

**PIL-LEACH MODEL FOR INCREASING ENERGY EFFICIENCY OF
LEACH PROTOCOL IN WIRELESS SENSOR NETWORKS**

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3	Project Academic Inputs: Project topic is relevant and makes extensive use of academic inputs in UG program and serves as a culminating effort for core study area of the degree program.	7.75
4	Project Supervision: Project supervisor's is technically competent to guide students, resolve any issues, and impart necessary skills.	8.00
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DECLARATION

I hereby declare that the research work reported in the dissertation entitled “PIL-LEACH MODEL INCREASING ENERGY EFFICIENCY OF LEACH PROTOCOL IN WIRELESS SENSOR NETWORKS” 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. Harwant Singh Arri. I have not submitted this work elsewhere for any degree or diploma.

I understand that the work presented herewith is in direct compliance with Lovely Professional University’s Policy on plagiarism, intellectual property rights, and highest standards of moral and ethical conduct. Therefore, to the best of my knowledge, the content of this dissertation represents authentic and honest research effort conducted, in its entirety, by me. I am fully responsible for the contents of my dissertation work.

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SUPERVISOR'S CERTIFICATE

This is to certify that the work reported in the M.Tech Dissertation-II entitled “**PIL-LEACH MODEL FOR INCREASING ENERGY EFFICIENCY OF LEACH PROTOCOL IN WIRELESS SENSOR NETWORKS**”, submitted by **Ponnada Ram Charan** at **Lovely Professional University, Phagwara, India** is a bonafide record of his original work carried out under my supervision. This work has not been submitted elsewhere for any other degree.

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ABSTRACT

Wireless Sensor Networks (WSN) play a vital role in modern arena. Sensors in WSN sense and collect information. As a result, WSN are deployed in various vital areas such as military operations, health care, surveillance, home application and environmental applications.

Wireless Sensor Networks include sensor nodes powered using battery to interconnect with one another for environment observation. Energy effectiveness is one of the main issues in wireless sensor networks. Various routing techniques are developed to achieve maximum reliability, network lifetime and scalability. Leach is one of the clustering conventions used in wireless sensor networks. Generally, the research topics (or) the fields of research in wireless sensor networks are power management, routing, mobility management, security. Even, after its existence of more than 17 years, the Leach protocol has grabbed attention and interest of the research community. Our research area is confined to power management. This paper proposes a technique (Improved Lifetime - LEACH with Particle Swarm Optimization or PIL-LEACH) to solve the associated information transmission inside the group and, to control the correlated data and cluster head selection problem in IL-Leach. The PSO algorithm selects the cluster head based on various parameters of sensor nodes such as residual energy, distance from base sink etc. This approach accepts that we know the area of the sensor hubs. In our proposed strategy PIL-LEACH, every one of the hubs or nodes that are chosen to be in a same VCC (virtual corresponded bunch) are given same TDMA with the goal that just a single one of them sends their information to the group head.

Table of Contents

INTRODUCTION	1
WIRELESS SENSOR NETWORKS	1
WIRELESS SENSOR NETWORK APPLICATIONS	3
WIRELESS SENSOR NETWORKS BENEFITS	4
DRAWING ASPIRATION FOR WIRELESS SENSOR NETWORKS PROTOCOLS	5
CLUSTERING IN WIRELESS SENSOR NETWORKS	6
LEACH	7
ADVANTAGES OF LEACH	8
PROBLEMS IN LEACH	9
LITERATURE SURVEY	10
OBJECTIVES OF STUDY	15
SCOPE OF STUDY	16
METHODOLOGY	17
EXPECTED OUTCOMES	21
CONCLUSIONS	22
REFERENCES	23

LIST OF FIGURES

FIGURE 1: STRUCTURE OF SENSOR NODE	2
FIGURE 2: FLOW CHART OF MODEL	20

INTRODUCTION

WIRELESS SENSOR NETWORKS

Proficient design and execution of wireless sensor networks is becoming a sizzling arena of investigation in modern time, caused because of the enormous prospective of sensor networks towards permitting applications that unite the real world to the practical world [5]. Associating the huge numbers of tiny sensor nodes, it is likely to acquire statistics about physical fact that was complex or unfeasible to attain in more conservative ways. In the upcoming years, proceeding technology permits the charge of developing sensor nodes to continue to drop, rising deployments of wireless sensor networks are projected, with the networks eventually growing to large numbers of nodes.

Wireless sensor network consists of abundant sensor nodes that could intellect, compute and ensue for the final resultants [1]. At the point when the sensor faculties and gathers the records all around the environment, the computational part process the measurements, information so collected is steered under detecting unit in ADC, additionally embrace the changed over type of information to the target Base Station [11] through handling and correspondence units and in conclusion make sense of it for the utilization in higher applications as appeared in Figure 1. Also, each sensor hubs is commonly operational with handset that are ordered of little size, short cost and multifunctional sensor hubs that faculties and mount up the data. Remote sensor systems banter with base station, as well as with all associate associations. The development of remote sensor organize was incited by means of outfitted applications, for example, combat zone observing, machine wellbeing checking, and movement steering and home computerization

Wireless sensor network empathize with not merely the base station but as well as craft gaze links. Thereby within the vast hasten of nodes it is demanding to formulate sensor network to serve the purpose to cutback energy consumption, charge and size of nodes for the intention of our requirements.

Wireless sensor networks associate innovative standard for admittance data from the surroundings. Conformist schemes exercise bulky size, sky-scraping rate sensors that are

linked to end user straightforwardly with chains and they must be positioned precisely in sensing field to acquire the records.

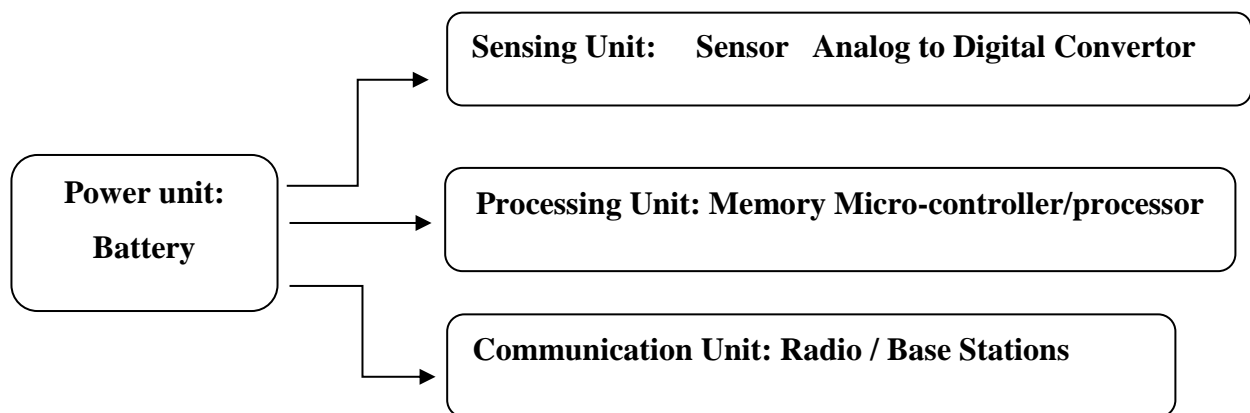


Figure 1: structure of sensor node

For example, seismic investigation for oil [2] in the oil industries is completed by using geophone sensors arrays that are attached to vast cables. Sensor nodes used in such type of applications are very posh and exceedingly energy intense. Beside it, sensor nodes should be placed in accurate locality because there are narrow figures of micro sensor nodes those achieves data from the environments. Additionally, organizations of these sensor network systems are extremely pricey and require helicopters to convey and bulldozers to locate the sensor nodes in exact sites. Substitute of big, weighty and classy foreseeable macro sensor nodes by cheap, less-weight and short power micro sensor nodes consequences in augmented highly cost-effective and ecological add. Jointly, misuse of these sensor nodes is remarkably graceful. This would bank significant charge in plan, placement of the sensor nodes and would guarantee to be error tolerant since due to dense deployment.

Due to mounting field of wireless sensor networks, wireless sensor network system is growing worldwide hastily. Market growth has massively in the recent 10 years. Europe, North America and Asia pacific cover the main market development of wireless sensor network systems. Improvement in wireless functionalities is also causative to develop the Industrial Wireless Sensor Network (IWSN) market and furthermore, also pretty series of applications in the industrial sector. Three technologies namely Bluetooth, ZigBee and Wi-Fi are vastly taken up and are being swiftly worn in automotive and healthcare industries.

WIRELESS SENSOR NETWORK APPLICATIONS

Concealed applications for these major wireless sensor networks subsist in the array of areas, including industrial machine screening, medical supervising, surveillance, environmental observations, home security and military operations. To comprehend the diversity of applications which can be propping up using wireless sensor networks [2] [3] [4], considering the following example.

- **Military operations:** Error tolerant, self-configuration and brisk exploitation asset fallout in major use of wireless sensor networks in military applications. Sensor networks can be used in battle field surveillance, supervising and trailing gracious strength, disclosure of biological, chemical and nuclear hits. Consequently wireless sensor networks are occupied in military guidelines, manage, figuring, communication, intellect and surveillance.
- **Surveillance:** Suppose many networking sensors (e.g., seismic, audio and video) are likely to spread throughout in a region for example battlefield. A reconnaissance application might be intended on the above of this sensor network to supply info to the end-user about the surroundings. In such kind of a sensor networks, traffic blueprints can vary from unrefined sensor information to a lofty level depiction of which is stirring in the surroundings, if information processing is completed locally. The application will have several Quality of service (QoS) supplies from these sensor networks, such as obliging a least proportion sensor.
- **Home Applications:-**Wireless sensor networks are being used in home automation systems. Sensor nodes can be established in home appliances such as microwave ovens, refrigerators and vacuum cleaners. Using wireless interface, devices can correspond with each other and sensor network permits the consumer to handle home devices distantly and locally.
- **Health Applications:** Wireless sensor networks are budding in utilizing health applications for patient examining, remedy organization and tele-screening.
- **Environmental Applications:** Wireless sensor networks can be worn to sense forest fires and floods, tracking and supervising of animals, earth supervising and terrestrial discovery.
- **Other Commercial Applications:** Wireless sensor networks can be recognized for observing product superiority, monitoring material exhaustion, creating smart office

places, vehicle tracking and exposure, robot control, managing inventory, factory course organizing and automation. To execute vehicle tracking, hundreds to thousands of energy-constrained nodes are speckled over a preset section. Seeing as communication outlay more than such outsized distances is energy-draining, communication to the base station should be steer clear of except enormously crucial.

WIRELESS SENSOR NETWORKS BENEFITS

Wireless sensor networks are accomplished in consistent observing and are used for different applications [7]. Deployment of such hundreds or thousands nodes in intellection field outcome in superfluous profit to these sensing applications, enlisted as:

- **Extended range of sensing:** partial physical array measures are sensed by a single macro sensor while micro sensor networks are able to reclaim the facts of diverse measures arises in different sections that assist outsized number of nodes those are physically divided and broaden over entire district.
- **Fault tolerance:** Due to partly covered arenas of sensed sections of diverse nodes consequences in data association that crafts wireless sensor network system more fault tolerant. Breakdown of macro sensor node cut short the system role whereas if some micro sensor nodes in network fail or expire other sensor nodes can take out the data of breakdown node due to data idleness or over lied sensed sections. Consequently the system can contribute suitable quality statistics.
- **Improved Accuracy:** As contrast to macro sensor's statistics, an individual micro sensor's data frequently is less precise but aggregation of data from diverse sensor nodes amplify the accurateness of sensed data. During aggregation uncorrelated data is condensed, considering as noise.
- **Unattended Operations:** Wireless sensor networks can be effortlessly established in the unkind surroundings those are very bulky to access or unfeasible to arrive at akin to battle fields, top of hilly areas etc. Wireless sensor networks can easily arrange themselves devoid of any central backbone.
- **Lower Cost:** Even though macro sensor is restored by lots of micro sensors but condensed dimension, consistency and correctness limit craft the micro-sensor nodes greatly cheaper than macro sensor nodes.

DRAWING ASPIRATION FOR WIRELESS SENSOR NETWORKS PROTOCOLS

Design and execution of superior protocols are primary anxiety in wireless sensor networks for the intention to consume the resources as the WSN is resource constrained mainly in energy, power and bandwidth. Hence, there is subsequent template that should be measured while calculating the protocols for WSNs.

- **Ease of Deployment:** A thousands of nodes can be worn to organize a sensor network in far-off or hazardous situations. Consequently sensor nodes are supposed to be undersized and despicable sufficient that is reasonable to chucking hundreds or thousands nodes over an isolated or hazardous arena from an aircraft to rescue the information in the ways that may not be promising otherwise [9].
- **System Lifetime:** Wireless sensor networks should be deliberated in a manner such that they can intend for long extent. System life span is calculated in terms of time to node breakdown or node die or time awaiting network does not supply adequate superiority fallouts.
- **Latency:** Data extorted from sensor networks is on average time sensitive. Hence accordingly data must be acknowledged in a timely behavior. Handing out or communication could ground elongated delays that are intolerable.
- **Quality:** This factor deals with the accurateness of dig up data that to an extent deals with what is equivalent to essentially going on in the upbringings. It is a data reliant and application-specific factor but quantity of data is directly proportional to the correctness. The more the data transmitted to the base station, the more precise view of environment could be extracted by base station or end user.

Trade-off can transpire amid these diverse bounds and excellent algorithms can be intended which are adaptive and scalable to fluctuates the virtual significance of the diverse bounds. For illustration, when energy is profuse, the end user may claim for high quality fallouts. As energy is exhausted, the end user may confer the quality of the fallouts to modest the energy dissipation in the sensor nodes.

CLUSTERING IN WIRELESS SENSOR NETWORKS

It is difficult to design WSN that can finish value economy and conservative size of plan. Hub vitality is the central worry in plotting design since vitality is crushed in conduction and by just supplanting the battery is no place an answer for agreement with this issue. With the predominant calculation like bunching, we can overcome better life expectancy. Bunch based various leveled steering convention is vitality effective. In the arrangement of bunching, sensor hubs are distanced in the hubs into group sets with a Head among each set and amass the information from different hubs in bunch. Cluster heads execute data aggregation and trim down the redundant data and propel it to the BS [6] [10] [12].

The function of clustering protocols is alienated into numeral of rounds and apiece round is accomplished in two phases specifically setup phase and steady-state phase. In Setup Phase, cluster heads election and clusters formation is done using either dispersed or federal clustering algorithm. In Steady State Phase, every node sends its records to its cluster head within owed TDMA programmed time slot. After getting the figures from their all the cluster members; cluster heads do the data compression, data compression depends upon the degree of correlation among sensed facts. Number of bounds is occupied in the course of clustering. Clustering Algorithms or Protocols are intended by allowing for some of them. The parameters that characterize clustering are given below:

- Amount of clusters being a graved factor can unswervingly affect the efficiency of the whole routing protocol. Amount of clusters can be predetermined or adaptive. For adaptive clusters, proficient methodology or algorithm can be deliberated. Within a cluster, communication between sensor nodes and its cluster head can be solitary hop or multi hop.
- If the nodes are immobile in the sensor field, stable clusters can be planned. While if nodes are energetic or portable, cluster heads should sustain an appropriate membership with the energetic nodes and should be coordinated with their mobility.
- Cluster configuration methodology is a vital where time proficiency or latency is a chief devise measure. Clusters can be shaped either in disseminated manner or using federal approach. In distributed manner, sensor nodes outline clusters using local verdict while in centralized approach, base station elects appropriate cluster heads to form clusters.
- Cluster head selection can be probabilistic or deterministic. In probabilistic loom, cluster heads are chosen randomly as in LEACH protocol. Whereas, in deterministic approaches

like HEED, etc. cluster heads are elected in view of metrics like residual energy, sensor node density, node centrality, node concentration, local and global distance etc.

There are following imperative profit of clustering in wireless sensor networks [8] [10] [13].

- Clustering makes probable the spatial reclaim of assets to lift system capacity. For example, clusters those are not in neighborhood can use the similar frequency for same cluster.
- Number of conductions for distributing routing facts are condensed in clustering, routing information is shared either the cluster heads or main cluster head. Thus this benefit can be used to draw more energy efficient routing protocol.
- Clustering increases the scalability of wireless sensor networks.
- Data aggregation at cluster head in a cluster abolishes the loud facts. Consequently, data association in clustering offers more precise information of sensed surroundings.
- Clustering provides efficiently accurate information as data aggregates at CH rejects disturbing/noisy data.
- Clustering increases system capacity with reusing the one cluster with idle frequency for communication pace.

Re-transmission of data is reduced by clustering; as the CH shares information

LEACH

Low-Energy Adaptive Clustering Hierarchy (LEACH) [14] is one of the pioneering clustering routing protocols for WSNs. The basic design of LEACH has been a motivation to the number of clustering routing conventions. The central aim of LEACH is to gather the CHs among the sensor nodes by different rotations, so the high energy is dissipated in collaborating with the base station is extent to all the nodes present in the network.

The basic operation of the LEACH is fragmented into number of rounds and every round is further divided among two phases i.e. setup phase and steady-state phase. The clusters are organized in the setup phase and data is delivered to the base station in steady state phase. During the setup phase, each node takes a decision to become a CH for the present round or not. This choice is based on the optional fraction of CHs for the network and the amount of times the node is a CH. This choice is made by the node selecting a random number among 0 and 1. This node is eligible for a CH for the current phase if the number is lesser than the threshold value. The procedure involved in each phase of the LEACH protocol.

Ad stage: This is the initial phase in LEACH convention. The qualified group head hubs will be issuing a warning to the hubs going under its range to end up noticeably a bunch part in its group. The hubs will acknowledge the offer in view of the Received Signal Strength (RSS).

Bunch set-up stage: In this progression the hubs will react to their chose group heads.

Timetable creation: After getting reaction from the hubs the group go to make a TDMA plot and send back to its bunch individuals to insinuate them when they need to pass their data to it.

Information transmission: The information gathered by the individual sensors will be given to the group head amid its opportunity interim and on all other time the bunch individuals radio will be set for diminish its vitality utilization. Here in the LEACH convention multi group obstruction issue was unraveled by utilizing remarkable CDMA codes for each bunch. It avoids vitality deplete for a similar sensor hubs which has been chosen as the group pioneer, utilizing randomization for each time bunch head would be changed. The bunch head is in charge of gathering information from its group individuals and wire it. At last, each group head will forward the melded information to the base station.

ADVANTAGES OF LEACH

- With clustering, LEACH carry out less message and data communication between nodes and sink.
- Cluster head schedules TDMA slots to every node, as a result there will be no collision among nodes and nodes will go into sleep mode till it gets TDMA schedule, as a result battery can be saved.
- LEACH protocol provides equivalent chance to all sensor nodes to become the cluster head at least once and for a member node several times during its lifetime.

PROBLEMS IN LEACH

- 1) In LEACH, normally cluster head is randomly. There is a probability to select a nodes that, has less energy as cluster head. Due to this, lifetime of network drastically affected.
- 2) Leach will not guarantee the no.of cluster heads (CH) and position of CH. As a result, load balancing will not be guaranteed.
- 3) Due to its only single stage .communication, between cluster head (CH) and base station, a CH which is far away from base station have to consume more energy for sending data which leads to uneven energy consumption. This reduces life time of WSN.

ITERATURE SURVEY

Amjad and Abu-Baker [2016] This paper investigates the energy efficient routing in cluster based totally WSN by using a linear components for trouble of minimizing strength intake in such network. This method considers electricity intake at one-of-a-kind sensor nodes within cluster and jointly optimize at extraordinary sensor nodes to transmit facts via direction with minimal strength. Extensive simulation is performed to evaluate proposed system. [15]

Noor Zaman et al., [2016] proposed a cross layer layout methodology become followed to design a power green routing protocol entitled “Position Responsive Routing Protocol” (PRRP). PRRP is designed to limit power consumed in every node by using (1) decreasing the amount of time wherein a sensor node is in an idle listening country and (2) decreasing the average conversation distance over the network. The result of the projected PRRP changed into critically assessed inside the context of network lifetime, throughput, and power consumption of the network in keeping with man or woman basis and in step with statistics packet foundation. The results display a substantial improvement inside the WSN in phrases of energy efficiency and the general overall performance of WSN [16].

RATHNA. R et al., [2012] proposed paper concerning the wi-fi sensor community for the ecological observations. A Wireless Network involves numerous sensor nodes besides a base station. The amount and type of sensors further to the proposed policies for any kind of wi-fi sensor community is decided via its use. The sensor information of the community is probably light depth, hotness, pressure, moistness. Clustering plus transmitting of statistics are the two elements which are given extra attention in this paper [17].

Zahra Rezaei and Shima Mobininejad [2012] make analysis on few communication rules intended for sensor networks. Centered on the power failure, numerous tactics are mandatory to analyze, even concurrently, to lessen the power depletion in sensor networks. At a very common level, the authors have recognized two foremost enabling methods viz.: duty cycling and information-driven tactics. Duty cycling is chiefly concentrated on the networking sub-system. The furthestmost energy-preserving process is setting the radio transmitter and receiver in the sleep state on every occasion communiqué is unnecessary. Preferably, the radio ought to be switched off the instant there is certainly no extra information is left to transmit plus must

be recommenced immediately a fresh data packet turns out to be ready. Like this, nodes substitute amid active and sleep phases subjected to network action. Duty cycle is well-defined as the portion of time nodes are lively through their lifespan. Information driven methods can be used to increase the energy effectiveness [18].

Agam et al. 2014 proposed the self-knowledge method in which SCHP is used to lower delay takes place in hyperlink permanency issue in SCHP. Each node is aware of about its neighbors by using its self-information. Receiver will send its receiving capacity and sender will ship statistics in keeping with that capacity. So hyperlink becomes more stable. In Self-understanding approach sender continues the records concerning its one hop neighbors. All the vital parameters like put off, threshold, packet length, and electricity are considered earlier than sending data to the next node. A minimal criterion is ready for all of the parameters, among all of the neighboring nodes the nodes gratifying this minimal criterion are considered for the candidates of relay node. Among these nodes the node with lowest postpone and most strength is chosen as relay node. If this node dies after someday then the following eligible candidate is selected as relay node and try is made to reconfigure the useless node. This approach offers a higher hyperlink stability than easy SCHP via keeping off congestion in the link due to the fact the sender publications the facts conferring to the capability of the receiver to simply accept. So the time and electricity wasted in re-setting up the hyperlink that can be lost due to congestion is saved that accounts in increasing the lifetime and reducing the postpone. [19]

Sk Kajal Arefin Imon et al. [20] the creator has proposed a tree arrangement established at the base station is characterized. Contingent upon different components, comprising the nodes' arrangement in WSN and the accessibility of assets, the energy utilization of nodes in various ways of the information accumulation tree might perhaps differ to a great extent, in this way influencing the general system lifespan. This paper discourses the question of lifetime amplification of WSNs in view of information accumulation trees. The authors suggest an innovative furthermore, proficient procedure, named Randomized Switching for Augmenting Lifetime (RaSMaLai), that goes for developing the lifespan of WSNs via load adjusting. Assumed an introductory information accumulation tree, RaSMaLai arbitrarily changes few sensor nodes from their unique ways to different ways with subordinate stack. The authors demonstrate that, beneath fitting settings of the working parameters, RaSMaLai joins with a little time many-sided quality. In light of the idea of limited adjusted trees, the procedure arbitrarily changes the information sending ways of nodes. They have given a basic yet

compelling exchanging procedure that outcomes in a quick merging. They have additionally introduced a disseminate usage of our plan that possesses a little overhead. A broad learning via both recreations and investigations on a genuine WSN test affirmed that their method can altogether increment the system lifespan with a lesser time intricacy as compared to the present cutting edge in an extensive variety of working circumstances.

Seifemichael B. Amsalu et al. [21] In the given paper, a routing procedure named Grid Clustering Hierarchy (GCH) which delivers a proficient energy management among WSNs has been projected. This procedure splits the network in a flexible amount of virtual grids grounded on the present average energy in the network to generate finest clusters in relationship to energy depletion. By means of a typical radio energy consumption prototype model that is frequently used for replication of WSNs, GCH is replicated in addition, its outcome is paralleled with an eminent routing procedure in WSNs termed LEACH.

Madhumathy, P. et al. [22] In this paper authors proposed an efficient routing protocol for single mobile sink and multiple mobile sinks for gathering of the data in WSNs. In this scheme, the next position of the sink is determined by using biased random walk method. After this the optimal data transmission path is found using rendezvous point selection with splitting tree technique. In case, the sink travels within the area of the rendezvous point, it receives the gathered data and if it moves out of the range, it chooses a relay node from its neighbors to pass the packets from meeting place to the sink. The scheme suggested here is effective in reducing the signal consumption and improving the triangular routing problem. The sink behaves like a vehicle and collects the data from the sensor The proposed convention adequately underpins sink portability with low overhead and induced delay when contrasted and Intelligent Agent-based Routing convention (IAR) and furthermore expands the dependability and conveyance proportion when the quantity of sources increments.

Nabajyoti Mazumdar et al. [23] In the vitality compelled remote sensor systems (WSNs), grouping is a proficient method to limit the vitality utilization of the sensor hubs. Be that as it may, the grouping calculations for WSNs with a static sink as often as possible experiences uneven vitality utilization issues, where bunch heads (CHs) assist far from sink devour more vitality in a solitary bounce correspondence, with the CHs sending its information specifically to the sink. Keeping in mind the end goal to take care of such issue, the creators have proposed a Distributed Energy-effective Clustering Algorithm for versatile sink based WSNs, where the

sink moves around the objective territory with a settled way and speed. The proposed grouping calculation, ties every sensor hub with a CH by means of single or multi-jump correspondence, where a CH transmit its information parcel to the sink when separate between them is negligible. In this manner, the controlled development of the sink around the system helps in adjusting the vitality utilization of the sensor systems. The test comes about show the proficiency of our proposed calculation over the current cutting edge calculations regarding diverse measurements like, arrange lifetime, vitality utilization, and so on.

Firoj Ahamad et al. [24] proposed an method to extend the WSN lifetime by means of fuzzy logic based selection of CH which provides absolutely non-conventional probabilistic methodology. In this method uses two fuzzy variables such as sink distance and residual energy of nodes. This method he uses multi node communication. CH have the ability to interact with both fellow cluster heads and with the Base station. Simulation result confirms the projected method in extending the WSN network lifetime.

Santar Pal Singh et al. [25], proposed algorithm called Particle Swarm Optimization (PSO) .the cluster head are selects by PSO on basis of its maximum power saving of nodes. The PSO algorithm ion simulation performs well in terms of network life time, packet delivery ratio, throughput etc., when compared with other algorithms.

Alka Singh et al. [26], propped V-LEACH in which, he introduced vice cluster head. If due to some condition cluster head fails due to lack of energy, vice cluster head will now take charge of cluster head. The cluster head was selected by Particle Swarm Optimization technique based on residual energy, distance from sink, velocity etc. On comparison with existing leach, the V-LEACH performs very well in terms of energy dissipations and life time of network increases to an extent.

Sunil Kumar Singh et al. [27] studies the different variants of LEACH Protocols that are proposed by research communal and analyses them. Based on the transmission of data from CH to sink, he classified the protocols in to two categories namely single and multi-hop communication. He analyses he protocols on various parameters such as overhead, energy efficiency. This paper discusses the various pros and cons of different variants of LEACH protocols and suggested the futures research fields in WSN

Rajat Kandpal et al. [28], proposed IL-LEACH (Improved Lifetime- Low Energy Adaptive Clustering Hierarchy). Sensor nodes that are placed in neighborhood collect correlated data then sent to the CH. the main aim of IL-LEACH is to mitigate the redundant data transmissions in the cluster with formation of virtual correlated cluster (VCC) and letting only a single node to transmit data in that TDMA slot. Simulation results validate that the proposed IL-LEACH enhances the lifetime of network when compared with present LEACH protocol.

OBJECTIVES OF STUDY

- To propose a new algorithm PIL- LEACH (PSO with IL-LEACH).
- Analyze and compare existing protocol with the proposed protocol on the basis of parameters lifetime, no of rounds, throughput.
- The proposed system will Increase the life time of networks by selecting proper nodes as cluster head which has high residual energy, will be near or a nominal distance from base station.
- Load balancing will be acquired by the proposed system with help of 2 tier architecture of cluster formations.
- Implementation of 2 tier architecture the sensor nodes can be freed from large distance communication with the help of multi hop communication.
- Nodes whose energy levels are below the average threshold energy will be kept out from the process of cluster head selection.

SCOPE OF STUDY

- On integrating PSO algorithm with existing IL-LEACH protocol the cluster head selection problem can be eliminated, which is based on conventional random probabilistic method. As a result only the nodes which are having energy levels more than the average threshold can be participated in cluster head selection process. The nodes whose energy is below the average threshold value will not participate in CH selection process.
- And with the implementation of 2 tier architecture sensing nodes will be equally distributed to an extent and sensor nodes can be freed from large distance communication with the help of multi hop communication.
- With these advancements the researchers can work on other areas such as security, routing protocols of WSN.

METHODOLOGY

We propose a technique (Improved Lifetime Low Energy Adaptive Clustering Hierarchy with Particle Swarm Optimization or PIL-LEACH) to smother the associated information transmission inside the group. This approach accepts that we know area of the sensor hubs. The arrangement centers to lessen the information transmissions in view of collection of sensor hubs into a virtual connected group (VCC). The gathering is done in view of count of an edge detecting scope (TSC) and Euclidean separation. At that point, on the premise of lingering vitality of every sensor hub, one of the hubs is chosen to transmit information from the gathering. In LEACH the hubs send information in view of TDMA plan made by the bunch head. PSO is an advancement strategy and depends on the idea of a "populace" of particles flying through the issue hyperspace with known speeds. In our proposed strategy PIL-LEACH every one of the hubs that are chosen to be in a same VCC (virtual corresponded bunch) are given same TDMA with the goal that just a single of them sends their information to the group head. Our proposed work alters the conventional LEACH. The setup is as follows:

- Member hubs pick group heads in view of flag quality and send a join_REQ ask for to the bunch heads as their demand for joining the bunch.
- Each sensor hub has a particular range in which it plays out their detecting errand.
- In the wake of getting message from the part hubs CH finds and gatherings all hubs that are in vicinity based on Euclidean separation and a Threshold Sensing Scope. Each sensor hub has a particular range in which it plays out their detecting errand. In our proposed calculation, we contrast the edge detecting scope and different hubs separate as indicated by the following Euclidean separation formula:

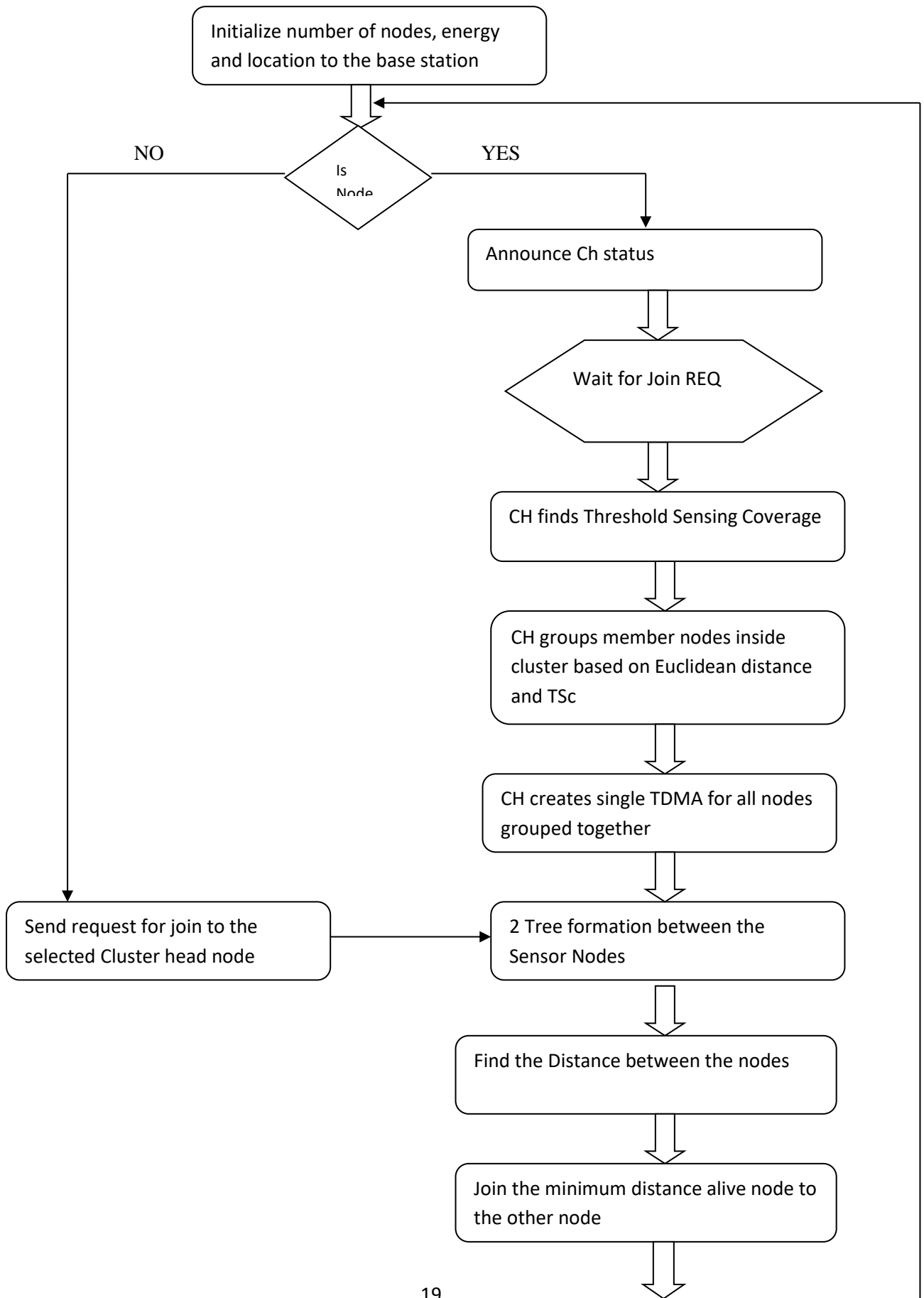
$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Where (x1, y1) and (x2, y2) are location coordinates.

- Cluster head in the wake of figuring and gathering the sensor hubs allots TDMA timetable to the part hubs. In our proposed approach every one of the hubs in the virtual connected group that is framed are given just a single TDMA space with the goal that just a single of the hubs may send its information to CH. In view of estimation of leftover vitality of the sensor hubs inside the virtual corresponded cluster (VCC), one of the hubs is chosen that would send information in the unfaltering stage.

- Select the channel by using Particle Swarm Optimization Technique.

FLOWCHART



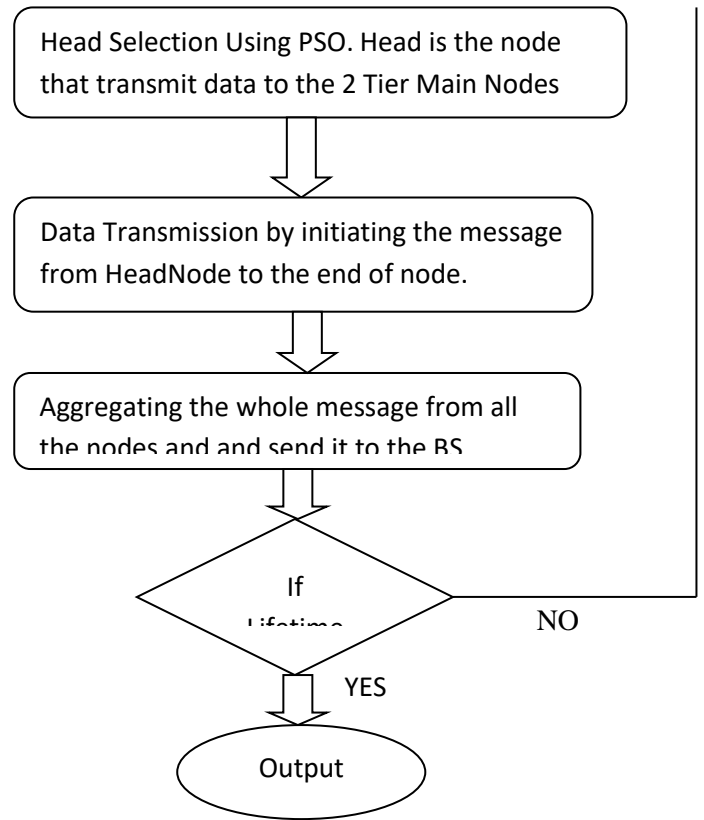


Figure 2: Flow chart of model

EXPECTED OUTCOMES

- The proposed system will Increase the life time of networks by selecting proper nodes as cluster head.
- Load balancing will be acquired by the proposed system with help of 2 tier architecture of cluster formations.
- Implementation of 2 tier architecture the sensor nodes can be freed from large distance communication with the help of multi hop communication.
- Nodes whose energy levels are below the average threshold energy will be kept out from the process of cluster head selection.
- A node that has selected as cluster head will have high residual energy, will be near or a nominal distance from base station.

CONCLUSIONS

Clustering is used as one of the methods to design routing protocols for Wireless Sensor Networks to control energy consumption of networks effectively. LEACH is the most famous type of clustering algorithms. In wireless sensor networks, energy efficient routing protocol is of the major concerns. This paper proposed a technique (PIL-LEACH) to smother the associated information transmission inside the group. This approach accept that we know area of the sensor hubs. In our proposed strategy PIL-LEACH every one of the hubs that are chosen to be in a same VCC (virtual corresponded bunch) are given same TDMA with the goal that just a single of them sends their information to the group head. Our proposed work alters the conventional LEACH.

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