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"CLUSTERING APPROACH FOR SOFTWARE FOR ALTERATION TO DEFINED WIRELESS SENSOR NETWORK"

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Abstract—As we studied Study and design of Heterogeneous WSN Network to increase the Lifetime of Wireless Sensor Network using the various LEECH Protocol) is a routing protocol in WSN which uses cluster based architecture and multi hop communication. Here the nodes are grouped together to form clusters which contains cluster head and this is selected by using distributed algorithm. And the Optimization Technique Known as • Particle Swarm Optimization (PSO) is a population-based optimization scheme. The random solutions of the system are initialized with a population and search optimal solutions in each generation. Wireless sensor network is a great boon to wireless technology which can be used in various critical applications, making it more familiar in emerging technologies which we use in our day to day life. Even though it has several advantages, it has some drawbacks like limited communication bandwidth, energy consumption etc. The purpose of the paper is to design an energy efficient cluster based routing protocol to minimize energy consumption since energy resource is the major life factor for a node. Usage of clustering concept in hierarchical protocol provides more advantages than any other traditional routing protocols. LEACH and LEACH-C are most commonly used hierarchical routing protocols. There is proposing an enhancement of LEACH-C protocol, instead of using constant round time usage of adaptive variable round time method provides a multi-hop communication between distance nodes to base station. Thus by using this method, this protocol can be used for larger geographical region with less energy consumption and less cluster head death. Here obtained by using NS2 simulator which shows the improvement of overall network efficiency by comparing with existing protocols. Wireless Sensor Networks (WSNs) are self organizing, infrastructure less and multi-hop packet forwarding networks. There is no concept of fixed base station. So, each node in the network acts as a router to forward the packets to the next node. Wireless networks are capable of handling of topology changes and malfunctions in nodes. Wireless Sensor Networks (WSNs) composes of tiny and self-organizing nodes that can acquire, process and transmit data over wireless medium. Many issues in WSNs are formulated as multidimensional optimization problems and approached through particle swarm optimization algorithm. Clustering phenomenon is adopted in many sensor applications to improve through put and scalability of the network.

Keywords— (Heterogeneous WSN Network, Leach Protocol,Particle Swarm Algorithim,)

1. Introduction

Wireless-sensor networks (WSNs) are networks of autonomous nodes used for monitoring an environment. Challenges that face by the Wireless Sensor Network is by communication link failures, memory and computational constraints, and and energy Limitation. Many issues in WSNs are formulated as multidimensional optimization problems, and approached through bioinspired techniques. We are using the Amendment techniques that is Particle swarm optimization (PSO) is a simple, effective, and computationally efficient optimization algorithm. It has been applied to address WSN issues such as optimal deployment, node localization, clustering, and data aggregation. This paper outlines issues in WSNs, introduces PSO, and discusses its suitability for WSN applications. It also presents a brief survey of how PSO is tailored to address these issues. A large amount of research activities have been carried out to explore and solve various design and application issues, and significant advances have been made in the development and deployment of WSNs. It is envisioned that in the near future WSNs will be widely used

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in various civilian and military fields, and revolutionize the way we live, work, and interact with the physical world.

2. Heterogeneous WSN Network

Heterogeneous wireless sensor network consists of sensor nodes having the different ability, such as different computing power and variation in sensing range. As Compared with homogeneous WSN, deployment and topology control are more complex in heterogeneous WSN. In this paper, a deployment and topology control method is presented for heterogeneous sensor nodes having different communication and sensing range. It is based on the irregular sensor model used to approximate the behavior of sensor nodes. Besides, a cost model is proposed to evaluate the deployment cost of heterogeneous WSN. According to experiment results, the proposed method can achieve higher coverage rate and lower deployment cost for the same deployable sensor nodes.

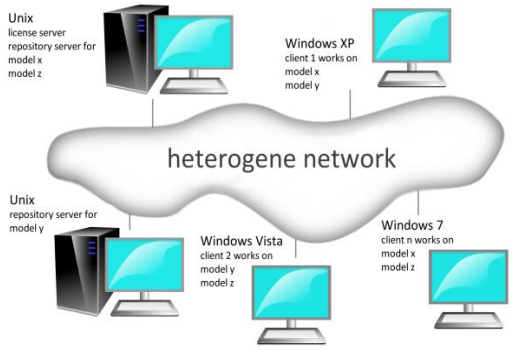


Fig.1Hetrogenous WSN.

2. LEACH PROTOCOL

The main objective of this research is to compare the performance of LEACH Proctocol and Heterogenous Protocol for Wiresless Sensor Network and measure and balance the energy level for Wireless Sensor Network. And to find the total data and Packet transmitted and received in the Network using the Leach Protocols.

ADVANTAGES OF LEACH PROTOCOL

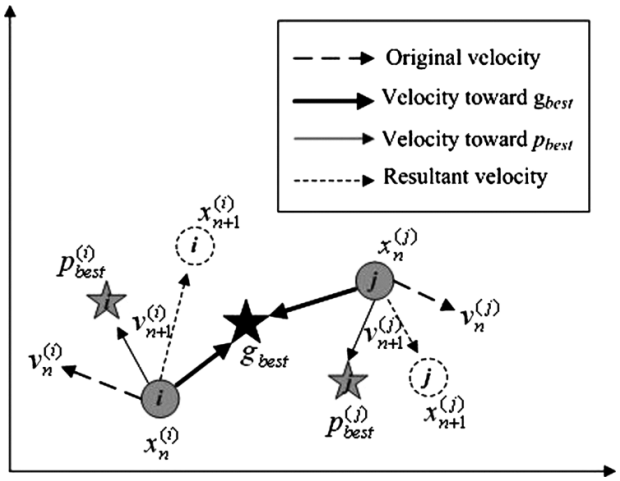
One of the advantages of LEACH is that it is completely distributed and does not require global knowledge of network. LEACH achieves over seven times more reduction in energy dissipation compared to direct communication and four to eight times as compared to the minimum transmission energy routing protocol. Leach employs dynamic clustering which increases lifetime of the system

DISADVANTAGES OF LEACH PROTOCOL

In LEACH, the cluster heads are randomly selected using a random number and not on the basis of residual energy which is the biggest disadvantage of LEACH. The set up phase does not guarantee that the nodes are evenly distributed among the cluster heads. LEACH protocol may lead to unbalanced energy distribution due to random selection of cluster head [5]. LEACH assumes that all sensor nodes have sufficient power to reach the base station as in LEACH algorithm, in the given formula there is no energy factor included, this would restrict the nodes having energy constraint [2].

3. Particle Swarm Optimization

Particle Swarm Optimization (PSO) is a population-based optimization scheme. The random solutions of the system are initialized with a population and search optimal solutions in each generation. The potential solutions in each generation are called particles. Each particle in PSO keeps the stored record for all its coordinates which are related to obtaining the better solution by following the current best particles. Fitness function of every particle is executed and the fitness value (best solution) is calculated and stored. The fitness value of the current optimum particle is called “pbest.” PSO optimizes the best population value that is obtained so far by any particle in the neighbors and its location is called lbest.



When all the generated populations are considered as topological neighbors by a particular particle, then the best value is chosen among the generated population and that particular best value is the best solution and it is known as gbest.

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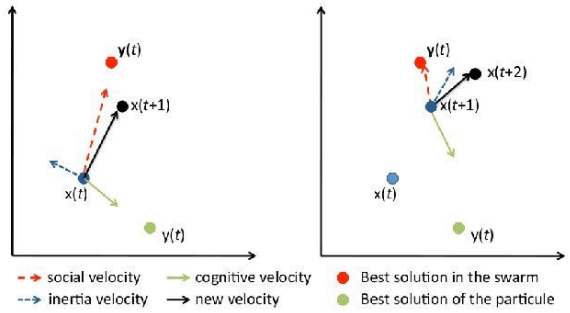


The PSO always try to change the velocity of every particle towards its pbest and lbest. The velocity is determined by random terminologies, which is having randomly generated numbers for velocity towards pbest and lbest localities. From the large deposit of generated solutions, the best one is selected to resolve the problem. The PSO algorithm always stores and maintains a record of results for three global variables such as target value or condition, gbest, and stopping value. Performance comparison with existing leach protocol shows proposed protocol provides better performance to minimize energy dissipation in the transmission and increases the life time of the wireless sensor networks, also other comparative performance metrics like End to End delay, data transmitted and total energy consumed shows proposed protocol provides better performance in comparison to existing leach protocol. PSO is initialized with a group of random particles (solutions) and then searches for optima by updating generations. In every iteration, each particle is updated by following two "best" values. The first one is the best solution (fitness) it has achieved so far. (The fitness value is also stored.) This value is called pbest. Another "best" value that is tracked by the particle swarm optimizer is the best value, obtained so far by any particle in the population. This best value is a global best and called gbest. When a particle takes part of the population as its topological neighbors, the best value is a local best and is called lbest.

Every obtained particle of PSO contains the following details.

(i) A data which can represent a global solution.
(ii) Value for velocity which will indicate the amount of data to be changed.
(iii) lbest value.

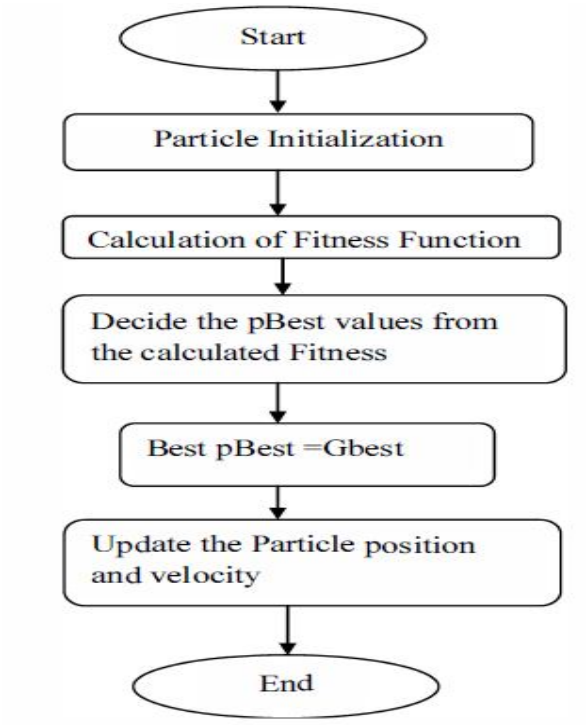


Fig.2. Execution Flow Chart

While maximum iterations or minimum error criteria is not attained

4. Control Nodes Selection Algorithim

CHs are elected from the deployed nodes based on the criteria such as residual energy, connectivity, communication cost and mobility.CH selection may be in deterministic or probalistic manner.

The pseudo code of the procedure is as follows
For each particle
Initialize particle
END

Do
For each particle
Calculate fitness value
If the fitness value is better than the best fitness value (pBest) in history

set current value as the new pBest

End

Choose the particle with the best fitness value of all the particles as the gBest

For each particle

Calculate particle velocity according equation (a)

Update particle position according equation (b)

End

From the procedure, we can learn that PSO shares many common points with GA. Both algorithms start with a group of a randomly generated population, both have fitness values to evaluate the population. Both update the population and search for the optimium with random techniques. Both systems do not guarantee success. However, PSO does not have genetic operators like crossover and mutation. Particles update themselves with the internal velocity. They also have memory, which is important to the algorithm.

5. Methodologies

To achieve the objective of this project, we have proposed following techniques;

In WSN, congestion has a direct impact on energy efficiency and application QOS. Moreover it leads to cause buffer overflow, packet loss and degrades link utilization. Thus, congestion and lifetime in a sensor networks has to be treated as a network problem.

- Increase the lifetime of network.
- Energy efficient clustering of WSN.
- Application of artificial intelligence based optimization methods in WSN.
- Develop a simulated environment of WSN having configurable parameters.
- LEACH(Low energy adaptive clustering hierarchy) is a routing protocol in WSN which uses cluster based architecture and multi hop communication. Here the nodes are grouped together to form clusters which contains cluster head and this is selected by using distributed algorithm.
- Particle Swarm Optimization (PSO) is a population-based optimization scheme.

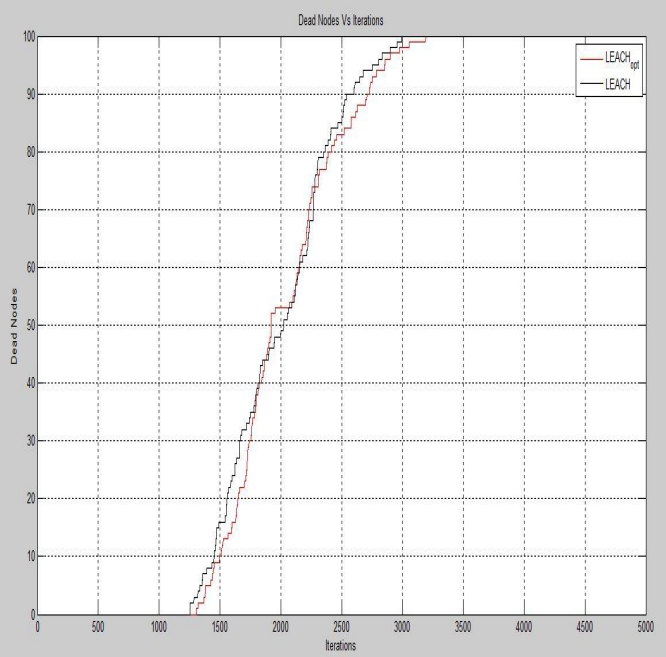
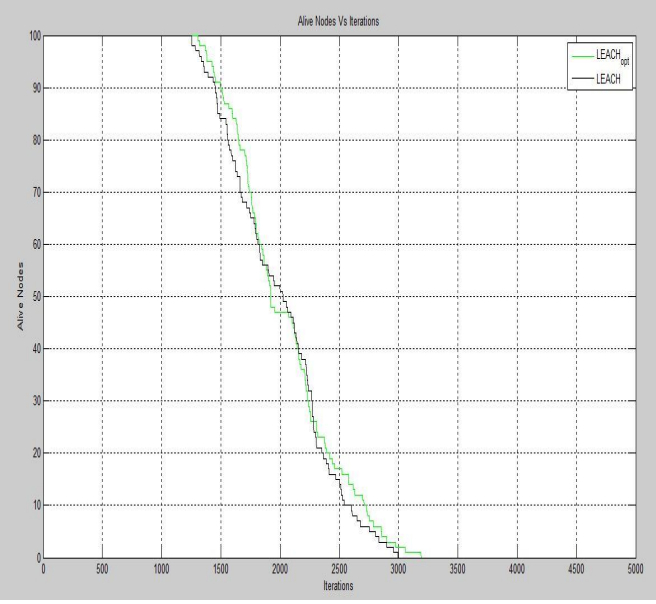
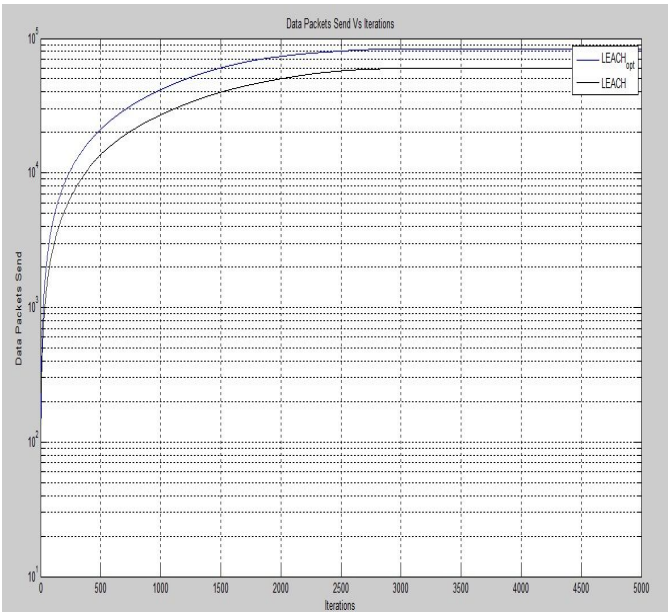


Figure 5, shows that the proposed approach outperforms LEACH protocol in terms of stability period or first node dead when the network size is 100* 100 and five cluster heads.



Total number of packets transmitted to the base station at different rounds of iterations when network size 150 * 150 and number of cluster head is 5.

In figure 6, it is clearly seen that the proposed approach outperforms LEACH protocol in terms of stability period or first node dead in the network size 150* 150 and with five cluster heads. The performance of LEACH protocols degrades almost 50% whereas the performance of proposed approach degrades only 4-5% in case of large network size. So it is evident that the proposed approach outperforms the LEACH protocol in case of large network size.



A random probability based selection in LEACH results the formation of inefficient cluster, which may cause earlier death of node .Simulation results shows that the proposed approach have higher stability period and better energy utilization as compared to existing LEACH protocol. Simulation result of Table 3 and 4 clearly evident that the Instability period is also significantly decreased in proposed approach as compare to LEACH.

6. Literature Survey

1.**Wei Xiang, Senior Member, IEEE, Ning Wang, and Yuan Zhou,"An Energy-efficient Routing Algorithm for Software-defined Wireless Sensor Networks" 2016 IEEE.**
In this paper, we presented a new energy-efficient routing algorithm for the software-defined wireless sensor networks. In our routing algorithm, the control nodes are assigned different tasks dynamically. Meanwhile, we utilize non-linear weight particle swarm optimization algorithm to create a cluster structure so as to minimize the transmission distance and to optimize the energy consumption of the network. Simulation results suggest that the proposed protocol is capable of prolonging the network lifetime.

2.I.S.Akila, Dr.R. Venkatesan ":A PSO based Energy Efficient Clustering Approach for Wireless Sensor Networks", 2016 International Conference on Computation of Power, Energy Information and Communication (ICCPEIC).
The formation of non-overlapping clusters using PSO algorithm and thereby increasing the network life time of WSN. Clustering is performed using PSO in such a way that all the members in the network should become the member of exactly one cluster. the number of iterations and scale of the network to study the equilibrium of the solutions against tradeoffs. The elimination of residual nodes formation during clustering can further be focused in the future works.

3.Basanta K. Nayak , Monalisa Mishra , Satyananda Champati Rai "A Novel Cluster Head Selection Method for Energy Efficient Wireless Sensor Network", 2014 13th International Conference on Information Technology
A novel clustering algorithm, Front-Leading Energy Efficient Cluster Heads (FLEECH), in which the whole network is partitioned into regions with diminishing sizes. In each region, we form multiple clusters. The selection of the Cluster Head (CH) is based on residual energy and distance of each node to the sink as its parameter. Simulation results show that our proposed model FLEECH outperforms Low Energy Adaptive Clustering Hierarchy (LEACH) with respect to energy consumption and extension of network life time.

4.Mao Ye, Chengfa Li, Guihai Chen1 and Jie Wu "EECS: An Energy Efficient Clustering Scheme in Wireless Sensor Networks" In this paper, we present a novel distributed, energy efficient and load balanced clustering scheme applied for periodical data gathering. EECS produces a uniform distribution of cluster heads across the network through localized communication with little overhead. What's more, a novel approach has been introduced to distribute the energy consumption among the sensors in the cluster formation phase. Simulation results show that EECS prolongs the network lifetime as much as 135% of LEACH and the total energy is efficiently consumed.

7. CONCLUSIONS

In this paper, we presented a new energy-efficient acquisition algorithm for the software-defined wireless sensor networks. In our acquisition algorithm, the ascendancy nodes are assigned altered tasks dynamically.

REFERENCE

1. I.S.Akila, Dr.R. Venkatesan ":A PSO based Energy Efficient Clustering Approach for Wireless Sensor Networks", 2016 International Conference on Computation of Power, Energy Information and Communication (ICCPEIC).

2. Wei Xiang, Senior Member, IEEE, Ning Wang, and Yuan Zhou,"An Energy-efficient Routing Algorithm for Software-defined Wireless Sensor Networks" 2016 IEEE.

3. J. RejinaParvin c. Vasanthanayaki "Particle Swarm Optimization-Based Clustering by Preventing Residual Nodes in Wireless Sensor Networks" , IEEE Sensors Journal, Vol. 15, No.8, pp. 4264-4274.20 15

4. Ragahavendra V. Kulkarni, Ganesh kumar Venayagamoorthy "Particle Swarm Optimization in Wireless Sensor Networks: A Brief Survey", IEEE Transactions on
Systems , Man ,and Cybernetics, pp.262- 267, Vol.4 1, No. 2,2011.

5. Riham S.Y.Elhabyan ,Mustapha.C.E.Yagoub "Two-tier particle swarm optimization protocol for clustering and routing in wireless sensor network", Elsevier, Journal of Network and Computer Applications , Vol. 52, pp.1 16- 128, 20 15

6. Buddha Singh , Daya Krishnan Lobiyal "A novel energy-aware cluster head selection
based on particle swarm optimization for wireless sensor networks", Springer, Humancentric Computing and Information Sciences, Vo1.13,No. 2,pp. 1- 18,20 12.

7. Buddha Singha, D. K. Lobiyala "Energyaware cluster head selection using particle swarm optimization and analysis of packet retransmissions in WSN", Elsevier, Procedia Technology Vol.33, No.4, pp.17 1176.20 12.

8. XU Jia-qi, WANG Lei, MA Can, SHU Lei, "Study of impacts of duty-cycle on overlapping multi-hop clustering in wireless sensor networks", Elsevier, The Journal of China Universities of Posts and Telecommunications, Vo1.19. No.2,pp 19-22, 20 12.

9. Houda Zeghilet, Nadjib Badache, Moufida Maimour, "Energy Efficient Cluster-based Routing in Wireless Sensor Networks", IEEE symposium on computers and communication 2009, ISCC- 2009. Pages: 701-704.

10. Sung-MinJung, Young-JuHan, Tai-MyoungChung, "The Concentric Clustering Scheme for Efficient Energy Consumption in the PEGASIS", IEEE/ International Conference on Advanced communication Technology.2007, Vol: 1, pp: 260-265.

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