MINIMIZATION OF ENERGY CONSUMPTION COOPERATIVE OPPORTUNISTIC ROUTING PROTOCOL USING AOMR-DIJKSTRA IN WIRELESS SENSOR NETWORKS

Deepika[1] and Vikas Kumar[2]
[1]M.Tech. Research Scholar, [2]Faculty
Galaxy Global Group of Institutions, Ambala, India

Abstract: In heterogonous with wireless sensor network (WSN) communicate dead node situation problem in wireless sensor networks: where to place a limited number of available nodes that can act as other relays to forward sensor data near base stations. According to experimental results, in proposed algorithm we will merges of Opportunistic Routing Protocol namely enhance average voltage for battery life time with in direction to improve the network connectivity and minimized first level of dead node of the censored area. Our lower energy shifting propagation-loss model comprises with path loss function with random distributed shadowing, independent across with base stations. Our results are valid in the whole estate of AMOR-Dijkstra (Ad hoc multi opportunistic path routing), in particular for EEOR using MATLAB 2014Ra version .
Keyword: WSN, Dijkstra, sensor nodes, heterogeneous,AOMR-DIJKSTRA-MCS,OR routing , AOMR etc.

I. INTRODUCTION

1.1 Introduction to WSN

Wireless Sensor Networks (WSNs) are useful for military, environment and scientific applications such as vehicle tracking, habitat monitoring, forest surveillance, earthquake observation, biomedical, building surveillance, monitoring, home automation and many others. Coverage in wireless sensor nodes in the region of interest is one of the key issues in wireless sensor networks. Optimal coverage of nodes is favorably to the maximum possible utilization of the available sensors.

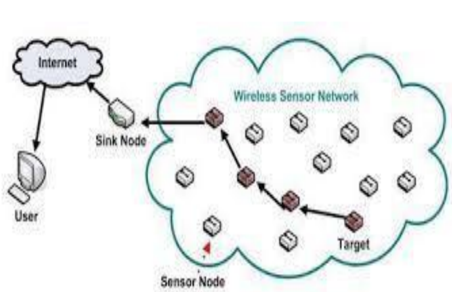


Fig. 1 Wireless Sensor Network

A Wireless Sensor Network can be composed of homogeneous or heterogeneous sensors, which possess the same or different communication and computation capabilities, respectively. Fig 1 shows the heterogeneous sensor network.

1.2 Heterogeneous Sensor

When fitness function is used for the handoff decision, being desirable to minimize it. This is an optimization problem which consists of the adjustment of a set of weights for the quality of service. Solving this problem efficiently is relevant to heterogeneous wireless sensor networks in many advanced applications. Numerous works can be found in the literature dealing with the vertical handoff decision, although they all suffer from the same shortfall: a non-comparable efficiency.

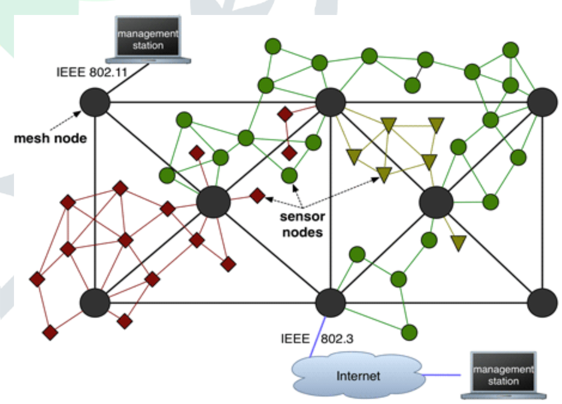


Figure 2: Heterogeneous sensors

Therefore, to achieve several goals necessary for competitive mobile terminals: good performance, low power consumption, low economic cost, and small area integration.

1.3 Routing With Infrastructure Assistance Data Mobile nodes have tendency to move towards ferries to send messages. Such assumption makes the algorithms limited in specific scenarios with the majority are buses and bus travelers. In fact, these algorithms are entirely constrained by the route and time schedule of ferries. Without the route information, the algorithms will perform poorly.

1.4 Mobility Model

To increase the realism of the mobility model, we propose two additional models, Random Shortest Path Map Based Movement (RSPMBM) and Road Side Unit Placement. The new models, together with exiting Map Based Movement, Bus Traveler Movement and Bus Movement, are suitably applied for different types of sensor nodes. This approach represents the heterogeneous nature of reality, with Road Side Units, cars, buses and pedestrians.

II RELATED WORK

Ahlawat et al. [1] has proposed a new technique in which concept of Vice Cluster head has been taken out to improve the network lifetime. Vice Cluster head has been selected as alternate head that has worked when the cluster head has fallen down. Criteria for the selection of vice cluster head have set up on the basis of three factors i.e. Minimum distance, maximum residual energy, and minimum energy. Improvement in the network life has been obtained because of the cluster head has not dead ever. As a cluster have head has been died it has been replaced by its vice Cluster head.

In [2], Liu et al. propose to use a new long term metric called expected minimum delay (EMD). This is the expected time that an optimal forwarding scheme takes to deliver a message from a source to a destination at a specific time in a network with cyclic and uncertain connectivity. Consequently, the use of a state diagram which includes a different state for each contact of each node is proposed. However, this creates a huge state diagram when the node meetings have a huge common round duration.

In [3], Li et al. propose an efficient store-and-forward based scheme called Adaptive Multi-Copy Routing (AMR), current network conditions and the end-to- end delay target, the upper limit of desired delay for the delivery of the message. By this way, the approach becomes replication-factor-free and more cost- efficient than the copying schemes in which the replication factor is

Beiranavand et al. [4] have proposed a enhancement in LEACH named I-LEACH, An Improvement has been done by considering basically three factors; Residual Energy in nodes, Distance from base station and number of neighbouring nodes. A node has been considered as head node if it has optimum value for discussed three factors i.e. have more residual energy as compare to average energy of network, more neighbours than average neighbours for a node calculated in network and node having less distance from base station as comparison to node's average distance from BS in network. Reduction in energy consumption and prolongation in network life time has been observed.

Chen et al. [5] have explained an improved model in WSN which has been based on heterogeneous energy of nodes for same initial energy and multiple hop data transmission among cluster heads is proposed. Problem of number of cluster heads reduces with the increase of the number of rounds. Confirmation has been provided with the approach that nodes with higher residual energy have greater probability to become cluster heads than that with the low residual

We present a change of variables stimulated by the dimensional spherical coordinates.

energy. Extension in the network lifetime and guarantees a well distributed energy consumption model been demonstrated.

Elbhiri et al. (2013) [6] have explained the spectral clustering methods. Spectral Classification for Robust Clustering in Wireless Sensor Networks (SCRC- WSN) named algorithm has been proposed. Spectral partitioning method has used the graph theory technics for separate the network in a fixed optimal number of clusters. Optimal number of clusters and changing dynamically the cluster head election probability has been very effective to increase the performance. A centralized approach has been used calculate the nodes residual energy. Effect of node density on the robustness of the algorithm has been studied which has resulted less energy consumption and increase in lifetime.

Heinzelman et al. (2000) [7] has proposed the first Leach protocol ever. Wireless distributed micro sensor systems that provide the consistent observing the areas for military and civil applications have been explained. It has also explained that the communication protocols, which have done the effective improvement on the overall energy dissipation of WSN. Localized coordination has exploited scalability and robustness in the networks, and data fusion has reduced the amount of data to the base station. A high amount of Energy reduction has been achieved as compared with conventional routing protocols.

III. SYSTEM MODEL

3.1 Sensor Field

A wireless sensor node is a popular solution when it is difficult or impossible to run a mains supply to the sensor node. However, since the wireless sensor node is often placed in a hard-to-reach location, changing the battery regularly can be costly and inconvenient.

3.2 Sink

In wireless sensor networks (WSNs), all the data collected by the sensor nodes are forwarded to a sink node. Therefore, the placement of the sink node has a great impact on the energy consumption and lifetime of WSNs. This Thesis investigates the energy-oriented and lifetime-oriented sink node placement strategies in the single-hop and multiple-hop WSNs, respectively.

3.3 Task Manager

Task management plane is responsible for task distribution among sensor nodes to improve energy efficiency and prolong network lifetime. Traffic transmission may transfer original sensing data or forward traffic as in an intermediate relay in a multi- hop path. Sensor nodes can be either distributed as a mass or one by one in a sensor field. Once deployed, sensor nodes start working and may auto-organize, wait for a command to work, or start sensing and forwarding data. Sensor nodes usually relay a data stream to a base station or command node (management node) based on a regular rule or event.

3.4 Numerical Derivation

$s1= u [\sin \theta 1 \sin \theta 2 \ldots \sin \theta n-1]\ 2/\beta$ $s2= u [\cos \theta 1 \sin \theta 2 \ldots \sin \theta n-1]\ 2/\beta$ $s3= u \cos \theta 2 \sin \theta 3 \ldots$

.sin θn−1] 2/β · · · sn = u[cos θn−1] 2/β .
Where qi = qi (θi , . . . , θn−1) := (si/u) β/2 . When β = 2 our scheme of synchronizes boils down to the regular n-dimensional spherical coordinates, whose Jacobin is J¯(u, θ1, . . . , θn−1) = u n−1 Qn−1 i=1 sini−1 θi ; cf [21, eq. (1.5)]). By introduction (or element belongings and the chain rule) our coordinate system has the corresponding Jacobian Mathematical addition of hyper geometric function 2F1 is used when the model has noise. A close-form answer with 2F1 is used in the no noise case.

Simulation characters are also comprised for assessment resolves. All network base stations are experimented on a disk region. The disk region needs to be large sufficient to decrease "edge effects", which become more protruding when fading is included.

Now, we can estimate the overlapping sensing area (see in Figure) taking into account the circular segment equation $A=0.864.s^2$

The area covered by all the WSN as a function of the number of nodes n when $n \geq 2$ in the WSN is expressed by $A=n.pie.s2-0.864.a_n$

3.5 Energy - Efficient Cooperative Opportunistic Routing Protocol (AOMR-Dijkstra)

1. AOMR- Dijkstra adopts a new concept called energy equivalent node (EEN), which selecting relay nodes based on opportunistic routing theory, to virtually derive the optimal transmission distance for energy saving and maximizing the lifetime of whole network. AOMR- Dijkstra selects a forwarder set and prioritizes nodes in it, according to their virtual optimal transmission distance and residual energy level.
2. Nodes in this forwarder set that are closer to EENs and have more residual energy than the sender can be selected as forwarder candidates.
3. Four metrics are used to evaluate the aforementioned performance requirements of different routing algorithms. Two of them are metrics implemented in the ONE: delivery probability and latency. Hop-count metric is no longer an informative metric to assess the delivery cost in time and distance in OppWSNs as it is used in connected ad-hoc WSNs. Instead, we define Delivery Speed and Delivery Cost for a more accurate evaluation.
4. Delivery Probability DP: The total number of successfully delivered unique message, denoted by Q, divided by the total number of created unique messages, denoted by P. Each unique message is created at certain time, and has an unique identification number to be distinguished with others in the network.

DP = Q /P .

5. Latency (DL):

The average of delays between the moment that unique message i is originated, denoted by T si , and the time when the first replicate of unique message i arrives at the destination, denoted by T di . The replicate is a copy of an unique message. The number of replicates depends on the methodology of the routing algorithm, single or multiple-copies

DL = 1 Q X Q i=1 (T di − T si)

Energy minimizing energy consumption and maximizing network lifetime for data relay in one- dimensional (1-D) queue network. Following the principle of opportunistic routing theory, multi hop relay decision to optimize the network energy efficiency is made based on the differences among sensor nodes, in terms of both their distance to sink and the residual energy of each other. Specifically,

IV. Simulation Results

3.5 Used Software Details

Tools and facilities that you work with as the MATLAB user or programmer. It includes facilities for managing the variables in your workspace and importing and exporting data. It also includes tools for developing, managing, debugging, and profiling M- files, MATLAB's applications.

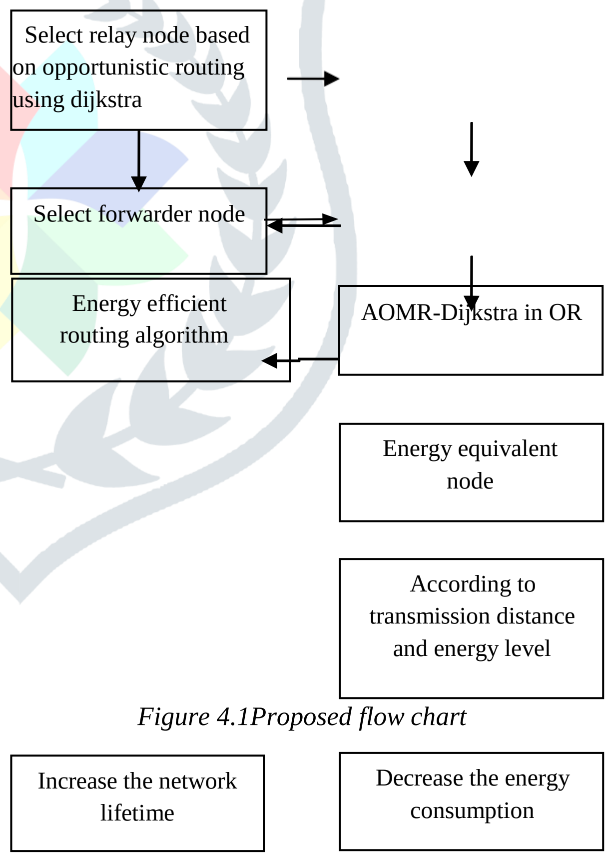


Figure 4.1Proposed flow chart

Simulation Parameters	Values
Network of field size (area)	200*200
Number of sensor nodes (N)	100
Testing time	10^5 Simulation Trial
Average Voltage	220
Location of the dual base station	X,Y
Sensor network deployment type	Random
Simulator software Version	2014a
Sensing range	100
Grid radius	3.5
Fading	AWGN

Table 1: Simulation parameter

In this figure shows the number of active sensor nodes (100) versus the simulation rounds. In this case, the OR and the AOMR-DIJKSTRA-Coverage-protocols lose their first node around the 200th round. The proposed AOMR-DIJKSTRA-MCS protocol is able to maintain all sensor nodes alive till the 400 round, which is approximately 1.2 times longer than those generated by the OR and the AOMR-DIJKSTRA- MCS Coverage- protocols.

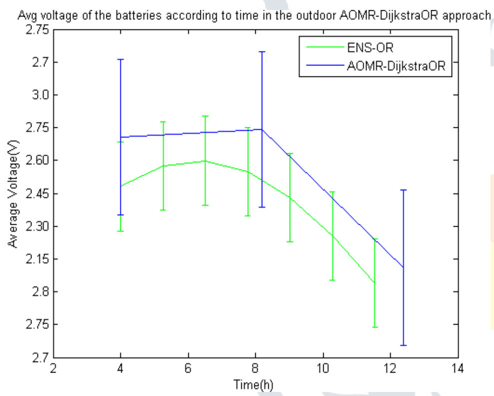


Figure 4.2: 100 Nodes with node for ENS OR and proposed AOMR dijkstra with average voltage

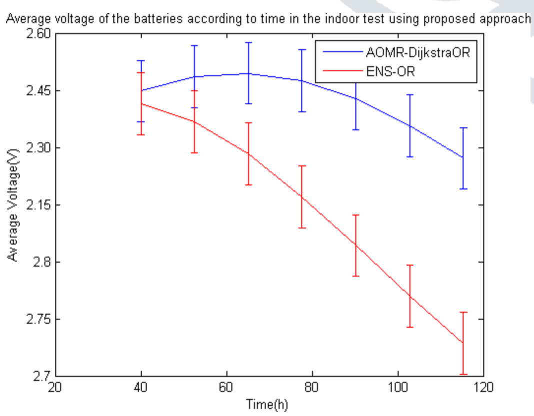


Figure 4.3:Average voltage with respect to time for indoor test using proposed approach

In figure 2 the advance nodes are shifting to other grid when occurrences of dead nodes. We see that a node is dead when its energy is less than the threshold level i.e., 0.5J in this case. The energy losses would be happened by transmitter, receiver and Data aggregation. The total number of rounds the network operates is until the last node in the network dies.

After shiting the advance node, showing 3 lower energy node areas in grid with respect to no of rounds which is 200. Showing above figure advantage that when a dead node is occur over the network or loss the node, the advance nodes shifted to other grid for enhancing the network lifetime to overall network.

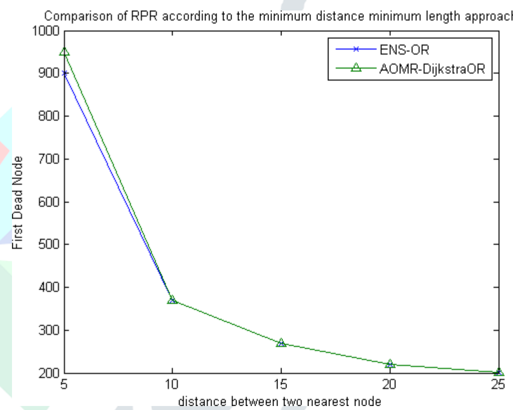
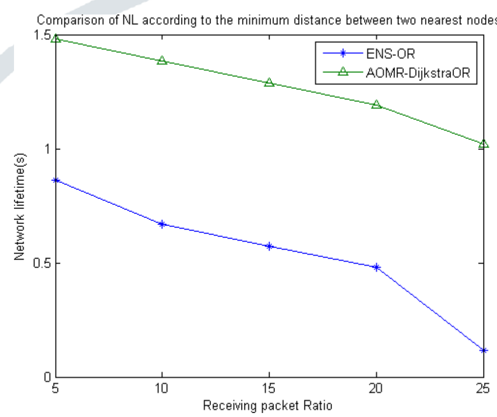


Figure 4.4: RPR according to minimum distance for first dead node minimization using proposed approach using different type of node



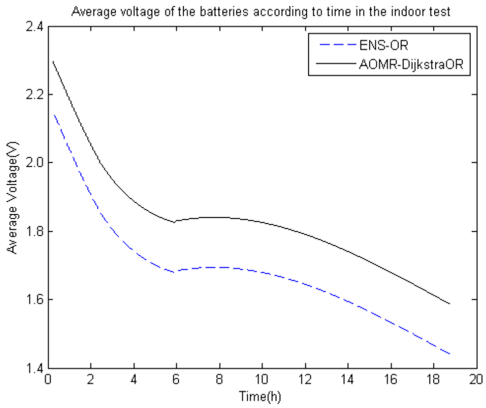


Figure 4.5: Network lifetime for no of receiving packet ratio between to nearest nodes

After updating entire network, it viewed like hexagonal grid. As per above graph, the AOMR- DIJKSTRA showing the less dead node probabilty as compae to existing technique

V. CONCLUSIONS

5.1 Conclusion: The main idea of the proposed algorithm is that in the stage of dead node occurrence both of the energy-balancing and coverage-preservation mechanisms are taken into network with the help of shifting node. With this shifting node selection scheme, the redundant nodes can be chosen as the sense the node in early stages of dead node. on the source location, creation time, and seriousness of detected events. One last point of our concern is the security and privacy of information. A leading principle should be that the creator owns the data . FUTURE SCOPE WSNs in mission critical applications could be achieved when using the EEOR (Energy efficient opponestic routing) protocol &In addition, ACHE can better adapt the applications with the great heterogeneous energy capacities in the sensor networks, as well as effectively reduce the control overhead.

REFERENCES

[1] Ahlawat, A. and Malik, V., "An Extended Vice-Cluster Selection Approach to Improve V-LEACH Protocol in WSN", IEEE 3rdconference on Advance Computing and Communication Technology, April 2013, pp. 236-240.

[2] Babaie, S., Agaalizadeh, S. and Golsorkhtabar, M. "The Novel Threshold Based Hierarchical Clustering Method for Wireless Sensor Network", IEEE International Conference on Electronics and Information Engineering (ICEIE), August 2010, pp. 191 – 195.

[3] Bakr, B. A. and Leszek, L., "Extending Wireless Sensor Network Lifetime in the LEACH-SM Protocol by Spare Selection",IEEE 5th Conference on Innovative Mobile and Internet Services in Ubiquitous Computing, July 2011, pp. 277-282.

[4] Beiranvand, Z., Patooghy, A. and Fazeli M., "I-LEACH: An Efficient Routing Algorithm to Improve Performance & to Reduce Energy Consumption in Wireless Sensor Networks", IEEE 5th International Conference on Information and Knowledge Technology, May 2013, pp. 13-18.

[5] Chen, G., Zhang, X., Yu, J. and Wang, M. "An improved LEACH algorithm based on heterogeneous energy of nodes in wireless sensor networks", IEEE International Conference on Computing, Measurement, Control and Sensor Network, July 2012, pp. 101-104.

[6] Elbhiri, B., Fkihi, S. E., Saadane, A., Lasaad N., Jorio, A., Driss, Aboutajdine, E.R. and Morocco "A New Spectral Classification for Robust Clustering in Wireless Sensor Networks", IEEE Conference on Wireless and Mobile Networking (WMNC), April 2013, pp. 1-10.

In figure 4 show the average minimum cover distance. The average energy coverage ratio consumption of each node *versus* the simulation Time stamp when using two different protocols. The average energy consumption of the AOMR-DIJKSTRA protocol steadily increases during the simulation due to its energy-balancing capability. Moreover, the comparison between the results yielded by the AOMR-DIJKSTRA protocols with compare to OR.

Figure 4.6: Average voltage improve for proposed protocol AOMR-DijkstraOR

[7] Heinzelman, W., Chandrakasan, A., and Balakrishnan, H., "Energy-Efficient Communication Protocol forWireless Microsensor Networks" IEEE Proceedings of the 33rd Hawaii International Conference on System Sciences, Jan 2000, pp. 3005- 3014.

[8] Katiyar, V., Chand, N., Gautam, G. C. and Kumar A., "Improvement in LEACH Protocol for Large-scale Wireless Sensor Networks", IEEE Conference on Emerging Trends in Electrical and Computer Technology (ICETECT), March 2011, pp. 1070-1075.

[9] Liu, Y., Luo, Z., Xu, K. and Chen, L., "A Reliable Clustering Algorithm base on LEACH Protocol in Wireless Mobile Sensor Networks" International Conference on Mechanical and Electrical Technology, September 2010, pp. 692-696.

[10] Lu, Y., Zhang D., Chen1 Y., Liu, X. and Zong P., "Improvement of L EACH in Wireless Sensor Network Based on Balanced Energy Strategy" IEEE Proceeding of International Conference on Information and Automation Shenyang, China, June 2012 on p 111-115 in IEEE,2013.

[11] Melese, D. G., Xiong, H., and Gao Q., "Consumed Energy as a Factor For Cluster Head Selection in Wireless Sensor Networks", IEEE 6th International Conference onWireless Communications Networking and Mobile Computing (WiCOM), September 2010, pp. 1-4. Kaur et al., International Journal of Advanced Research in Computer Science and Software Engineering 4(12), December - 2014, pp. 970-978 © 2014, IJARCSSE All Rights Reserved Page | 978

[12] Peng, J., Chengdong, W., Yunzhou, Z. and Fei, C., "A Low- Energy Adaptive Clustering Routing Protocol of Wireless Sensor Networks", IEEE International Conference on Wireless Communications, Networking and Mobile Computing (WiCOM), September 2011, pp. 1-4.

[13] Kashaf, A., Javaid, N., Khan, Z. A., and Khan, I.A., "TSEP: Threshold-sensitive Stable Election Protocol for WSNs", 10th IEEE International Conference on Frontiers of Information Technology (FIT 12), 2012, Pakistan.

[14] Manjeshwar, A. and Agrawal, D.P., "APTEEN:A Hybrid Protocol for Efficient Routing and Comprehensive Information Retrieval in Wireless Sensor Networks.", Proceedings of the 16th International Parallel and Distributed Processing Symposium (IPDPS), 2002, pp.1-8.

[15] Aderohunmu, F.A., Deng J.D.,“ An Enhanced Stable Election Protocol for Clustered Heterogeneous WSN.” Department of Information Scie.ce, University of Otago, New Zealand.