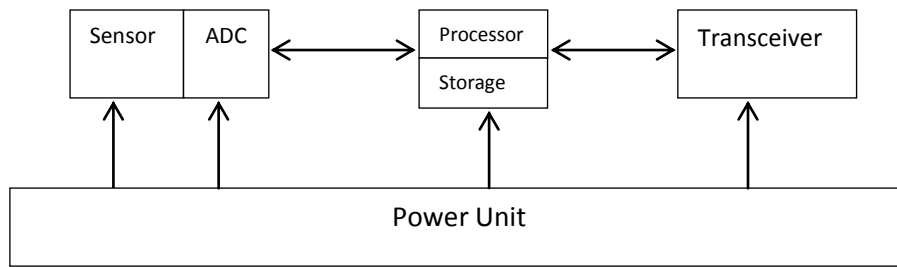


Figure 1.2: Basic components of a sensor node

Mostly power of SN is much wasted while transmitting data to sink, secondly in receiving time or idle listening time and less power is consumed when a node is in sleep mode. An efficient technique is used to manage the sensor node sleep/wakeup mode. LEACH (Low Energy Adaptive Clustering hierarchical protocol) is cluster based routing protocol which is used for saving the energy of sensor nodes.

Lifetime of the sensor network is defined by the fraction of time sensor nodes keep alive. When any sensor node dies, the responsibilities of this dead node is managed by the neighbour sensor and due to more load on this neighbour sensor it also run out of energy very soon and lifetime of network is reduced. To minimize the energy usage of each node, different energy efficient techniques are design for maximized the life of the network.

There are two main ways of energy consumption that are useful reasons and wasteful reasons [5]. Useful reasons of power wastage include transmitting and receiving data, query processing and forwarding query to neighbour nodes. Wasteful reason of energy waste include idle listening (in which sensor nodes listen to an idle channel), collision (any node who receive more than one packet at same time is considered as collision occurred at that node), overhearing (in this a sensor node received those packet whose receiver is another node but get packets that is not destined for that node), control packet overhead (some control packets are used for initial data transmission) and over emitting (means destination node at that moment of time is not ready for receiving data packets but sender start sending).

Sensor network lifetime should as much as it satisfied the application requirement. Life of the network is basically from few months to year. If there is no energy efficiency technique is used then, a node would stop working within a couple of days because of battery drain, so, need of energy efficient protocol for increase the lifetime and improve throughput with less delay.

1.1.1 WSN Architecture

Sensor nodes in WSN are the basic component of sensor network and sink node or base station are data collector which receive data from all sensor nodes. Sensor nodes are deployed using three different ways:

1. Layered based Architecture
2. Cluster based Architecture
3. Sensor nodes with mobile Sink node based Architecture

In Layered based architecture different layers are formed. There is one sink node who receives all sensor nodes information. Sensor nodes send data to sink node using one hop, two hops etc. In this way data is transmitted to the base station using layers.

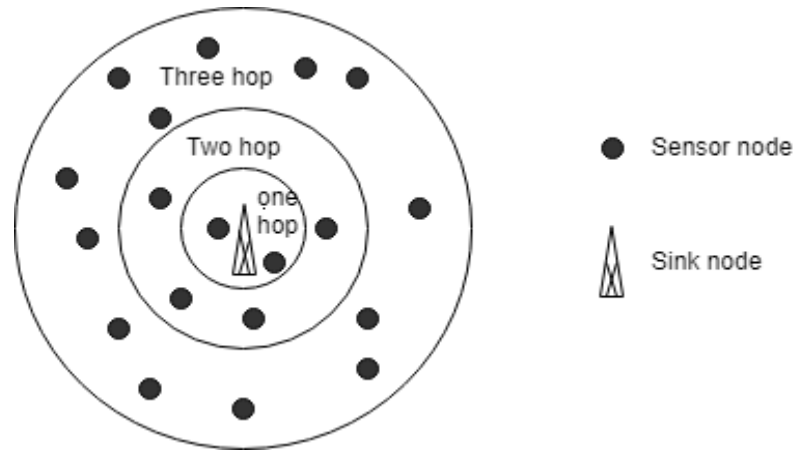


Figure 1.3: Layered based Architecture.

In cluster based architecture, different clusters are formed and one cluster head is elected in each clusters. All nodes present in the network send data to this cluster head and then CH transmit this data to sink node.

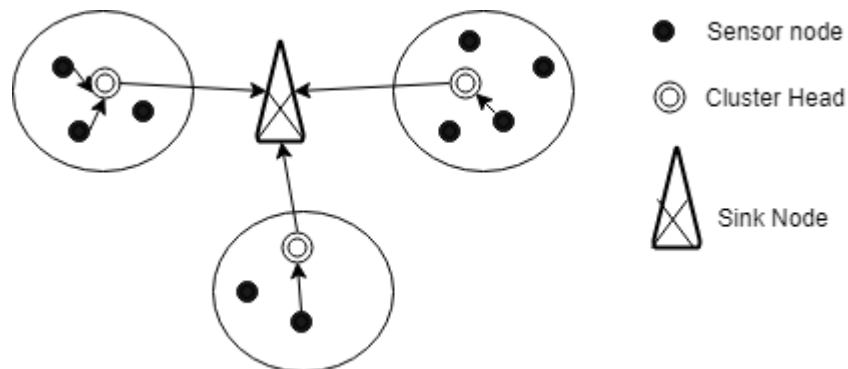


Figure 1.4: Cluster based architecture

In sensor node with mobile sink node architecture, sink node is moveable and travel in sensing area and collecting the data from the sensor nodes. Sometimes data collectors are installed within the sensing area for collecting the data.

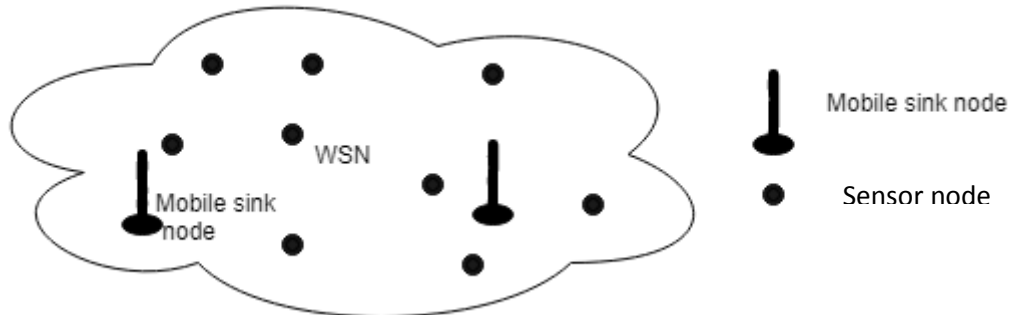


Figure 1.5: SN with Mobile sink node

1.2 LEACH (Low Energy Adaptive Clustering Hierarchy Protocol)

W.R.Heinzelman projected LEACH protocol in which whole sensor network is partitioned into different clusters. One head node is randomly chosen from all sensor nodes present in that cluster. The probability for every node present in that cluster to be selected as cluster head is equal and workload is distributed among nodes in different rounds. Working of LEACH is done in different rounds and each round having two states:

1. Cluster setup state
2. Steady state.

In first state, clusters are created and among each cluster one head is elected based on the threshold value. Each node in sensor network selects one value between 0 and 1 and this value is then compared with threshold value and if selected value is less than this threshold value then the node become the CH for the current round [14]. Threshold is mostly given as:

$$T(n) = \begin{cases} p/1-p*(r \bmod 1/p) & \text{if } n \in G \\ 0 & \text{otherwise} \end{cases}$$

Where, n represent each node, p is desired percentage of node to become cluster heads, r is used for current round, and G represent set of nodes that haven't been CH within the last 1/p rounds. In steady state, SN sends the processed data to the head node in their allocated TDMA slot. In the meantime these nodes are in sleep state which helps to save the power.

Advantages of the LEACH protocol are:

1. Most useful hierarchical routing protocol in sensor networks which save the energy of nodes.
2. Sensing area is divided into many cluster and cluster head among all sensor node collect data and send it to sink which helps to maintain the battery of sensor nodes.
3. A node which is CH in current round is not become the CH in next $1/p$ round. In this way load which cluster head node handle is equally distributed among other nodes.
4. The head node is chosen randomly among other nodes and probability for every node to become the CH is equal.

1.3 ADAPTIVE FILTER

Adaptive filter are used for reduce the effect of noise from the sensed data of sensor nodes. Noise is unwanted signal which is added into the information and normally not understand and interpreted by the machine correctly. Store this noisy data into memory and process it with accurate data and send to base station is one reason of energy wastage. This unnecessary data sometime leads to wrong result and conclusion which is not good and affordable.

$$\text{DATA} = \text{True signal} + \text{Noise} [11].$$

So, it is required to reduce or cancel the noise signal from data for energy efficiency of the sensor node because sensor node having limited resources and we have to proper utilize these resources by using appropriate methods. Adaptive filter like LMS adaptive filter is used for noise cancellation and it is energy efficient.

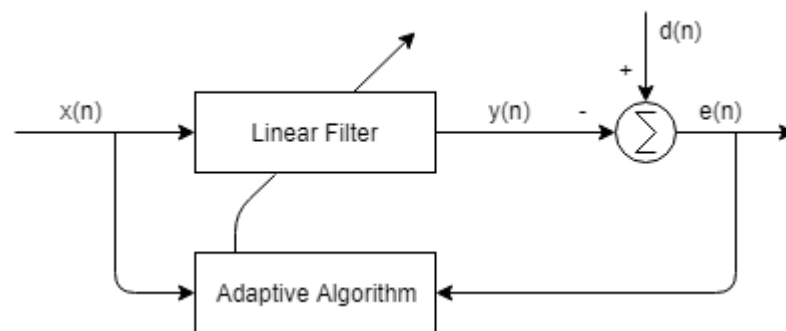


Figure 1.6: Basic adaptive filter

Where, $x(n)$ is signal input in linear filter, $y(n)$ output signal from linear filter, $d(n)$ additionally added to the filter and $e(n)$ is error signal which shows the significant difference between $y(n)$ and $d(n)$.

Finite impulse response or infinite impulse response are types of linear filter [19]. An adaptive algorithm is responsible for adjusting the coefficients of the filter so that reduce the error signal present in the data. The least mean square is one adaptive algorithm which is mostly used for adjusting the coefficients of finite impulse response [20].

CHAPTER 2

LITERATURE SURVEY

Wireless sensor network having many applications and used in different areas. Sensor nodes are resource constrained like limited memory, power and processing. It is important to save the power of sensor nodes by using energy efficient approach.

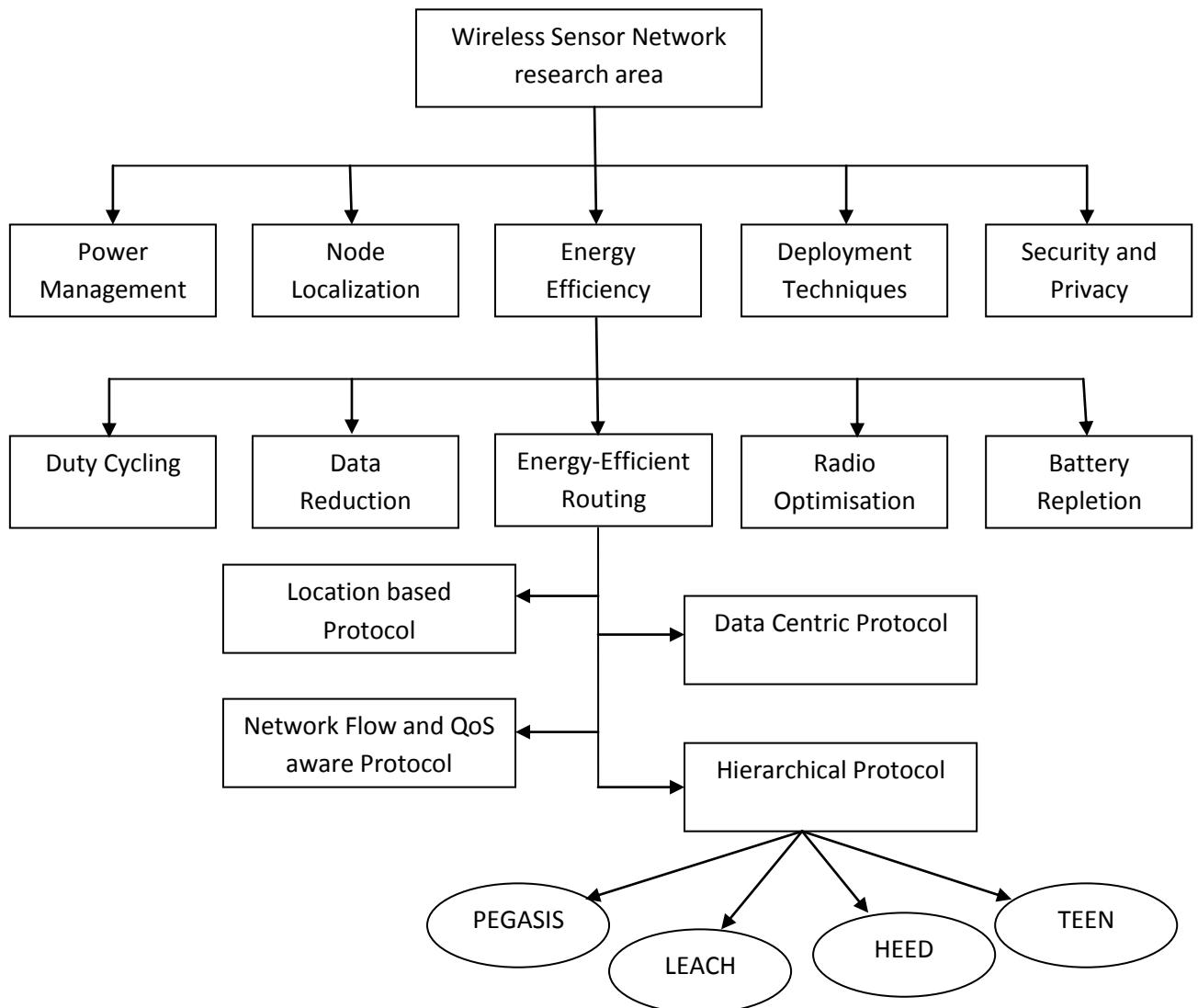


Figure 2.1: Research areas of WSN.

I.F.Akyildiz et al. covered the basic concepts of sensor network which include applications, Factors influencing sensor network, and sensor network protocol stack. Sensor network include sensor nodes and these nodes are deployed very close to each other in the monitoring area. SN's present in the network contains sensors for sensing purpose, processors for processing the

data, limited memory for storage, transceiver for transmission of signals, and power supply which provide power to all other components.

- Applications of sensor networks are Military applications like battlefield surveillance, Battle damage assessment, reconnaissance of opposing forces etc. Environmental applications like detection of forest fire, detecting floods and precise agriculture. Health care applications like monitoring the human physiological data, inside the hospital monitor patients and doctor location, and drug allocation to patient in hospitals all are monitored [13]. Home applications include home automation (like vacuum cleaners, microwave ovens, refrigerators, VCR.), and smart environment etc.
- Factors influencing sensor network design includes: Fault tolerance means if any sensor node fails it should not affect the whole sensor network. Scalability means including more sensor nodes without affecting the working of other sensor nodes. Production cost of sensor network is as less than 1\$. Hardware constraints according to the application sensor node hardware design like including mobilizer, location finding system and power generator components. Sensor network topology change and include pre-deployment and deployment phase, post-deployment phase, re-deployment phase. Other factors are Environment, Transmission media, Power consumption, and communication.
 - Application layer protocols: Sensor management protocol through it system administrator interact with sensor network. Task assignment and data advertisement protocol in this user send their interest to sensor node and sometimes sensor node advertise the available data then user query the data which is interested for it. Sensor query and data dissemination protocol provides user application with interfaces to issue queries, respond to queries and collect incoming replies.

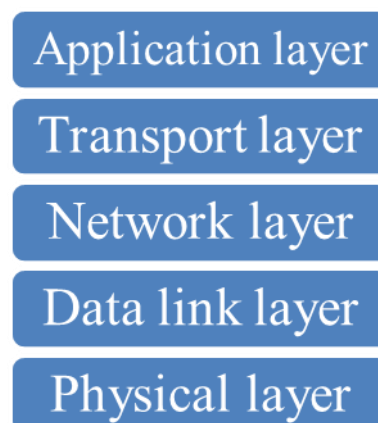


Figure 2.2: Sensor network Protocol stack

- Transport layer uses UDP protocol rather than TCP because sensor node having limited memory.
- Network layer is responsible for choosing the best route for communication. In this the route having the following characteristic is preferred: Maximum power available route, Minimum energy route, Minimum hop route, Maximum minimum power available route.
- Data Link layer responsible for multiplexing of data stream, data frame detection, medium access and error control.
- Physical layer done frequency selection, carrier frequency generation, signal detection, modulation and data encryption [1].

Ridha Soua and Pascale Minet defined WSN having of large number of sensor nodes deployed in hostile environment for longer duration and no human interaction required. Sensor node main components, a sensor unit for data gathering, a microcontroller for data processing, a communication unit for data transmit/receive and power source which is battery. Mainly sensor node detect any event happened in the environment and perform some processing and through communication unit send this information to the sink. Reasons of energy wastage include Collision, Overhearing, Control packet overhead and idle listening. Classification of energy efficient techniques:

- **Data Reduction:** Sensor nodes are collecting data from the environment. Multiple nodes can acquire the same data because they are closer to other sensor node or in routing a node get same data from different nodes. Redundancy in sensor nodes data can consume more energy which reduced the network lifetime. Data reduction technique reduced the size of data which is delivering to the sink. Data reduction technique includes data aggregation and data compression [6].
- **Protocol overhead reduction:** in this reduced the overhead of the protocol which help to save the energy and increase protocol efficiency and also network lifetime. Optimized flooding is one way to reduced overhead.
- **Energy efficient routing:** main function of energy efficient routing protocols are to use the sensor nodes in such way that extend the network lifetime and less power consumed while sending data to destination and avoid those nodes which have less energy. In [15] author defined routing protocols used in WSN.
- **Duty cycling:** it means the time period when nodes are active and participated in network. Putting the sensor node in sleep mode when not in use. In High granularity technique

limited number of nodes active for sensing the area and these nodes cover the area and provide connectivity also. Low granularity deal with scheduling in which radio of active nodes switching off/on depending on their time slots.

- Topology control: provide network coverage and connectivity by adjusting the transmission range of sensors. Local information of node is used while constructing the network.
- Energy efficient routing protocols: Data centric protocols are spin, direct diffusion in which sensor nodes or sink broadcast the advertisement about interested data. Hierarchical protocols include LEACH, PEGASIS and TEEN. These protocols are hierarchical and also considered as data centric protocol [16]. Geographical protocols are GEAR, which uses nodes location information while transmitting data. In each cell, one node is active and other nodes are put in sleep state. Opportunistic protocols reducing the broadcast nature of nodes and node mobility [12].

Giuseppe Anastasi et al. present the energy conservation schemes because sensor nodes having limited battery and to save this battery is important aspect. Authors define duty cycling, data driven and mobility based approaches to save the battery so that to enhance the lifetime of sensor network. Duty cycling means put the sensor nodes in sleep mode when not in use. Topology control and power management techniques are used in duty cycling for saving energy. Data driven include reducing the amount of data by aggregation and compression and gathered only sampled data. Mobility based include mobile sink node which move in sense area and collect data from sensor and mobile relay [3].

W. Heinzelman et al. proposed LEACH protocol which uses cluster based approach for energy efficiency. LEACH uses location information of sensor nodes and done data fusion for reducing the total information which is send to base station. LEACH works in round and in each round two phases are followed i.e. Setup phase and Steady phase. In Advertisement Phase, sensor nodes become the cluster head depending upon the threshold value and random number which they choose between 0 and 1. The node which is cluster head, advertised the message that I am cluster head for current round. In Cluster Set-Up phase, sensor nodes join that cluster which is near to that node by checking the signal strength. Based on the number of sensor nodes join the cluster, cluster head create the TDMA slots for each SN in its cluster. Now data transmission start and radio of sensor nodes are off and on when their TDMA slot occurred. This helps to save the energy of sensor node by putting the sensor nodes in sleep mode. Interference between two clusters is reduced by using CDMA code. Different cluster head uses different CDMA code in their cluster and all non CH nodes use this code while transmit the

data to CH. In this way, LEACH minimizes the energy consumption by distributing the load on sensor nodes by rotating the CH after each round [2].

Dr. Deepak Dembla proposed modification in LEACH and designed new Improved-LEACH protocol. In WSN, the nodes are randomly deployed in sensor area and are very close to each other which results in redundancy and having security problems. WSN is most used day by day, the sensor nodes having resource constrained like battery constrained. Communication in WSN, consumes more power and various approaches are used to save this energy. Energy efficient routing protocols are flat, hierarchical, location-aware routing protocols. LEACH routing protocol have two phase: Setup phase: In this phase every node taking decision about to become a cluster head or not.

$$T(n) = \begin{cases} p/1-p^{*(r \bmod 1/p)} & \text{if } n \in G \\ 0 & \text{otherwise} \end{cases}$$

Where p is the percentage of becoming cluster head, r is for current round, and G is set of nodes that are not becoming the cluster head in previous $1/p$ rounds [18]. After cluster head choose, TDMA scheduling is done for all nodes in which they send data to cluster head in their time interval. Steady state phase: In this, data is then transmitted to the head node and sensor nodes make their radio off when not having their turn as in TDMA scheduling. Thus minimize the energy dissipation in these nodes [4]. PEGASIS is developed from LEACH and a chain-based protocol, and it is based on the idea of making chain. The nodes who receive data become the leader and pass this information to next closer neighbor in the chain [17]. TEEN protocol is useful for that application area which requires periodic information. In it, nodes are active periodically and transmit the sensed data in regular interval. HEED is a hierarchical based and distributed clustering based protocol in which single-hop communication is performs within each cluster, multi-hop communication is done between CHs and the BS. The CH node selected on the basis of residual energy and intra-cluster communication. The proposed algorithm (I-LEACH) is evaluated on the basis of: average energy consumption of the sensor nodes, average throughput and life time of the WSN [4].

Noor Zaman et al. introduced PRRP (Position Responsive Routing Protocol) to enhance the energy efficiency of WSN. This protocol selects the cluster head among each cluster which is fairly distributed and having less distance among other nodes.

- Routing in WSN is more power consuming as compared with ad hoc and other networks.

- Clustering provides energy efficiency, scalability and less delay. So, most useful in WSN.
- Previous routing protocol CELRP having some limitations and those are: more number of sensor nodes in each cluster, selection of leader among all cluster head is done on the basis of level of power present in cluster head by using the greedy method [7].
- Energy in transmission and receiving of k bit data in d distance is represent using following equations:

$$ETx = kEelec + k (Eamp) d^2 \quad (1)$$

$$ERx = kEelec \quad (2)$$

Where, ETx is transmission energy, ERx is receiving energy, $Eelec$ is electronics energy and $Eamp$ is amplifier energy [2].

- Comparison analysis shows that PRRP is better than CELRP routing protocol by improving lifetime and increased energy efficiency of WSN.

R.Sujee and Dr. Kannammal.K.E compare the LEACH, genetic-LEACH and inter cluster comm. in LEACH. As we know that LEACH protocol having two states and all round uses these setup and steady state. In genetic algorithm added only one preparation phase for the first round. In this phase each sensor nodes chooses one random value between 0 and 1 and compare with threshold value, on the basis of this value sensor nodes chooses themselves as a candidate cluster head. Then this CCH status, node id and their location is send to base station. After this normal LEACH protocol working is start. In inter cluster communication in LEACH protocol among all cluster head basic LEACH is performed and these CH nodes select one value between 0-1 similar to LEACH and send information to base station. Inter cluster comm. in LEACH is better than LEACH and genetic LEACH protocol [21].

Deepak M. Birajdar and Sharwari S. Solapure define LEACH protocol using OMNET++ simulation tool. Author define flat routing which uses intermediate node for data transmission to sink node, Hierarchical routing protocol construct cluster and sensor nodes send data to head node and location aware routing used to finding the location of nodes. Then basic functioning of SPIN, GAF, TEEN and APTEEN protocol is explained. Working of LEACH protocol is discus using OMNET++. LEACH is mainly used for power saving and provide scalability which helps to maximize the network lifetime [22].

Emad Alnawafa and Ion Marghescu proposed new algorithm IMHT-LEACH protocol. In previous MHT (multi-hop technique) distribute cluster head in two levels where in IMHT number of levels are used. IMHT uses dissipation energy model and having four phases i.e. initial, announcement, routing and redundancy phase. In first phase setup of cluster head is

performed and each CH know its position and distance from the base station, in second phase all cluster head announces about its position and distance in broadcast way, in third phase routing table is check and select best path for transferring data to sink and in fourth phase redundant data is removed in case of CH at same level. Simulation result shows that IHMT improve the lifetime, stability and throughput of sensor network [23].

Mohammed E. et al. author proposed a hybridized of LMS filter and matrix completion to reduce the amount of information which sensor nodes transmit to sink node in WSN. Energy is limited in sensor network and properly utilized this energy is main issue. PCA (Principal Component Analysis) is used for reducing the size of data of all sensors by aggregating and finding uncorrelated information. Prediction technique is also useful for reducing the data by building a model which predict the real world phenomena rather than using the sensed data [3]. In dual prediction scheme, sensor nodes and sink node having same filtering model. LMS adaptive filters are more used than other because its training time is less and used in that situation when knowledge about sensed signal is not available [8]. Compressive sensing and matrix completion methods recovered the original data in case of failure in this way retransmission of packet is reduced which result in power saving of sensor nodes. This paper deals with: recovering of loss data, lifetime of network increase when less retransmission is there which maintain the battery power of sensor nodes [9].

CHAPTER 3

SCOPE OF THE STUDY

As the sensor nodes are mostly battery operated, design of energy efficient algorithms for routing in wireless sensor network is a rapidly growing area of research. The development of more energy efficient algorithms will result in increased application areas of WSN. As in static sink the nodes near to the sink also choose for data forwarding process, and these nodes near to the sink soon get died called hotspot problem. An energy efficient routing protocol also helps to deal with this hotspot problem. High frequency of re-clustering and distribution of cluster heads, the areas such as finding the optimal route with high residual energy for inter-cluster multi-hop communication, by using LEACH may be considered to bring further improvement in energy efficiency and overall lifetime of the network in WSN.

More power of sensor node is used when transferred the sense data to the base station. So, routing protocol for WSN should be energy efficient and save the battery power of sensor nodes which result in increases the network lifetime. Energy dissipation and network lifetime of LEACH Protocol is poor, so there is lot of a future scope to improve LEACH protocol and much research work can be done further. There are many open issues in WSN regarding improvement of routing algorithms such as LEACH.

WSN is deployed in real world phenomena which include lots of disturbance which is also called noise or unwanted signal. If these unwanted signals are also transfer to base station then long size of packet waste sensor power and also the decision made from this information is also not accurate.

CHAPTER 4

OBJECTIVE OF THE STUDY

LEACH protocol with adaptive filter will provides the energy efficiency and helps to enhance the lifetime of sensor network and will achieve following objectives:

- To Implement energy efficient LEACH protocol with adaptive filter to achieve energy efficiency.
- To minimize the effect of noise from sensor nodes data and forms an efficient clusters to improve lifetime of sensor nodes.
- To calculate the result of LEACH with adaptive filter used in the sensor network.
- To compare the previous LEACH protocol result with the result of LEACH with adaptive filter.

CHAPTER 5

RESEARCH METHEDODOLOGY

Network Simulator like NS2, MATLAB Simulink, OPNET, OMNET++ etc. are many tools which are used for constructing wireless sensor network. We may use Network Simulator NS2 for our research work for designing the network setup and deploying the sensor nodes in the simulation environment. NS2 tool is most used for constructing network simulation and provide many features like topology definition, node configuration, execution, result analysis, graphically comparisons etc.[10]

Network Simulator tool for constructing the network of sensor nodes and will having following criteria for each sensor node: Sensor nodes are uniform, all sensor deployed with same energy (i.e. 0.5J) and battery on each sensor. Sensor nodes know its location and energy level. Base station is located far from the sensing area. Number of sensor node 50-100 varies in our simulation, which cover the 40*200m (variable) area. Sensing range of each sensor 8m and transmission range is 70m.

Selecting the appropriate adaptive filter like LMS (least mean square) filter which is used for noise signal cancellation and data fusion of sensor nodes. After that we will implement LEACH protocol with adaptive filter which is used for cluster formation and energy efficient routing for saving the battery of sensors and overall improving the lifetime of network.

We will calculate the results after its proper execution on network simulator. We will check the energy utilization and compute its efficiency against previous implemented protocol by graphically comparison. We shall record the improvement in our implemented protocol; which should be effective and energy efficient.

In this way, the LEACH (which is energy efficient routing protocol) and adaptive filter (which also save the energy by reducing the noise signal and aggregates the sensor node data) are combines such a way that they helpful to energy wastage problem of sensor nodes and improve the accuracy and lifetime of sensor nodes.

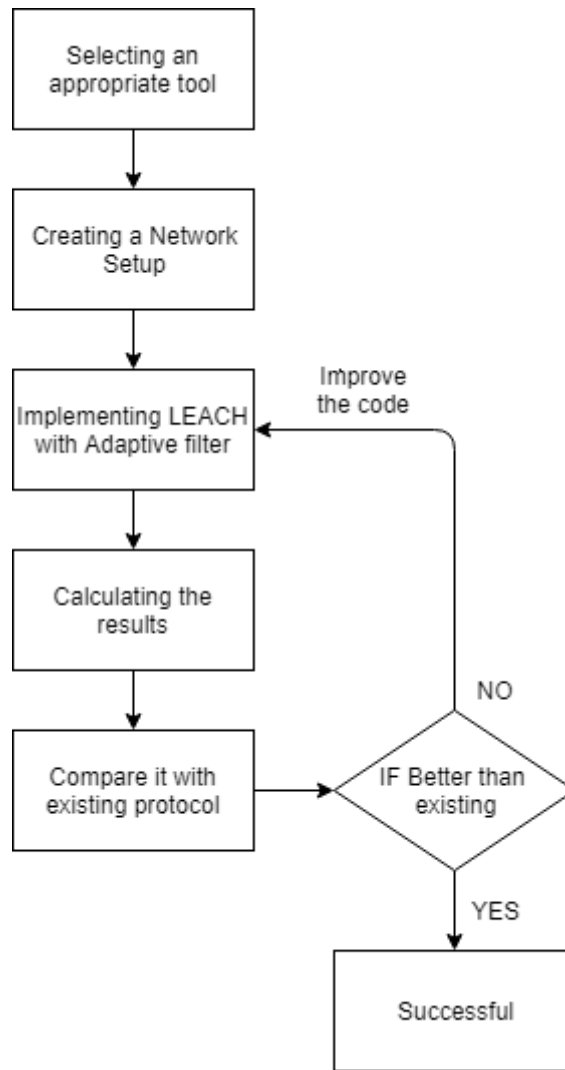


Figure 6.1: Flow chart of planned work.

CHAPTER 6

EXPECTED OUTCOMES

By implementing the LEACH protocol with adaptive filter, will improves the energy efficiency of sensor network. These sensor nodes are deployed in real world may contains noise in the environment. Adaptive filters reduce the effect of noise present in sense signal of sensor nodes. Valuable data is transfer which is noise free result in accurate decision. LEACH protocol save the battery of sensor nodes by distributing the load among each sensor. Save the battery which also enhance network lifetime.

In this way, hybrid combination of LEACH and adaptive filter result in energy saving and accurate decision made which is the main purpose of WSN.

CHAPTER 7

SUMMARY AND CONCLUSION

In today world, sensor network is most used network in many application areas like military, environment, health, home etc. Sometime sensor network are deployed in hostile environment and to recharge or replacing the battery of these sensor nodes are difficult. So, it is necessary to efficiently use the power of these sensor nodes so that each node actively participates in the network for longer duration. LEACH routing protocol is energy efficient routing protocol that used hierarchical clustering approach for designing the clusters and we use adaptive filter for reducing the effect of noise from the collected information. Because noise itself is major source of energy wastage in sensor nodes and adaptive filters like least mean square filter is used for cancelling the noise from the data. These increase the lifetime of sensor network and accurate data which is noise free and received by the base station. Accurate decision should be made by end user when the source information is accurate.

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