International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

COPY RIGHT

IJIEMR Transactions, online available on 12th May 2018. Link
:http://www.ijiemr.org/downloads.php?vol=Volume-7&issue=ISSUE-05

Title: **IMPLEMENTATION OF NOVEL HIERARCHICAL ROUTING PROTOCOL TECHNIQUES FOR ENERGY EFFICIENT IN WIRELESS SENSOR NETWORK**

Volume 07, Issue 05, Pages: 42–48.
Paper Authors

POOJA KRISHNAMURTHY REVANKAR, SRINIVASARAO UDARA
S.T.J.IT, P.B Road, Ranebennur, 581115, India

USE THIS BARCODE TO ACCESS YOUR ONLINE PAPER

To Secure Your Paper As Per UGC Guidelines We Are Providing A Electronic Bar Code

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

IMPLEMENTATION OF NOVEL HIERARCHICAL ROUTING PROTOCOL TECHNIQUES FOR ENERGY EFFICIENT IN WIRELESS SENSOR NETWORK

POOJA KRISHNAMURTHY REVANKAR[1], SRINIVASARAO UDARA[2]

[1]S.T.J.IT, P.B Road, Ranebennur, 581115, India

[2] S.T.J.IT, P.B Road, Ranebennur, 581115, India

Corresponding Author (Research scholar)

E-mail:pooja.k.revankar@gmail.com, Tel: +08095844631

Abstract

The zone of wireless sensor networks (WSNs) is one of the rising and quickly developing fields in the logical world. This has realized growing ease, low-control and multi-work sensor hubs. Notwithstanding, the significant actuality that sensor hubs come up short on vitality rapidly has been an issue and numerous energy productive steering conventions have been proposed to take care of this issue and save the longetivity of the system. This is the motivation behind why directing systems in remote sensor arrange center basically around the achievement of energy preservation. The vast majority of the current distributions have demonstrated such a large number of conventions mostly intended to limit energy utilization in sensor systems. This printed material proposes a progressive steering system which demonstrates energy proficiency. Our method chooses bunch head with most astounding lingering energy in every correspondence round of transmission and furthermore considers, the briefest separation to the base station from the group heads. Reproduction comes about demonstrate that various leveled steering strategy with various level of pecking order delays the lifetime of the system contrasted with other bunching plan and the energy lingering mean an incentive after some correspondence rounds of recreation increments fundamentally.

Keyword: Wireless Sensor Network, Hierarchical Routing, Clustering, Energy Efficiency, Network Lifetime

1.1Introduction

Wireless Sensor Network (WSN) is an up and coming innovation which has an extensive variety of use including systems assurance, mechanical detecting and diagnostics, condition observing, context–mindful figuring (for instance savvy home and responsive condition) et cetera. This sort of system generally comprises of an expansive number of hubs that unite themselves to shape a remote system. The

segments of a WSN are sensor hubs, BS and observed occasions (that is, an occasion that is required to be detected in the earth) [7]. A normal sensor hub is made of four building squares: control unit, correspondence unit, handling unit and detecting unit [1]. The detecting part in a hub measures certain physical trademark like temperature or distinguishes soil dampness of an area in which it is set. The handling part is in charge of gathering and preparing caught information from its encompassing. The remote correspondence segment of a sensor hub is in charge of transmission or gathering of caught information starting with one sensor hub then onto the next hub or to an end client through the bunch make a beeline for the base station (BS). The sensor hub, its preparing and correspondence part expects vitality to work obviously, and the power segment, which is of constrained sum, is exclusively in charge of arrangement of vitality to the three different segments [1]. In view of utilization, the checked occasion can either be dynamic or static in its task WSNs are typically sent in a situation to screen static or dynamic events. The estimation of static occasions, (for example, temperature, humidity and so forth) is anything but difficult to complete. Then again, dynamic occasions are ordinarily non-helpful occasion is the development of an undesirable vehicle in a war zone and the development of whales in the sea. They are difficult to screen and they are not steady as they go all over. Along these lines, it is exceptionally hard to ponder vitality sparing plans for detecting of dynamic occasion. For instance, a woodland checking application includes static observing methodology while an objective following application includes a dynamic observing methodology [7].Sensor arrange requires certain protocol for proficient execution. For example, protocol can come in type of a particular application with a characterized request to total information and enhancing energy utilization. This sort of convention is alluded to as various leveled directing. In addition, we have additionally an information driven steering convention which depicts a system situation whereby a sensor hub likewise depends on information driven approach which performs detecting application to find course way from different sources to a solitary goal. In view of this, information from each hub in a system can be depict by a rundown of trait esteem sets called quality based locations, with the end goal that a hub can open its accessibility to the whole sensor network [2].Because of the idea of the WSN, sensor hubs are typically controlled by the utilization of batteries and in this manner having an exceptionally obliged spending plan as far as energy [1]. To viably keep up the system sensors to have longer lifetimes, all zones of the system ought to be precisely intended to be energy productive. Among numerous strategies, bunching the sensor hubs into gatherings, with the goal that sensors send data to just the group heads (CH) and afterward the CH convey the totaled data to the base stations, might be a decent technique to limit vitality utilization in WSN. Particularly for WSN that has a substantial number of energy compelled sensors; it is important to sorted out sensors in bunch shape to diminish vitality devoured

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

when transmitting data from hubs to the base station.

1.2 related work

Different techniques for limiting energy utilization in remote sensor organize have been proposed, for example, by Heinemann et al. [3] who depicted the LEACH convention as a progressive self sorted out group based approach for checking application. The information accumulation zone of the information is haphazardly isolated into groups. Filter utilizes time division various access (TDMA), to transmit information from the sensor hubs to the bunch head. At that point CH totals the information and transmits it to the base station for preparing. One of the highlights of LEACH is restricted coordination and control for the development and activity of bunches. The bunch head turn arbitrarily. In [4] Lindsey et al. came to fruition the recommendation of PEGASIS which is an expansion of LEACH. It takes out the overhead of dynamic bunch development made by LEACH. In this convention, the hubs transmit to the CH and transmission of information is finished by the bunch head, which is chosen in a rotational way, to the BS. PEGASIS convention is found to spare more vitality and is more powerful in hub disappointment when contrasted with LEACH. Muruganathan et al. [5] built up a convention that makes bunches of the comparative size and uses multi-bounce steering amongst CH and the BS. The bunch head which forward the last bounce is chosen haphazardly from the arrangements of group heads to limit the heap of bunch head which are found closest to the base station. In [8], Wei Li proposed a geometric programming model to expand the system lifetime of the sensor organize by bunching sensor hubs into gatherings. He built up an iterative strategy for explaining the geometric programming by picking the ideal area of group heads. The ideal said in his suggestion alludes to limiting energy utilization in light of to between sensor organize under particular compelled. Bunching of methodologies is helpful in the observing of living space and environs. This in any case, requires the utilization of nonstop stream of sensor information.

Xinhua Liu et al. [12] propose DDBC (Directed Diffusion Based on Clustering). DDBC is a energy productive coordinated dispersion steering convention which depends on the lessening of the system topology and offers concealment to the repetition message in plain flooding keeping in mind the end goal to limit wireless utilization in remote sensor arrange.

Ye, Heidemann and Estrin [13] gave a portrayal of a conflict based medium access convention, S-MAC, which limits vitality utilization in remote sensor organize by utilizing virtual groups. They built up the regular rest plan for the bunches and catching is kept away from by the utilization of in-channel flagging. Wei Cheng et al. [14] proposed a novel versatile, dispersed,energy productive bunching calculation, AEEC for remote sensor organize. Their approach chooses bunch heads in light of the hub vitality identified with that of the entire system which can achieve productivity in heterogonous systems.

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

Al-Karaki and Kamal [12] likewise made a study of the steering strategy in remote sensor organize and said that progressive directing procedure has the favorable circumstances identified with adaptability and proficient correspondence.

1.3 proposed methodology

Our proposed various leveled steering protocol depends on the standard of bunching calculation. With information transmission at the system layer being the center zone of intrigue, we have adjusted the LEACH protocol as far as progressive information exchange with the work of energy expectation procedure for choice of CH by means of any most limited way to the BS.

The proposed system assumed with the following properties:

- The sink located very far from the cluster-heads.
- All the sensor nodes are stationary with limited energy.
- All the sensor nodes are equipped with power control capabilities to vary their transmitting power.

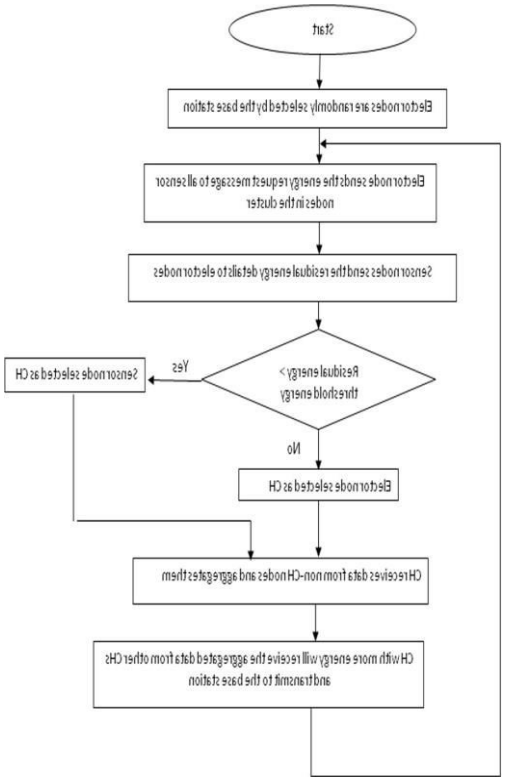

Figure 1.1 Flow Chart of proposed algorithm

Expect that there are N sensor hubs arbitrarily conveyed into M x M area. It is accepted that M=100 and the base station finds exceptionally a long way from the detecting territory. At that point the separation from the bunch hubs to the base station is long. Additionally, we accepted that bunches are similarly estimated. Accordingly there are normal N/k hubs per groups and (N/k)- 1 non bunch head hubs. The EEAP includes three fundamental stages: the Initial stage, the grouping stage, and the information transmission stage. The underlying stage is performed just once in the start of system activity.

Y

NETWORK MODEL:

Give us a chance to consider a sensor

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

organize, comprising of n sensor hubs, which are haphazardly conveyed over in a territory of remote sensor arrange. To set up the system display, the accompanying presumptions are made about sensor hubs.

Suppositions:

1. There is one base station which is settled and situated at center in a given sensor organize.
2. All sensor hubs are settled and homogeneous with a constrained put away energy.
3. Base station can transmit different power levels.
4. The detected information by the sensor hubs are directed to the base station.
5. Every hub is furnished with control oblige capacities and fluctuate their transmitted power.
6. Hubs are not outfitted with GPS unit.

Algorithm 1: Setup phase

No. of nodes N

BS can transmit i levels; i ≥1

1. for each level i, message transmitted by BS
2. if (Nodes does not assign previous level and hear new message, set the current level)
3. Assign level i
4. End if
5. End for
6. BS broadcast hello message, which contains the information of upper limit and lower limit of each level.
7. Each node calculates the distance from the BS based on received signal strength

Algorithm 2: Cluster setup phase

1. for each (node N)
2. N selects random number x between 0 and 1.
3. If (x< T (n))
4. N becomes CH.
5. N broadcasts an advertising message for its CH status.
6. Else
7. N becomes a NCH node.
8. N chooses the CH, this selection is based on the received signal strength of advertise.
9. N informs the selected CH and become a member of its cluster.
10. End if.
11. for each (CH)
12. CH creates TDMA schedule for each cluster member.
13. Each cluster member communicates to the CH in its time slot.
14. End for

Algorithm 3: Inter cluster routing.

1. for each (level i)
2. for each CH
3. CH receives the data from the cluster member
4. Aggregate the data.
5. if (i ==1)
6. CH transmits data to the BS.
7. Else
8. CH broadcasts data in the next level.
9. End if
10. End for
11. End for

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

1.4 simulation results

In this area, the reproduced comes about are gotten to assess the execution of EHCRP utilizing MATLAB. We recreated the energy utilization, number of groups and coming about lifetime of the system. Right off the bat we assessed the execution of EHCRP for various estimation of k and locate the ideal estimation of k. At that point we contrasted the execution of EHCRP and LEACH. The outcomes acquire as far as three metric: Energy utilization of CHs, number of groups and life time of WSN are spoken to in type of charts. We accept that 100 sensor hubs are arbitrarily sent more than 100 x 100 m square zone sensor field and the entire system is partitioned in three levels (n=3). The BS situated at (50, 50). The underlying energy of every hub is .05 J and a hub is viewed as dead when its energy is not as much as equivalent to 0.Simulation parameters

Parameters	Value
Network size	100 x100 m
BS station	(50, 50)
Number of sensor nodes	100
Initial energy	.05 J
^{E}elec	50 nJ/b
$^{\varepsilon}$mp	10pJ/b/m^{2}`
EDA	5nJ/b/signal
Data packet size	4000 bits
n (level)	3

Energy consumption of cluster heads (chs)

Figure 1.2 demonstrates the consequence of Protocol devoured by CHs in EHCRP and LEACH Protocol for 30 rounds. The Protocol devoured by CHs for each round in EHCRP is lower than in LEACH demonstrates the dissemination of the quantity of groups in EHCRP and LEACH for 30 rounds. It demonstrates that the quantity of bunches in EHCRP is many less than LEACH. The outcome between the quantity of hubs alive and the quantity of rounds is appeared by Figure 6.4. The outcome acquired by estimating of time until the point when the principal hub bites the dust to time until the point when the last hub kicks the bucket. It is watched that the EHCRP much better enhances the life time of system than the LEACH Protocol.

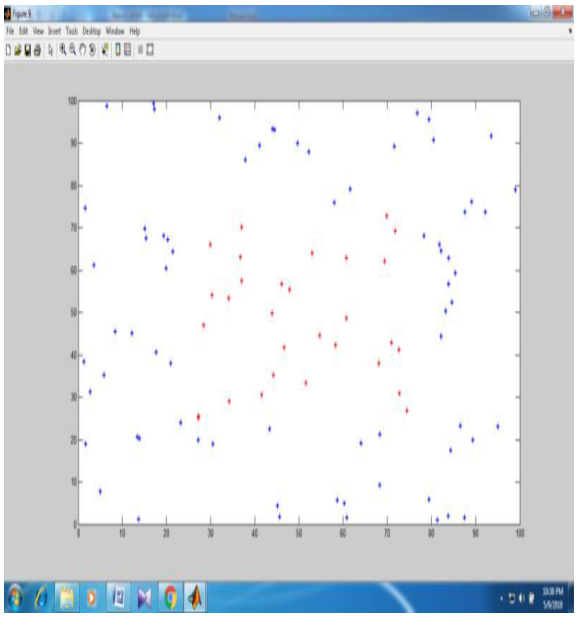

Figure 1.2: Energy Consumed by CHs

Number of clusters

Figure 1.3 demonstrates the dissemination of the quantity of bunches in EHCRP and LEACH for 30 rounds. It demonstrates that the quantities of groups in EHCRP is many less than LEACH.

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

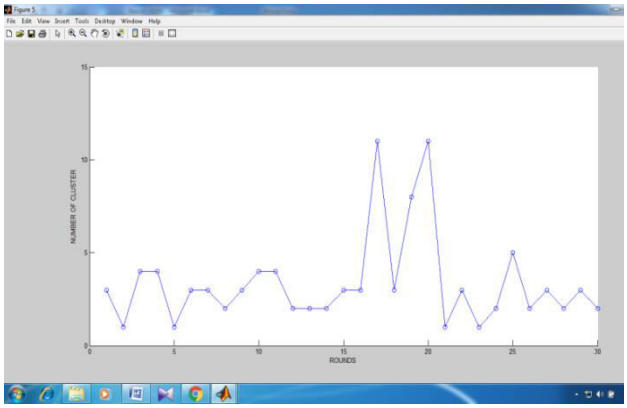

Figure 1.3: Number of Clusters

Life time of wsn

The outcome between the quantity of hubs alive and the quantity of rounds is appeared by Fig [7]. The outcome got by estimating of time until the point that the principal hub bites the dust to time until the point that the last hub bites the dust for 410 rounds. The principal dead hub showed up in cycle 97 for EHCRP, in 82 rounds for LEACH and the last dead hub showed up in 407 rounds for EHCRP and in 335 rounds for LEACH. It is watched that the EHCRP much better enhances the life time of system than the LEACH.

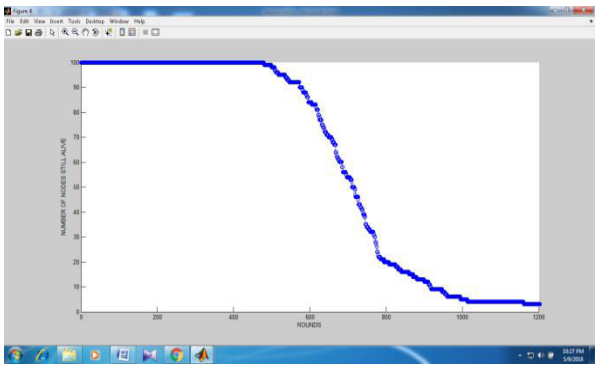

Figure 1.3: Network Lifetime

1.5 conclusions

We propose a energy proficient various leveled hierarchical routing techniquein which bunch heads are chosen in view of the expectation of transmission energy by means of a briefest separation to the base station. Our approach applies a topographical arrangement of sensor hubs into groups, turning the part of CH, and improving the CH choice by forecast of energy transmission vitality in each round of recreation, and amassing information before transmission to the BS. The essential highlights which incorporate group development and revolution, bunch head race and pivot, and group improvement of our proposed various leveled directing system in transmitting information to the base station was investigated and underscored.

References

[1] N.M. Elshakankiri, N. M. Moustafa and Y. H. Dakroury, "Energy Efficient Routing Protocol for Wireless Sensor Network" in *IEEE International Confer*ence on pp. 393–398,December 2014.

[2] B.Krishanamachari, D. Estrin and S. Wicker, "The impact of data aggregation in Wireless Sensor Network," in *Proc- of 22nd International Conference on Distributed Computing Systems Workshops (ICDCSW'02)*, Vienna, Austria, 2 - 5 July 2009, pp.575-578.

[3] W. Li, G. Chen, "Energy-Efficient Clustering Algorithm in Wireless Sensor Network" in *IET International Conference* on pp. 1-4, November, 2006.