AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume:4 Issue:2
November 2021
Impact Factor:5.7
Subject:Science

Graded node deployment with Improved M-LEACH protocol to increase lifetime of WSN

S. Reeta Ponmalar[1], Prof. V.K. Sharma[2]
[1]Research Scholar, Deptt. Of ECE, Bhagwant University, Ajmer, Rajasthan
[2]Professor, Deptt. Of ECE, Bhagwant University, Ajmer, Rajasthan

ABSTRACT

Wireless network networks (WSNs) cover a large number of battery-operated wireless nodes and are compressed by a power supply. The entire network should reduce power consumption to allow for offline and unsupervised operation for a long time. A basic way to reduce such power consumption and extend life is by carefully positioning the sensors nodes in the network area. Current work suggests a lifelong node improvement strategy. In particular, many nodes are located near the sink, taking advantage of the fact that the nodes near the sink are consuming more energy. The life of WSN can be extended by various router protocols. LEACH is a low energy saving protocol. In this paper an improved M-Leach protocol is introduced when the sensor node takes care of the current power to select a cluster head that solves the problems of low power nodes selected as cluster heads.

Keywords: LEACH, M- LEACH, WSNs, Energy etc.

INTRODUCTION

In a wireless sensor network (WSN) sensory data is usually sent to a base station that connects the sensor network to other networks (possibly the Internet) where data is collected, analyzed and processed appropriately. An action is taken.

In very small sensory networks where the base station and the MOTs (sensor nodes) are so close that they can communicate directly with each other, small multi-hop communication nodes produce and transmit not only their own objects but also other sensors. and acts as a channel towards the channel. The process of finding the right route from the source location to the destination is called a route and is the main responsibility of the network layer. The single-hop connection but in many WSN systems the cover area is so large that thousands of metal are selected. Knowledge of network structure and router protocols is very important

ISSN: 2320-3714
Volume:4 Issue: 2
November 2021
Impact Factor: 5.7
Subject: Science

and should be adapted to the usage requirement. Finally the performance analysis of the various router protocols was performed using WLAN and a ZigBee-based wireless network network. Nodes should be set and this condition requires multi-hop connection as most of the sensor nodes are far from sync area (gateway).) so that they can communicate directly with the base channel. Single-hop communication is also called direct communication and multi-hop communication is called indirect communication.

LEACH protocol

Low energy adaptive clustering hierarchy (LEACH) LEACH incorporates a route protocol first proposed by MIT's Chandrakasan designed for a flexible wireless network network algorithm. The algorithm randomly selects group heads, and some nodes split into groups depending on the signal strength received from the group header. LEACH defines the concept of "wheel" (Round), and each wheel is made from two stages of group stability and establishment. LEACH protocol with an algorithm distributed to form a cluster, each node independently determines to function as a cluster node in the current round. Each 'n' node should be randomly assigned between 0 and 1. If the random number is below the T (n) threshold, then the node is selected as the current cycle of the group head node.

T (n) is defined as

T(n)= {p / (1-p) (rmod(1/p))) n € G

If not When p is the cluster head of an expected batch for all percentage of sensory nodes, r the number of rounds performed, G is in the last 1 / p rounds are not given as a set of cluster head nodes. After the cluster head node is selected as node header, each cluster header transmits information that becomes cluster head (ADV), another non-cluster node header according to the received signal information to determine which cluster to add, and send a request to join the cluster head . When a cluster head node receives members from the "Subscribe" message from members, it generates a TDMA time slot for the allocation of each member based on the number of node members, thus ensuring that there is no conflict between data sources, where each node knows the location its time and apply a stable function. In the stable phase, the node members who are part of their time send data to the header group, while the radio module can always be turned off and go into sleep mode, which is one of the main ways to save. LEACH power. After the Cluster head node receives the data collected by the node members, it will compile the data and send it to immersion C.

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume:4 Issue: 2
November 2021
Impact Factor:5.7
Subject:Science

The advantage and disadvantage of LEACH

The LEACH algorithm uses hierarchical, head of the collection, in a way to combine data to reduce data traffic. The LEACH algorithm is a randomly selected group, with rotation selection so that high power consumption will be distributed evenly across all nodes in the network. Therefore, compared to standard multi-hop track systems and robust integration algorithms, LEACH can extend the network life cycle by 15%.

The choice of cluster head node ignores residual power, location, and other information, which can easily cause cluster head node to fail immediately. In addition, LEACH assumes that all nodes can be directly connected to the cluster head node and base station node connections, while the actual network of basic channels is usually far from the sensor area, causing the cluster head, to be remote. Basic channel, easy to fail. So network expansion is not feasible.

THE IMPROVED MULTI-HOP (LEACH-M) ROUTING ALGORITHM

A . Algorithm proposed

In wireless communication, node power consumption works with the same wireless communication model in the literature [2]. The two communication models are: free space model and aging models with multiple options. If the distance between the sending point and the receiving node is less than a certain value of d0, a free space model is used. Transmission capacity reduced d2; otherwise, the transmission capacity was reduced d4. If you are sending K bit data in grade d, the recipient can use the following formula to calculate their power consumption:

$$E\_sx(k,d) = \{k\ E\_elec + k\mathcal{E}f\_s\ d\text{^}2$$
$$k\ E\_elec + k\mathcal{E}\_mp\ d\text{^}4$$
$$d < d\_0$$

Similarly, receiving K bit data consumed energy

$$E_{Rx}(k) = k\ E_{elec}$$

Where E_{elec} means wireless transmission line so as to consumed energy Ɛ fs and Ɛ mp while receiving and transmitting data.

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume:4 Issue: 2
November 2021
Impact Factor:5.7
Subject:Science

In general cluster heads consume other while receiving and transmitting data the energy consumption of cluster head is given by

$$E_H = n\left[E_{Rx}(k) + E_f\right] + E_{sx}(k,d)$$

The above analysis shows that the volume of the sensory node is very limited.if all nodes that directly connect to the channel may die soon .the simple multi hop will not be static as the cluster head next to the channel will soon die will not pass the next data.

Improved by the following points

1.The development of low power consumption, its main concept is based on the recognition of the region, the number of nodes and the location of the base station to determine the correct group number rather than the low power conversion algorithm at a fixed value.

(2) In the multi-hop mode selection mode, the cluster head node adjacent to the base station (BS) commits to a large number of forwarding, fast-moving power, leading to a group head from the base station near premature death. In order to reduce the load of nodes in the header group near the base station, a group size compression method is available. This paper introduces an advanced algorithm based on the multi-hop LEACH cluster head (LEACH-M) algorithm, and considers the total number of cluster head selection, taking into account the power factor of selecting the cluster head node, to maintain the internal load balance. collection. With restriction of compact size under multi-hop route mode, clusters near the base station are small but of high value, distant clusters of the base station are large but of small value, in order to achieve the purpose of maintaining load balances.

Algorithm description

Within the k-group the advanced algorithm reconfigures the collection head continuously during the operation process. the operate on process is divided into two phases one process establishment and the second phase a stable data transfer process. The design process takes care of the collection head selection and merging process.

The selection of a collection head takes into account the considerable power provided by

$$T(n = \left\{\frac{p}{(1-p)\left(r \bmod \left(\frac{1}{p}\right)\right)}\right\} E_{current} \,/E_{initial}$$

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume:4 Issue: 2
November 2021
Impact Factor:5.7
Subject:Science

Where $E_{current}$ is node current energy and $E_{initial}$ is the node initial energy. The low power feed will be prioritized for selection as the head of the collection. The power level of each node is compared to selecting a cluster head node that uses very little power is completed as a cluster head and then other nodes are distributed with information.

Clustering process

The number of nodes within a cluster and the distance between the node and the base station (BS) have less linear relationships, making a smaller cluster near a channel with larger numbers, and a larger cluster distance away from smaller number nodes.

Some nodes select their sub-headings according to the power level and inform this group header. when a group has received a small number of nodes that it can handle it will send a rejected message to weak signal nodes that indicate they are away from the group header and notify them to join other groups thus the merging process is performed.

SIMULATION RESULTS

Assumptions made:

1.There are 100 sensor nodes spread in 100 mx100 m area

2.sending and receiving circuit loss 50 nJ/b

Data fusion loss 5nJ/b

Magnification factor 10nJ/b

For simplicity do is taken as 80m

Data packet length 2000b

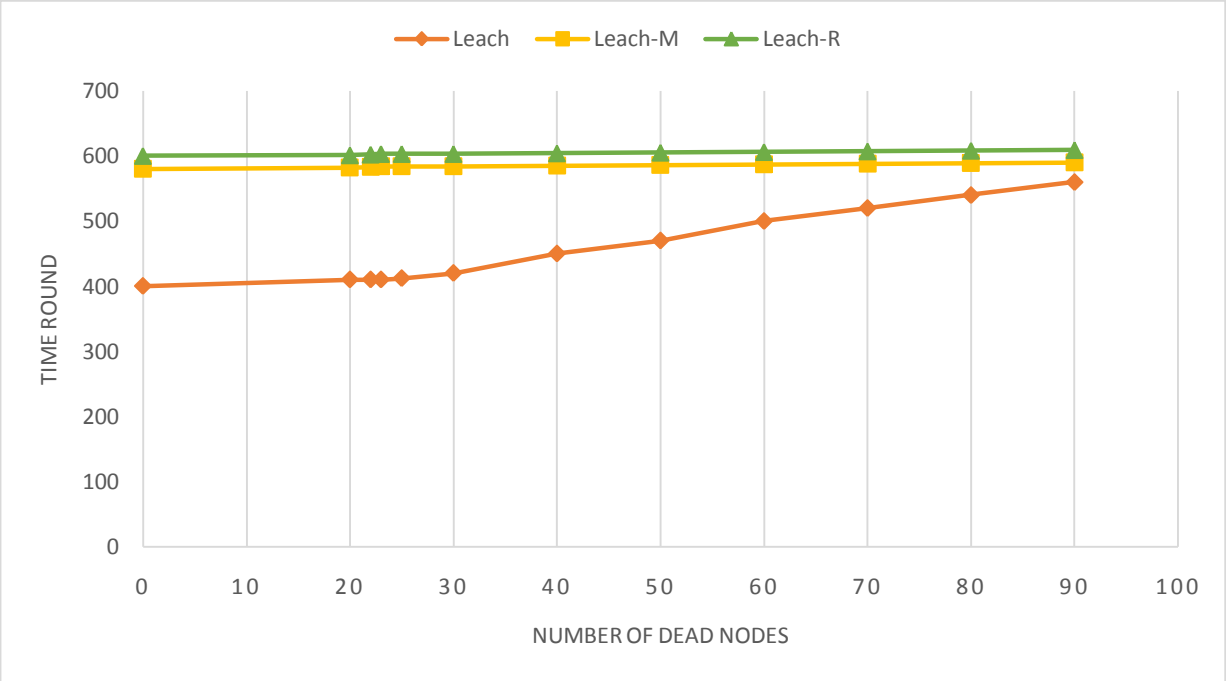
Simulation results show relationship between time and dead nodes.

When N=100 base station is located at (50,255)

As per simulation results improved LEACH and M-LEACH are almost parallel to horizontal axis. The dead time of first node and last node are almost same since this two algorithm based on evenly distribution of energy. From the results it shows that life time expectancy of Improved LEACH and M-LEACH is 40% more than LEACH. But Improved LEACH has lifetime expectancy more than 20% of M-LEACH. The LEACH-R and LEACH-M clusters use multi-hop to transfer data to the main channels, so the increased distance between the base channels and the regional exploration has little effect on the network. While in the LEACH protocol, the distance between the base channels and the test site is very large, which

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume:4 Issue: 2
November 2021
Impact Factor:5.7
Subject:Science

will lead to power loss in some cluster head nodes consuming too quickly, thus affecting network life. Figure describes the relationship between a living network location and a base station. As can be seen in Figure, with a growing distance from the base station network, the decay rate of life is slowly increasing. Tests show that when a channel domain goes from (65,215) to (65,390), network life time from 410 rounds down to 250 rounds to reduce the rate to less than 40%, which is better than 40% better than -M- LEACH and LEACH.



CONCLUSION

This paper shows a method that takes the characteristics of the current node in account in a group header selection, which solves the problem that less powerful nodes are selected to be the header group. That makes it more likely that high-density nodes choose to be a relatively compact header, even more effective in increasing the survival time of the node. And under multi-hop route selection mode, cluster size is limited, which achieves the goal of maintaining load balance between clusters and compensating for the inadequacies of the multi-hop algorithm. The tests show that the above steps effectively measure the power consumption of the node, effectively increasing the life time of the network. Guessing will be evenly distributed across all nodes in the network. So compared to standard multi-hop routing systems and static clustering algorithm, LEACH can extend the network life cycle by 15%. The selection of the cluster head node ignores the remaining power, location and other

ISSN: 2320-3714
Volume:4 Issue: 2
November 2021
Impact Factor: 5.7
Subject: Science

information, which could easily lead to the cluster head node will fail immediately. Additionally, LEACH assumes that all nodes can be directly connected to the cluster head node and base station node, while the actual network of basic channels is usually far from the hearing area, so that can make the cluster head, far away from the base station, easy to fail. So network expansion is not feasible.

BIBLOGRAPHY

[1]. Wireless Sensor Networks Improvement using LEACH Algorithm To cite this article: Sadeer Rasheed Ahmed et al 2019 IOP Conf. Ser.: Mater. Sci. Eng. 518 052023

[2]. Akyildiz LF, Su W, Sankara subramaniam Y, Cayirci E. A survey on sensor networks. IEEE Communications Magazine, 2002, 40(8): 102~114.Vol.25, No.4: 114-124

[3]. R.A.Roseline and Dr.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

[4]. Ian F. Akyildiz, Weilian Su, Yogesh Sankarasubramaniam, et al. Wireless Sensor Network: A survey [J]. Computer Networks, 2003, 38(4): 393-422

[5]. Heinzelman W, Chandrakasan A, Balakrishnan H. Energy Efficient Communication Protocol for Wireless Microsensor Networks. In Proceedings of the 33rd Hawaii International Conference on System Sciences. Maui: IEEE Computer Society, 2000, Vol.2: 3005-3014.

[6]. Cui Li Ju, Hailing, Miao Yong, Li Tianpu, Liu Wei and Zhao Ze,Overview of Wireless Sensor Networks[J];Journal of Computer Research and Development;2005

[7]. W. Abushiba, P. Johnson, S. Alharthi, " An Energy Efficient and Adaptive Clustering for Wireless Sensor Network (CH-leach) using Leach Protocol", 2017, 13th International Computer Engineering Conference (ICENCO), Vol. 19, No. 4, pp. 265-274.

[8]. V. P. Saxena, "Wireless Sensor Networks: Introduction, Advantages, Applications and Research Challenges", 2015, HCTL Open International Journal of Technology Innovations and Research (IJTIR), Vol. 25, No. 6, pp. 543- 552.

ISSN: 2320-3714
Volume:4 Issue:2
November 2021
Impact Factor:5.7
Subject:Science

[9]. P. Giri, A.Potnis, P. Tripathi, "Comparative Study of LEACH, SEP, TEEN, DEEC, AND PEGASIS In Wireless Sensor Network", 2018, International Research Journal of Engineering and Technology (IRJET),Vol. 5, No. 6, pp. 254-264.

[10]. C. Dragana, G. Stamatescu, V. Mihai, D. Popescu, "Evaluation of Cluster Formation Algorithm in Large Scale Wireless Sensor Network", 2017, the 9th IEEE International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications, Vol. 34, No. 20, pp. 653-663.

[11]. F. Shemim, A., S. Shajahan, "Enhanced Energy Aware Multi-Hop Hierarchical Routing Algorithm for Wireless Sensor Networks", 2017, International Conference on Electrical and Computing Technologies and Applications (ICECTA), Vol. 28, No. 11, pp. 674-684.

[12]. 25] N. I. Sulieman, Richard D. Gitlin, "Ultra-Reliable and Energy Efficient Wireless Sensor Networks", 2018, IEEE 19th Wireless and Microwave Technology Conference (WAMICON), Vol. 14, No. 7, pp. 532-542.

*****