SURVEY ON CLUSTER BASED ENERGY EFFICIENT ROUTING PROTOCOL USING ANT COLONY OPTIMISATION IN MANETS

[1]Dr.S.AnbuKaruppusamy, [2]N.Ariveerasethupathi, [3]Dr.N.Nandhagopal
[1]Professor, [2]PG Scholar, [3]AssociateProfessor / Department of ECE
Excel Engineering College, Komarapalayam, Namakkal, Tamilnadu

ABSTRACT

Developing highly efficient routing protocols for Mobile Ad hoc Networks (MANETs) is a challenging task. In order to fulfill multiple routing requirements, such as low packet delay, high packet delivery rate, and effective adaptation to network topology changes with low control overhead, and so on new ways to approximate solutions to the known NP-hard optimization problem of routing in MANETs have to be investigated. Swarm intelligence (SI)-inspired algorithms have attracted a lot of attention, because they can offer possible optimized solutions ensuring high robustness, flexibility, and low cost. Moreover, they can solve large-scale sophisticated problems without a centralized control entity. A successful example in the SI field is the ant colony optimization (ACO) meta-heuristic. It presents a common framework for approximating solutions to NP-hard optimization problems. ACO has been successfully applied to balance the various routing related requirements in dynamic MANETs. This paper presents a comprehensive survey and comparison of various ACO-based routing protocols in MANETs.

1. INTRODUCTION

Air pollution has become a major issue of modern megalopolis, where the majority of world population lives, adding industrial emissions to the consequences of an ever denser urbanization with traffic jams and heating /cooling of buildings. According to World Health Organization (WHO), exposure to air pollution is accountable to seven million casualties in 2017.In 2018 the International Agency for Research on Cancer (IARC) classified particulate matter, the main component of outdoor pollution, a carcinogenic for humans. Monitoring urban air pollution and detecting pollution peaks is therefore required by both municipalities and the civil society, wanting to design and assess for pollution mitigation policies. The purpose of air quality monitoring includes collecting of real data from the atmosphere and to provide the necessary information to the professionals in order to monitor the consequences, assessing compliance about the targeted area. Most of the air quality monitoring is equipped with multiple lab quality sensors. These systems are expensive and difficult to maintain. An alternative approach would be to use wireless sensor networks which is less complex devices and with compact size. The main advantage of a WSN infrastructure is of self organization and healing as well as energetic autonomy of the nodes for air pollution monitoring which is to obtain a finer spatiotemporal granularity of measurements.

A Wireless sensor network consists of low size and low complex devices known as nodes that may sense the environment and gather the data from the monitoring field and communicate through wireless links. The information collected is forwarded through multiple hops to a sink. In WSN, the sensor nodes are deployed randomly in a sensing area. Each sensor in WSN monitors its environment and delivers some global data or an inference about the environment to a base station which could be located randomly in a network. So, it collects the local information, process them and send it to a remote base station. Using GPS technology, the information about the environment are collected and given to the application Web server for data communication. In the proposed system, two important facts are taken into account for energy efficient transmission and to have a prolonged network lifetime. In this work, a Power- aware scheduling and clustering algorithm based on Ant Colony Optimization (PASC-ACO) with energy efficient transmission using compressive sensing is deployed for large scale WSN multi hop data delivery. It improves the energy of each sensor node in the clustered network as well as enhances the lifetime of the real sensor network.

2. EXISTING METHODOLOGY

Conventional measuring stations are equipped with multiple lab quality sensors. The majority of deployment approaches uses a simple detection model assuming the detection range of the sensors. Most research work is based on atmospheric dispersion modeling which calculates the threshold using ILP formulation for WSN coverage. Some of the work is based on geographical analysis to identify the flow of effect over the region and the network is switched based on the result generated by the geographical conditions of the area.

2.1. DEMERITS

- Massive, inflexible and expensive.
- Threshold values are inaccurate.
- Needs more intelligent system to perform geographical analysis

3. POWER AWARE SHEDULING -PROPOSED SYSTEM

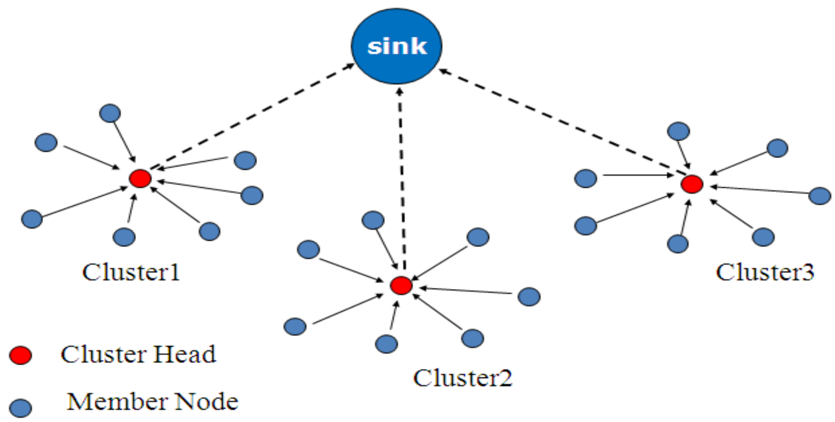
In the proposed work, two important facts are considered for energy consumption in the real sensor network. The first work details about Power Aware Scheduling and Clustering Algorithm based on ACO (PASC-ACO) for large scale WSN multi hop data delivery. It combines the scheduling and clustering techniques with an ACO approach to prolong the network lifetime and to improve performance of the sensors in the network. The second work is based on compressive sensing, an efficient transmission approach, ECS is to have effective transmission by minimizing the battery consumption of the sensors in the network.

3.1MERITS

- It provides efficient way of communication in the network.
- ECS based Compressive sensing provides energy efficient data Transmission between the nodes
- The process is performed within the WSN nodes so not need of any processor system.
- Minimize the energy wasted while transferring the redundant data.
- Enhance the network lifetime by selecting optimal path.

4. NETWORK MODEL

A wireless sensor network consists of large number of low cost nodes which is randomly deployed to monitor the environment. Sensors are communicate with each other using multi hop approach and the flow of data ends at the special node called base station (sink).A base station links the sensor network to another network as a gateway to disseminate the data sensed for further processing. They have sufficient memory, storage and computational power. Basically, nodes are placed closely for effective sensing. Therefore they are organized as a group called clusters in which the communication is passed through the cluster head to transmit information. Multiple cluster heads are used to carry the data packets to the base station using ACO approach.

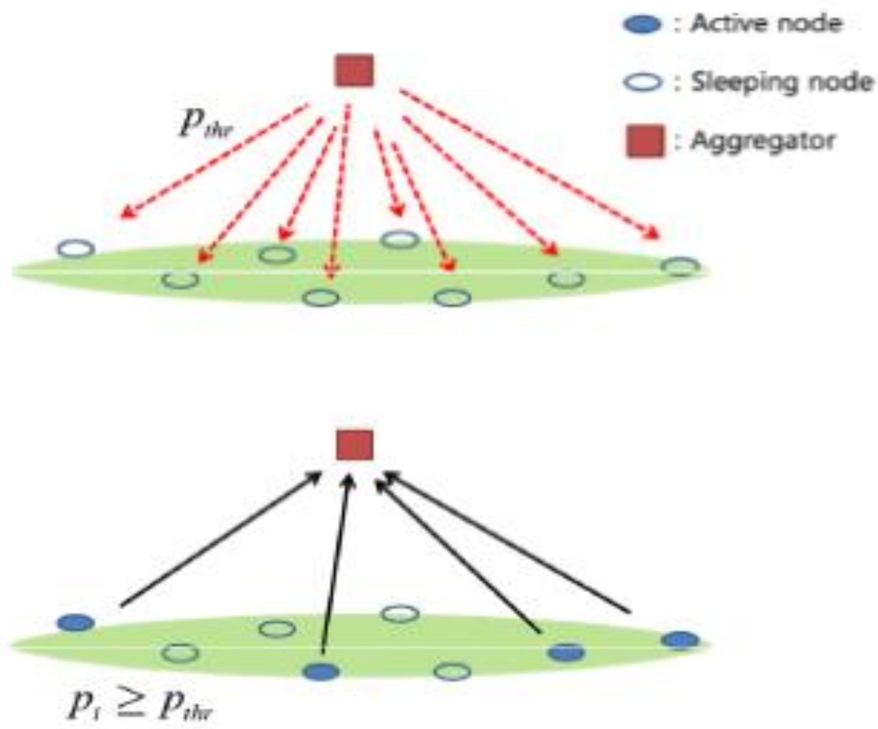


Proposed Network Model

5. ENERGY EFFICIENT CS – BASED TRANSMISSION APPROACH

Compressive sensing is an emerging technology that can recover the signal from under sampled measurements based on the signals from the sensors. WSN collects data with a large number of nodes. CS technique can compress with simple encoding process and save the information exchange among inter nodes. In conventional compression algorithms, each sensor nodes need to know the global correlation structure and perform complex computation in sensors. In this work, ECS is combined with WSN to develop an efficient transmission at the receiver side. N sensor nodes are located over the field and collect data in the environment. These data packets are received by the cluster head and reconstruct the original signal using CS recovery algorithm.

Depending on the channel condition from each sensor to aggregator, efficient scheduling may have potential to improve performance for CS based WSN. In practice, channel gains can be different due to various reasons, such as path-loss and short term fading. So, reconstruction performance may be significantly affected by scheduling which exploits knowledge of channel condition. Thus it is obvious that reconstruction performance will be better, if we design a proper scheduling scheme which considers knowledge on channel state information. We consider a sensing architecture as shown in Fig. 1, where N sensor nodes are spread over the field and collect data. To characterize the proposed methods, we make a simplifying assumption that each sensor node makes perfect measurement of information without noise. An aggregator receives these data sets from active sensor nodes and reconstructs the original signal using a CS recovery algorithm.



5.1 Compressed signalling

The received signal at the cluster head or aggregator is given by R = ΦW + n
Where ΦW: compressed signal & n: noise occurred in the signal

6. CONCLUSION

Wireless sensor network are used for Air pollution monitoring and in particular the deployment of sensors using scheduling and clustering algorithm. Energy Efficiency is the major criteria of WSN as the sensor nodes are running on the battery power which is difficult to recharge once it is deployed. Therefore in order to maximize the lifetime of the network and also to minimize the wastage of energy consumed by the redundant data, we use Power Aware Scheduling and clustering algorithm based on ACO and energy efficient compressive sensing .PASC-ACO is to find the optimal path for data transmission and TDMA scheduling is slotted to each node for balancing the load among all the nodes. ECS is used to recover the signal for efficient transmission of data packets. From this work, the overall network lifetime is maximized and power consumption is minimized. In future, heterogeneous wireless sensor network are constructed in a large scale for environmental application using the proposed PASC –ACO algorithm.

7. REFERENCES

[1] Boubrima.A, Matigot.F, Bechkit.W, Rivano.H, and Ruas.A, "Optimal deployment of wireless sensor networks for air pollution monitoring," in ICCCN'15. 24th International Conference on Computer Communications and Networks. IEEE, 2015, pp. 1–7.

[2] Boubrima.A, Bechkit.W, and Rivano.H, "Error-bounded air quality mapping using wireless sensor networks," in Local Computer Networks (LCN), 2016 IEEE 41st Conference on. IEEE, 2016, pp. 380–388.

[3] Boucetta.C, Idoudi.H, Azzouz Saidane.L, PASC: Power Aware Scheduled Clustering in Wireless Sensor Networks. International Symposium on Wireless Communication Systems (ISWCS), Spain, August 2014.

[4] Boucetta.C, HanenIdoudi, ''Ant Colony Optimization Based Hierarchical Data Dissemination in WSN'', IEEE TRANSACTION ON WIRELESS COMMUNICATION, VOL.13, NO.12, PP.782-787, 2014.

[5] Cardei.M ,Pervaiz, M. O. and Cardei.I "Energy-efficient range assignment in heterogeneous wireless sensor networks," in ICWMC'06. International Conference on. IEEE, 2006, pp. 11–11.

[6] Chakrabarty.K ,Iyengar.S.S, Qi.H and Cho.E, "Grid coverage for surveillance and target location in distributed sensor networks," Computers, IEEE Transactions on, vol. 51, no. 12, pp. 1448–1453, 2002.

[7] Diongue.D, Thiare.O, An Energgy Efficient Self-healing Mechanism for Long Life Wireless Sensor Networks, Innovations and Advances in Computing, Informatics, Systems Sciences, Networking and Engineering Lecture Notes in Electrical Engineering Vol. 313, pp. 599-605, 2015.

[8] Donoho.D.L, "Compressed sensing.IEEE Transaction. Information Theory",2006,52(4):1289-1306.

[9] Hao Yang, Keming Tang, Hua Xu, Licai Zhu, Xiwei Wang, Kun Qian, "Energy Efficient Transmission based on compressive sensing in WSN", IEEE 2017.

[10] Heinzelman. W. B., Chandrakasan. A. P., and Balakrishnan. H, An application-specific protocol architecture for wireless microsensor networks, IEEE Transactions on Wireless Communications, vol. 1, No. 4, pp. 660670, 2002.

[11] K.Rajiv Gandhi, N.Nandhagopal, R.Sivasubramanian, "Automatic System For Pre-Processing And Enhancement Of Magnetic Resonance Image (MRI)", International Journal of Applied Engineering Research (IJAER) vol.9 (22),pp. 15485-15499, 2014.

[12] Iyengar. S, Wu. H.-C., Balakrishnan. N. Chang. S.Y., Biologically Inspired Cooperative Routing for Wireless Mobile Sensor Networks, IEEE Systems. Journal. Vol. 1, No. 1, pp. 2937, 2007.

[13] Javaid. N, Mohammad. S. N, Latif. K, Qasim. U, and Khan. Z. A.,. Khan, HEER. M. A: Hybrid Energy Efficient Reactive Protocol for Wireless Sensor Networks, 2nd IEEE Saudi International Electronics, Communications and Photonics Conference (SIECPC 13), 2013.

[14] Kadri. A, Yaacoub. E, Mushtaha. M, and Abu-Dayya. A, “Wireless sensor network for real-time air pollution monitoring,” in ICCSPA, 2013 1st International Conference on. IEEE, 2013, pp. 1–5.

[15] Khediria. S. E.L, Nasria. N, Weic. A, Kachourid. A, A New Approach for Clustering in Wireless Sensors Networks Based on LEACH , The 5th International Conference on Ambient Systems, Networks and Technologies (ANT-2014), the 4th International Conference on Sustainable Energy Information, Vol. 32, pp. 11801185, 2014.

[16] XieHui, Leila Azouzsaidane, ‘‘Ant Colony Optimization Based Hierarchical Data Dissemination in WSN’’, IEEE TRANSACTIONS ON WIRELESS COMMUNICATION, VOL.8, NO.15, PP.728-786, 2015