IJCSE International Journal of Computer Sciences and Engineering Open Access
Research Paper Vol.-7, Issue-6, June 2019 E-ISSN: 2347-2693

Low Energy Adaptive Clustering Hierarchy (LEACH) Protocol for Extending the Lifetime of the Wireless Sensor Network

R.Ghosh[1*], S. Mohanty[2], S. Pramanik[3]

[1, 2] School of Computer Engineering, KIIT Deemed to be University, Bhubeneswar, Odissa, India
[3] Department of Computer Science and Engineering, Haldia Institute of Technology, Haldia, West Bengal, India

Corresponding Author: ramkr.ghosh@gmail.com

DOI: https://doi.org/10.26438/ijcse/v7i6.11181124 | Available online at: www.ijcseonline.org

Accepted: 17/Jun/2019, Published: 30/Jun/2019

Abstract— Wireless Sensor Network (WSN) is demanding and very appealing technology useful for different applications. WSNs consist of wirelessly interconnected sensor nodes (SNs) which can assemble, distribute and process information in a range of application regions. Power utilization in WSN is a key difficulty. Some of the usages comprise landslide detection, glacial monitoring, wildlife tracking, health care, military applications, environmental monitoring and a large number of applications to robotics and projects on "internet of things". Our paper will illustrate the primary characteristics of WSN followed by power consumption protocol LEACH. Here we have carried out the comparative performance analysis of power consumption protocol LEACH at different energy levels and multi-path factors.

Keywords— WSN, LEACH, Cluster Head, Hierarchical routing protocols, Network Life time

I. INTRODUCTION

A WSN comprises of a huge amount of minute SNs used to scrutinize regions, assemble and report data to the base station (BS). Due to the achievement in lesser power digital circuit and wireless transmission, most of the usages of WSN are employed and utilized in defence usages, object capturing, habitat supervision and so on. A classic WSN is composed of a huge quantity of SNs, which are scattered over the sensor network at random. The signals are chosen by all kinds of sensors and the data attaining unit, processing and conveying them into a SN known as *sink node* or BS. The BS needs for the sensor information by redirecting a query all over the sensor network. When the SN finds out the information identical to the query, the reply communication is sent back to the BS. The power preservation of the sensor network can be diminished by permitting the porting of the SNs called cluster heads (CHs). The information assembled from the SNs are added and compacted by the CHs. After that, the assembled information is redirected to the BS, although it has a number of difficulties. The most important difficulty is power dissipation and it is directed on the CHs. With the purpose of determining this concern, the cluster routing can be applied to disseminate the power wastage with the CHs.

Data collection is a well organized scheme for saving power in sensor networks. The key principle of data collection is to eradicate the unnecessary data and save communication power [1-3]. An algorithm for data collection consists of some collection techniques to lessen the data traffic. It diminishes the quantity of communication interchange among the SNs and BS. The achievement of data collection in WSN can be identified dependent upon the speed at which the sensing data can be accumulated and sent out to the BS. Specially, the approximate computation to acquire the shortcomings of gathering processing in WSN is the capability for many-to-one information gathering. Information collection capability reveals how capable BS can assemble sensing data from every sensor under the occurrence of intrusion. Carrying out the data collection role over CH yet will produce noteworthy power wastage. In homogenous WSNs, CH will rapidly expire and re-clustering needs to be begun. It causes higher energy consumption.

In our research paper, a power-proficient LEACH Protocol has been initiated. The planned technique focuses on defining a power -proficient routing dependent upon LEACH clustering and best CH election. The Gaussian distribution representation is included for the SN exploitation. The data are conveyed from the various sources to the BS relying on power-proficient routing scheme.

The remaining part of our paper is prepared as follows. Section 2 demonstrates a literacy review. Section 3 presents the benefits and drawbacks of LEACH. Section 4 describes

Energy Model. Section 5 shows the simulation results. Section 6 draws about the conclusions.

II. LITERACY SURVEY

WSNs shown in Fig. 1 present an ample of benefits such as portability, flexibility, improved productivity, deplorability, mobility and lesser setting up expenses. WSNs are scattered network of all tiny and light weighted SNs that can sense physical parameters such as temperature, pressure etc.

A wireless sensor node has a little quantity of memory for keeping programs and data .In WSN; numerous sensors are connected jointly via communication links of radio frequency. Different sorts of Dos attacks can change a sensor network. If affected SN continues to switch over information with adjacent SNs and leads to reduce its power then the SN is stated as dead node which is worst case.

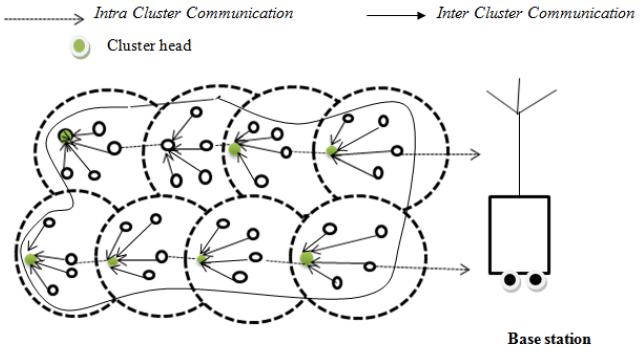

Fig 1: Wireless Sensor Network

The WSN carries out computation which comprises of data mining, data correlation, etc [4-5]. The foremost goal of routing protocols is to lessen the power expenditure and boost network life span. Sensor Network lifespan can be enhanced by employing different protocols for routing that consume a lesser amount of energy opted for path between SNs and BSs. There are three different sorts of protocols for routing dependent upon the Sensor Network architecture [5]-

1. Flat protocol- Here SNs are positioned evenly and carry out the identical task i.e. every SN is at the identical level within the sensor network.
2. Hierarchical protocol-Here SNs are organized into clusters and the SNs which have utmost power is called as CH. CH is accountable for gathering data from SNs of their cluster and taking out redundancy among gathered data to lessen power necessity for sending out of data packets from CH to BS e.g. LEACH, Stable Election Protocol (SEP), TEEN, APTEEN, etc [10].
3. Location based protocol- SNs are distinguished dependent upon their position within sensor network. Distance among SNs are computed dependent upon strength of the signal, higher is the strength of signal smaller is the distance between SNs. A number of protocols dependent upon position permit SNs to come into sleep mode if there is no action that is happening at that specific SN.

Among the sorts protocols for routing of WSN, FLAT protocols have lowest amount of overhead to uphold resources [9].The major goal of our work is to review LEACH protocol and compare the performance analysis of that protocol at different energy levels and different multi path fading factors.
An ample of research activities have been carried out on the part of energy proficient data gathering in WSN, while the primary task of the WSN is to effectively assemble the information with minor power spending. Usually large no of algorithms based on data gathering are planned to diminish the energy exploitation difficulty.

Liu et. al [7] have proposed a low power irregular cluster protocol design technique. Their work aims at the arbitrary selection for CH of conventional LEACH protocol, and the shortcoming of the single hop from the entire CHs to the BS, an enhanced way for LEACH protocol. Initially, the selection model of CH is enhanced, and the SN remaining power is thought in the threshold method and the CH election to advance the entire sensor network lifespan. In the multi-hop way, deciding the utmost power and the adjacent SN as the next hop and a route transporting information among a lot of clusters is created. Their research illustrates the scheme having vast development in comparison LEACH protocol and extending the network lifespan.

Malik et. al [8] in their work has mentioned a concise introduction to the challenges for routing in WSN. Their paper furthermore presents the fundamental categorization of protocols for routing in WSNs along with the most power competent protocol named LEACH along with its benefits and shortcomings. Their work as well focuses on a number of of the enhanced version of LEACH protocol.

Roseline et. al [18] In their paper have presented a study of protocols for routing and algorithms employed in WSNs with power competence as the major objective.

Chunyao FU et. al [22] have gone through regarding an algorithm of power balanced LEACH Protocol in WSN. In reply to the irregular power allocation that is created by the chance of CH formation. Opting for CHs arbitrarily in LEACH protocol creates that the existing power of a number of CHs are less or their distances to BS are far away, due to

the profound power burden, the CHs will expire quickly. For this concern, their article has initiated a fresh superior algorithm of LEACH protocol which aspires at balancing power utilization of the entire sensor network and enhancing the sensor network lifespan by balancing the power utilization of those CH.

Sapna Choudhary et al. [23] have demonstrated the review of LEACH Protocol and adapted versions of this protocol in WSN. LEACH protocol that is one of the power competent protocols for clustering. LEACH is a resourceful protocol in extending the sensor network lifespan by consuming a little proportion of the total used up power in the WSN. In their paper, a familiar protocol in WSN known as LEACH is explained. LEACH is foremost little power protocol initiated in WSN which set aside power and boost sensor network lifespan. With the amount of benefits of LEACH protocol it too arrives with a quantity of drawbacks. To overcome those difficulties a lot of ancestors of LEACH protocol have been commenced and several of them like C -LEACH, MLEACH, E-LEACH and VLEACH are explained in their paper that how those protocols overcome the shortcomings of the LEACH protocol and create the networks further capable.

Authors in [24] have evaluated a sensor network life span of LEACH, LEACH-C and LEACH GA by altering the probability of CH and initial SN energy.

Yassein et al. in their paper have explained the structural design of the LEACH protocol, the phases of LEACH, the algorithms that are dependent on the LEACH protocol, the improvements to the LEACH protocol, a evaluation between the LEACH modifications, the attacks against LEACH and its security ways, and a quantity of the systems for identifying the attacks.

LEACH

LEACH is a power competent cluster-dependent hierarchical protocol for routing. The key characteristic of LEACH is that it outlines a local cluster and opts for its CH for communication with the BS. CH is accountable for routing and communication in its specified time period and combines local data before communication. The CH is preferred within several restrictions at random. Normally, the SN with the maximum residual power will perform as the CH so that it can guide the collection of SNs for a longer period of time than other SNs in the cluster. Once the CH is preferred, it will convey the other SNs a message to connect in the cluster. Nevertheless, SNs other than the CH will decide their CH dependent on smallest amount of communication power required for their transmission. Once a cluster is created, the CH decides the transmission plan for its SNs.

A variety of phases of LEACH are given below.

1. Advertisement phase
2. Cluster setup phase
3. Schedule creation phase
4. Data transmission phase

1. Advertisement phase- Throughout the time for cluster creation, if a SN needs to be a CH, it might pick a random number between 0 and 1. If the random number elected by SN is less than the threshold value $T(n)$, it will be designated as CH. The formula to compute Threshold (T(n)) is

$$T(n) =$$

Where r is the current round, p is the required percentage of clusters and G is set of SNs that have not been elected CHs in the previous 1/p rounds [6]. When $r = 0$, every SN is eligible to be a CH. Once a SN has acted as CH in r = 0, it will not be appropriate for 1/p rounds, so the chance of being a CH will rise for other SNs. One time the CH is elected, all CHs SNs broadcast at the identical signal strength. The non-CH SNs obtain the message and decide a CH dependent upon signal strength, where higher signal strength points to nearer proximity to the CH. Higher signal strength/nearer proximity involves the smallest amount transmission power to CH.

2. Cluster setup phase- Dependent upon the inward signal strengths, a SN picks
its individual CH and conveys the respond message to the CH, of that it is an associate.

3. Schedule creation phase- The CH upholds its member listing, locates a Time Division Multiple Access (TDMA) for SNs and relays the transmission plan to its associates.

4. Data transmission phase. Cluster associates converse to the CH until the radio is switched off. Once the CH has obtained every information from its associates, it constricts it to a single signal and communes it to the BS.

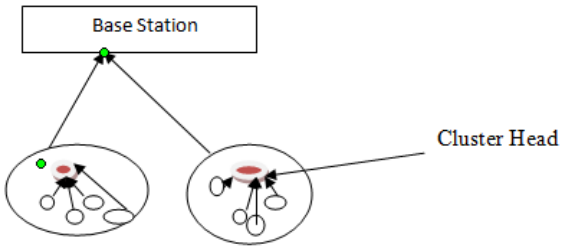

Fig 2: Sensor Nodes with Clusters

The key purposes of LEACH protocol are i. amplify lifespan of the sensor network. ii. diminish power consumption of SNs. iii. lessen the quantity of transmission messages.

To fulfil the aforementioned purposes the SNs organize themselves into clusters. As shown in the Fig. 2, member SNs of a cluster transmits their individual information to the CH that is accountable for transporting the gathered information from its entire member SNs to BS.

Luan et al. [19] have suggested an algorithm built upon LEACH by combining SN Degree and residual power of

WSNs. The CH is selected dependent upon the quantity of linked SNs and the highest residual power.

Taneja and Bhalla [20] planned an enhanced version of LEACH: Three Levels Hierarchical Clustering LEACH Protocol (TLHCLP) for Homogeneous WSNs. BS is thought as the location center and a fixed radius is exploited. SNs are well-organized like within SNs.
Authors in [11]-[16] have shown their keen interests on routing protocols in WSN.

III. MERITS AND DEmerits of LEACH

It maintains the majority of the communication within the clusters, and thus offers scalability in the sensor network. It presents benefits similar to
1. Single-hop routing from SN to CH, so reducing power.
2. This protocol does not need information for the position of the SNs to outline the clusters. Consequently, this is commanding and easy.
3. This protocol boosts sensor network lifespan in three ways. Initially, allocating the job of CH to the other SNs. Secondly, combining the information by the CHs. Finally, TDMA, which given by the CH to its associates, puts most of the sensors in sleep mode, especially in event-dependent usages. Hence, this is competent to boost the network lifespan and acquire a more than 7-fold lessening in energy dissipation contrasted to direct communication [17].

With the quantity of benefits of LEACH protocol it too arrives with a number of difficulties like

1. CHs directly commune with BS—there is no inter cluster communication, and it desires high transmission power. Therefore, this will not perform fine in large- scale sensor networks that necessitate single-hop communication with BS.
2. Extra overheads because of CH changes and calculations leading to power ineffectiveness for active clustering in vast sensor networks.
3. CHs are not evenly distributed; CHs could be situated at the edges of the cluster.
4. CH selection is random, which does not take into consideration power utilization.
5. LEACH is not appropriate to sensor networks that are utilized in large region as it employs single hop routing where every SN can transmit directly to the CH and BS.

IV. ENERGY MODEL

The energy model used in LEACH protocol assumes that transmission energy is made up of a constant amount of energy and propagation energy proportional to the transmitter – receiver separation distance raised to a power of 2 or 4 relying on whether the distance is larger or smaller than cross over distance shown in Fig. 3. The transmission energy relies on the amount of bits transmitted. In WSN a model for energy outlined in physical layer explained in [21] utilized for analysing loss of power in every SN while communing with other SNs. There are two channel propagation models employed are the free space (d^2 loss of power) for the purpose of one-hop or direct communication and the multi-path fading channel (d^4 loss of power) for transmission of packet by means of multi-hop. Consequently, the power utilized for this variety of transmission of a l-bit packet over distanced d is computed in equation 3.

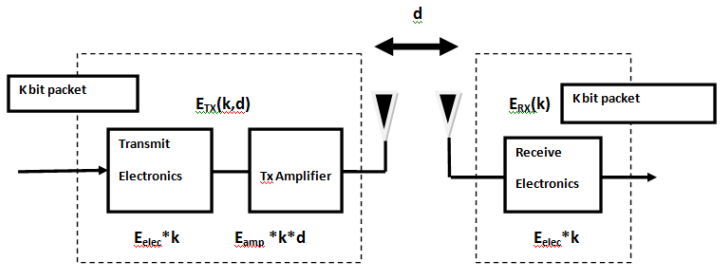

Fig3: Radio Energy Model

The energy needs to transmit l bit message is

$E_{tx} = lE_{elect} + l\mu d^n$ - (2)

Where l is the number of bits transmitted.
E_{elect} is the energy consumed per bit.
μd^n is the propagation energy per bit.
The factor μ is a constant that depends upon propagation loss.
d is the distance of transmission.
The whole power consumed is calculated as

$E_{tx}(l,d) = lE_{elec} + lE_{fs}d^2, \quad d \le d_0$

$lE_{elec} + lE_{mp}d^4, \quad d > d_0$ -(3)

$E_{rx}(l) = lE_{elec}$ -(4)

Where E_{elec} represents the energy consumed to transmit or receive l bit message. E_{fs} denotes the amplification coefficient of free space signal ,E_{mp} indicates the multi path fading signal and d represents the distance between the transmitter and receiver; l signifies the bit amount of sending information.
All SNs are separated into n clusters at random, if the value of n is very little, several clusters will expire previously because of energy draining, and this scheme will influence the life time of the sensor network. If the worth of n is very big clusters require convey broadcast messages to every SN.

V. SIMULATION RESULTS

We have done this simulation using MATLAB 13. The specifications for the performance of LEACH protocol are given in Table 1. We have carried out simulation for 4500 rounds.

Table 1: Specifications for the performance of LEACH protocol

Specifications	Values
BS Position	50, 50
Size of the network	300m
Number of sensor nodes	100
CH probability	0.1
Initial Node energy	0.25J, 0.5J, 1.0J
Energy Dissipation (Efs)	10pj/bit/m^2
Energy for transmission (ETx)	50nj
Energy for reception (ERx)	50nj
Data Aggregation	5nj/bit/signal

Table 2: Performance of LEACH protocol at Initial Energy 0.25J

Death of First node (in rounds)	Death of Half of the nodes (in rounds)	Death of Last node (in rounds)
137	329	834

Table 3: LEACH protocol at Initial Energy 0.50J

Death of First node (in rounds)	Death of Half of the nodes (in rounds)	Death of Last node (in rounds)
265	728	1558

Table 4: LEACH protocol at Initial Energy 1.0J

Death of First node (in rounds)	Death of Half of the nodes (in rounds)	Death of Last node (in rounds)
711	1709	3167

The throughput for LEACH protocol at different energy levels is shown in Fig. 4, Fig. 5, Fig. 6. Also we have shown in Fig. 7, Fig.8 and Fig. 9, the throughput of the protocol at initial energy level 0.25J and different Multi path factors 0.0013 pj/bit/m^4, 0.0050 pj/bit/m^4 and 0.0065 pj/bit/m^4 respectively.

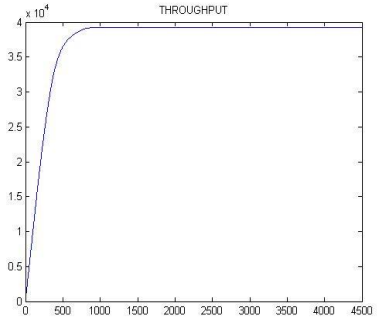

Fig. 4: Throughput at energy level 0.25

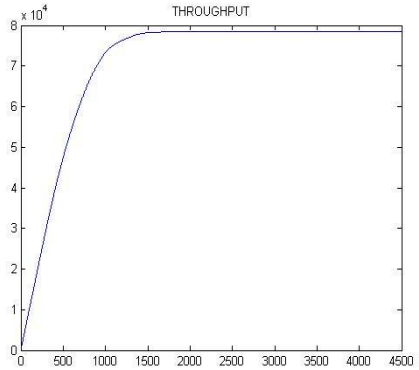

FIG. 5: THROUGHPUT AT ENERGY LEVEL 0.50

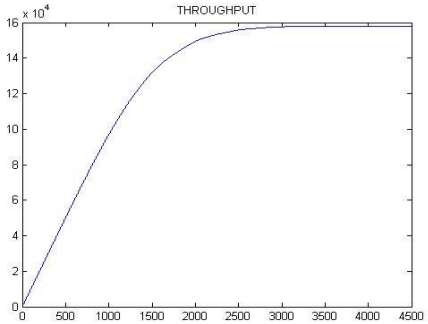

Fig. 6: Throughput at energy level 1.0

Table 5: LEACH protocol at Initial Energy 0.25J and Multi path factor 0.0013 pj/bit/m^4

Death of First node (in rounds)	Death of Half of the nodes (in	Death of Last node (in

	rounds)	rounds)
131	372	886

Table 6: LEACH protocol at Initial Energy 0.25J and Multi path factor 0.0050pj/bit/m^4

Death of First node (in rounds)	Death of Half of the nodes (in rounds)	Last node dies(in rounds)
30	178	883

Table 7: LEACH protocol at Initial Energy 0.25J and Multi path factor 0.0065 pj/bit/m^4

Death of First node (in rounds)	Death of Half of the nodes (in rounds)	Death of Last node (in rounds)
37	226	813

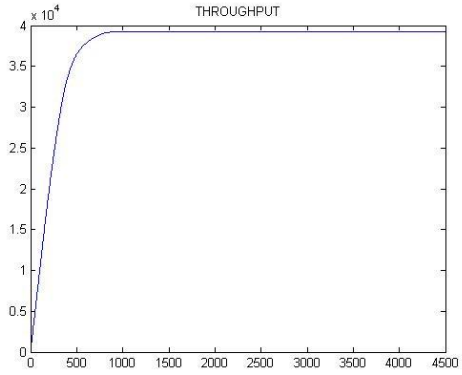

Fig. 7: Throughput at Initial Energy 0.25J and Multi path factor 0.0013 pj/bit/m^4

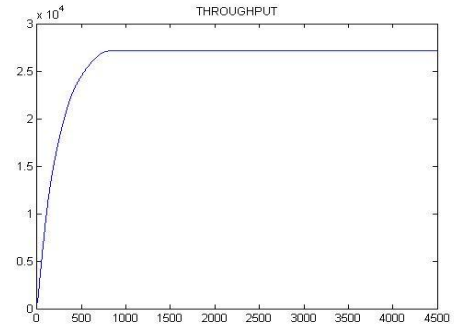

Fig. 8: Throughput at Initial Energy 0.25J and Multi path factor 0.0050 pj/bit/m^4

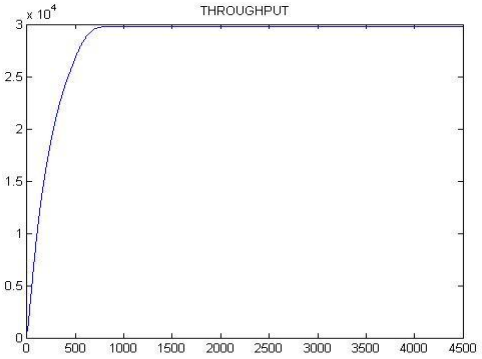

Fig. 9: Throughput at Initial Energy 0.25J and Multi path factor 0.0065 pj/bit/m^4

From the above figures and tables, it is clear that throughput varies for different initial energy levels as well as for different multi path factors at same initial energy level.

VI. CONCLUSIONS

In our paper, a well-liked protocol in WSNs called Low Energy Adaptive Clustering Hierarchy (LEACH) is described to progress the lifespan of the WSN. Earlier LEACH was the protocol which has number of boundaries with regard to energy utilization, lifespan, non-uniform distribution, etc as compared to the other protocols in hierarchical routing i.e. TEEN, APTEEN, and PEGASIS. But, still all these other protocols have some restrictions. Therefore it is not appropriate to make use of any particular protocol for any precise application. With the number of benefits of LEACH protocol it also comes with some shortcomings. To decrease energy utilization and boost sensor network life span and stability, clustering is utilized. In this work, we have carried out comparative study of LEACH at different initial energy levels and multi-path factors and shown the simulation outcomes.

REFERENCES

[1]. Y-h Zhu, W W-d, J Pan, T Y-p, "An energy-efficient data gathering algorithm to prolong lifetime of wireless sensor networks", Comput. Commun. , Vol. 3, Issue.3, pp.639–647, 2010.
[2]. S Gao, H Zhang, SK Das, "Efficient data collection in wireless sensor networks with path-constrained mobile sinks", IEEE Trans. Mob. Comput., Vol. 10, pp. 592–608 , 2011.
[3]. MH Anisi, AH Abdullah, SA Razak, "Energy-efficient data collection in wireless sensor networks", Wirel. Sens. Netw., Vol. 3, pp.329-333 ,2011
[4]. C.S Raghavendra, K.M. Sivalingam, T.Z Eds, "Wireless Sensor Networks", Kluwen Academic, NewYork, 2004.

[5]. E. Cayirci, R. Govindam, T. Znati, M. Srivastava, "Wireless sensor networks", Int. J. Conmput. Telecommun. Netw., Vol.43, Issue. 4 , 2003.
[6]. R. Kaur, D.sharma, N.Kaur, "Comparative analysis of LEACH and its descendant protocols in wireless sensor network", Int. j. P2P Netw.TrendsTechnolol., Vol.3, Issue. 1,2013.
[7]. Yi Liu, Shan zhong, Licai you, Bu LV, Lin Du," A Low Energy Uneven Cluster protocol Design for wireless sensor network", Int. j. Communications, Network and System Sciences, Vol. 5, pp. 86-89, 2012.
[8]. M. Malik, Y.Singh, A. Arora, " Analysis of Leach Protocol in Wireless Sensor Networks",Internatrional Journal of advanced Research in Computer Science and Software Engineering, Vol. 3, Issue. 2, 2013.
[9]. L.Y. Ming, V.W.S.Wong, "An energy efficient multi-path routing protocol for wireless micro sensor networks",research articles. Int. J. Commun. Syst., Vol. 20, Issue. 7, pp.747-767, 2007.
[10]. W. Heinzelman, A. Chandrakasan, H. Balakrishnan, "An Application- specific protocol architecture for wireless microsensor networks", IEEE Transactions on Wireless Communication, Vol. 1, Issue. 4, pp. 660-670, 2002.
[11]. J. Peng,W. Chengdong, C. Fei, " A Low-Energy Adaptive Clustering Routing Protocol of Wireless Sensor Networks", in Proceeding of 7th IEEE on Wireless Networking and Mobile Computing 2011.
[12]. G. Smaragdakis, I.Matta, A. Bestavros," SEP: A Stable Election Protocol for clustered heterogeneous wireless sensor networks",in: Second International Workshop on Sensor and Actor Network Protocols and Applications(SANPA 2004),2004.
[13]. L. Qing, Q. Zhu, M. Wang," Design of a distributed energy efficient clustering algorithm for heterogeneous wireless sensor networks", Computer Communications, Volume 29, Issue .12, pp. 2230-2237, 2006.
[14]. A. Manjeshwar , D. P. Agarwal," TEEN: A Routing Protocol for Enhanced Efficiency in Wireless Sensor Networks", IEEE Computer Society Washington, DC,USA, 2001.
[15]. C. Siva Ram Murthy and B.S Manoj ," Adhoc Wireless Networks Architectures and Protocols", Prentice Hall Communication Engineering and Emerging Technologies Series, 2004.
[16]. S. Bandyopadhyay , E.J Coyle,"An energy efficient hierarchical clustering algorithm for wireless sensor networks", in Proceedings of INFOCOM 2003, April 2003.
[17]. J. Xu,N. Jin, X. Lou,T. Peng,Q.Zhou,Y.Chen"Improvement of LEACH protocol for WSN" 2012 IEEE.
[18]. R.A.Roseline, .P.Sumathi, Energy Efficient Routing Protocol and Algorithms for Wireless Sensor Networks-A Survey. Global Journal of Computer Science and Technology, Vol.11, December 2011.
[19]. W.C.Luan, B.S. Zhu,,C. P.ei. ,"An Improved Routing Algorithm on LEACH by Combining Node Degree and Residual Energy of WSNs. – Internet of Things", Communications in Computer and Information Science, Vol. 312, pp. 104-109, 2012.
[20]. H.Taneja,P. Bhalla. An Improved Version of LEACH: Three Levels Hierarchical Clustering LEACH Protocol (TLHCLP) for Homogeneous WSN. – International Journal of Advanced Research in Computer and Communication Engineering, Vol. 2, Issue. 9, pp. 3610-3615, 2013.
[21]. J. Wang, X. Yang, T. Ma, M. Wu, and J.-U. Kim, "An energy efficient competitive clustering algorithm for wireless sensor networks using mobile sink," International Journal of Grid and Distributed Computing, Vol. 5, Issue. 4, pp. 79–92, 2012.
[22]. C. FU, Z. JIANG, W. WEI, A.WEI, "An Energy Balanced Algorithm of LEACH Protocol in WSN" IJCSI International Journal of Computer Science Issues, Vol. 10, Issue. 1, No 1, January 2013.
[23]. S. Choudhary, S. Sharma, "A Survey of LEACH Protocol and its Modified Versions in Wireless Sensor Network" International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 4, Issue. 1, January 2014.
[24]. P.Sivakumar, M.Radhika, "Performance Analysis of LEACH-GA over LEACH and LEACH-C in WSN", 6th International Conference on Smart Computing and Communications, ICSCC 2017, 7-8 December 2017, Kurukshetra, India, Procedia Computer Science Vol.125, pp.248–256, 2018.
[25]. M.B.Yassein, S.Aljawarneh, R.K. Al-huthaifi, , Enhancements of LEACH protocol: Security and open issues, 2017 International Conference on Engineering and Technology(ICET),IEEE,10.1109/ICEngTechnol.2017.8308164,2018.

Authors Profile

Mr. R. Ghosh is a PhD scholar of CSE in KIIT Deemed to be University, Bhubeneswar, Odissa, India. He has total 11 years experience out of which 10 years teaching experience and 1 year industerial experience. He completed M.Tech in IT from Jadavpur University after having qualified in GATE 2007 on paper IT with score 438 and with all India rank 180. He has published many international journals and engineering books. His research interests include Wireless Sensor Network, Cryptography, Soft Computing etc. He travelled all over India through his teaching only.

Dr.Suneeta Mohanty is an Assistant professor of School of Computer Engineering in KIIT Deemed to be University, Bhubeneswar, Odissa,India. She is a Doctorate in Computer Science and Engineering. Her research interests include Wireless Sesor Network,Cloud Computing etc.

Mr. Sabyasachi Pramanik is an Assistant Professor of CSE in Haldia Institute of Technology, Haldia,West Bengal, India. He has 12 years teaching experience. His research interests include Cryptography, WSN etc.

