iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** IV **Month of publication:** April 2018

DOI: http://doi.org/10.22214/ijraset.2018.4266

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

Maximum Coverage Range Based Sensor Node Selection Approach to Optimize in WSN

Rinku Sharma[1], Rakesh Joon[2]
[1]*Post Graduate Scholar,* [2]*Assistant Professor Department of Electronics and Communication Engineering, Ganga Institute of Technology and Management, Kablana, Jhajjar, India*

Abstract: ***Wireless communication is one which plays very important role in all aspects of upgrading technologies today. Energy savings, Delay, Range, Efficiency, Power etc. are some of the factors which affect the performance of wireless communication. One of the important type of wireless communication is wireless sensor network, in which energy saving and coverage range optimization is major issues to be concentrated. Since most of embedded sensor nodes are equipped with limited power resources. The idea of this paper focuses on reducing the expenditure of energy with maximum sensing range of sensor node and finding shortest path between the nodes, thereby improving network lifetime and reducing the delay. By using the sensor node selection approach, an energy effective minimum hop path is selected over the network between the source and destination nodes. An algorithm called Minimum Hop Maximum Range routing (MHMR) has been designed to save energy and provide maximum coverage range of sensor nodes. Results and graph simulations shows that proposed algorithm can significantly improve the network life time and provide energy savings.***
Keywords: Wireless sensor network, Matlab, Coverage range, Energy efficiency.

I. INTRODUCTION

Wireless networks have become increasingly popular in the computing and communication industries, since their emergence in the '1970s'. Wireless networks are gaining popularity to its peak today. Wireless Networks enable users to communicate and transfer data to each other without any wired medium between them [8]. Wireless sensor network is one of the most important type of wireless network. Wireless sensor networks use various types of embedded sensors in the sensor nodes to monitor different type of physical and environmental conditions such as vibration, pressure, temperature etc. Sensor nodes are the basic functional unit in the Wireless sensor networks.

Wireless sensor network provide many wide range applications in the field of medical care, home automation, environment monitoring, earth sensing, air pollution monitoring, forest fire detection, military application, traffic monitoring, industries applications etc. [9].

The constraints of wireless sensor network include the memory, computing power, energy etc. These networks are able to perform bi-directional communication over the network and to control the network activity [10]. It is well-known that the sending of data consumes more energy than the receiving data in sensor nodes. Due to this network lifetime also decreases and consumes more time. To improve the energy efficiency of transmission data, many of energy efficient routing algorithms are designed to discover the minimum energy consumption path and shortest path between sending node and receiving node.

Using efficient energy routing protocol in wireless sensor network, find the minimum energy consumption path between source and destination nodes.

Also concentrates on balancing the residual energy between each sensor nodes in the whole network. Due to network partitions and some network failures causes data packet loss and multiple transmission of data packets in selected path. Retransmission of data packets in selected path makes much more consumption of energy. It means that if we maximize the energy consumption and network life time decreases and vice versa. Therefore both energy consumption and network lifetime must be balanced [11]. This paper concentrates on finding shortest path between source node and sink node. The algorithm is used to know the proper transmission range distance between nodes for energy consumption and prolong the network lifetime since the sensor nodes have fixed position.

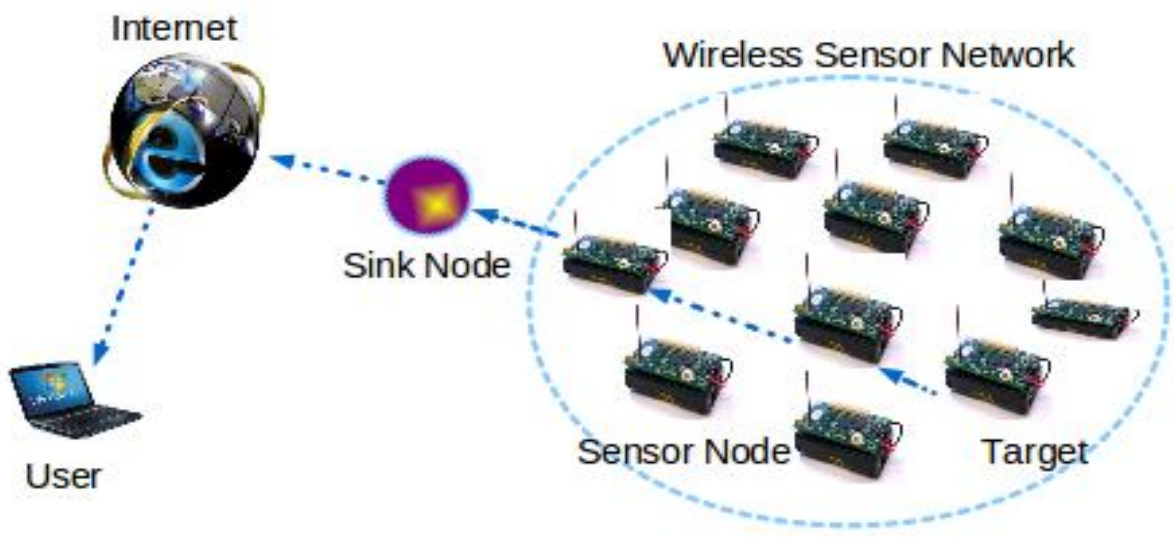


Fig. 1 Wireless Sensor Network

II. SURVEY OF THE PREVIOUS WORK

Isabel Dietrich, Falko Dressler [1], Network lifetime has become the key characteristic for evaluating sensor networks in an application specific way. Especially the availability of nodes, the sensor coverage, and the connectivity have been included in discussions on network lifetime. Even quality of service measures can be reduced to lifetime considerations. A great number of algorithms and methods were proposed to increase the lifetime of a sensor network. Motivated by the great differences in existing definitions of sensor network lifetime that are used in relevant publications, author reviewed the state of the art in lifetime definitions, their differences, advantages, and limitations. Author definition incorporates the components of existing lifetime definitions, and introduces some additional measures. In addition, author combined coverage and connectivity to form a single requirement called connected coverage.

Jiann-Liang Chen [2], has defined an adaptive route generation for sensor network. Author has improved the communication under proactive, reactive and hybrid routing. Author defined the routing under communication network and to improve the communication over the network. Author has defined an adaptive routing protocol for redundancy communication with effective route generation for network. Author improved the simulation by effective communication route generation.

Yawen Dai [3], has presented an energy effective route scheduling for sensor network. Author defined the energy effective routing in sensor network. Author has defined an effective communication approach to optimize the route generation over the network. Author has presented a topology specific communication under traffic monitoring and reliable data transmission. Author has defined a city traffic monitoring mechanism to improve the network communication. Author has defined a city traffic effective routing to improve the communication under energy optimization. Author has defined a shortest path algorithm to improve the network communication under algorithmic computations.

Vinay Joseph [4], has defined an effective power effective scheduling and routing under multi hop scheduling and energy effective routing. Author has defined multicast communication routing in sensor network. Author improved the broadcasting over the network with performance improvement. Author has defined suboptimal algorithm under the performance study.

H.Liu et.al [5], has explained the concept of opportunistic routing theory for unrealistic wireless links that provides routing in wireless networks. Compared with other routing methods, Opportunistic routings such as geographic random forwarding, extremely opportunistic routing and QOS aware geographic opportunistic routing takes advantages of providing packet forwarding for multiple neighbors and transmission nature for longer distance of wireless medium.

Xinbing Wang, Sihui Han, Yibo Wu, and Xiao Wang [6], has presented the coverage and energy consumption control in mobile heterogeneous wireless sensor networks (WSNs). By term heterogeneous, mean that sensors in the network have various sensing radius, which is an inherent property of many applied WSNs. Two sensor deployment schemes are considered –uniform and Poisson schemes. Author studied asymptotic coverage under uniform deployment scheme with i.i.d. and 1-dimensional random

walk mobility model, respectively and proposed the equivalent sensing radius (ESR) for both cases and derive the critical ESR correspondingly. Results show that the network performance largely depends on ESR. By controlling ESR, the network can achieve full coverage, regardless of the total number of sensors or the sensing radius of a single sensor under random mobility patterns, which is a much easier and more general way to operate coverage control. Under the Poisson deployment scheme, author investigated dynamic k-coverage of WSNs with 2-dimensional random walk mobility model.

Aneesh K.V.N., Ayana A. [7], has presented that wireless sensor network is commonly used to monitoring and recording special events in a geographical area with the help of number of sensors called sensor nodes. These sensor nodes are small in size, weight and portability.

They are very vulnerable to various type of failures. These failures form holes in the coverage area. The four key elements that ensure coverage for WSNs are determining the boundary of RoI, detecting coverage holes and estimating their characteristics, determining the best target locations to relocate mobile nodes to repair holes, and dispatching mobile nodes to the target location while minimizing the moving and messaging cost.

The coverage enhancement and hole healing is a big task in the field of wireless sensor networks. There are different methods are available for detecting holes and their boundary.

III. PROBLEM DEFINITION

The main concern in Wireless sensor network is energy efficiency and sensing range of sensor nodes. A Wireless sensor network contains large number of sensor nodes which perform the action of sensing the environmental and physical parameters. The sensor nodes also transmit large amount of data to neighbour nodes over the network. So, there are more chances of transmission data loss over the network. Our work is defined in same field.

We proposed an algorithm to get the energy efficiency as well as the reliability in Wireless sensor networks. In this work, an efficient maximally covered range based sensor node is selected in the network. In this work we have presented the algorithm that combined the path selection routing concept with the concept of energy preserving path. The initial path of routing will be determined using the path selection concept and in case of any broken link in the network or energy hole in the path then it will look for the alternate concept for the routing path that provides the energy preserving in the Wireless sensor network.

IV. PROPOSED METHODOLOGY

In wireless sensor network distance is the major factor respective to which routing algorithm. But in this present work we have considered multiple parameters to identify the right communication path. The parameters included in this work are:

A. Energy
B. Distance
C. Maximum Coverage Range

Based on these all parameters the reliable communication path will be generated and that path will be taken as the main routing path on which the communication will be performed. The algorithm used is MHMR algorithm. Figure 2 shows the proposed algorithm. As the algorithm start, the source and the destination nodes are specified between which the communication path will be generated. Now to perform the effective communication between the source and the destination the effective parameters are required to identify for each neighbor node of current node.

We need to find the next effective neighbor over which the communication will be performed. In the simple form, a minimum distance neighbor is considered as the effective next node. But in this work, the maximum distance node within the sensing range and with maximum energy is considered as next effective node. Set this node as the best neighbor node and communication will be performed over that node. The process is repeated till the destination node is not arrived.

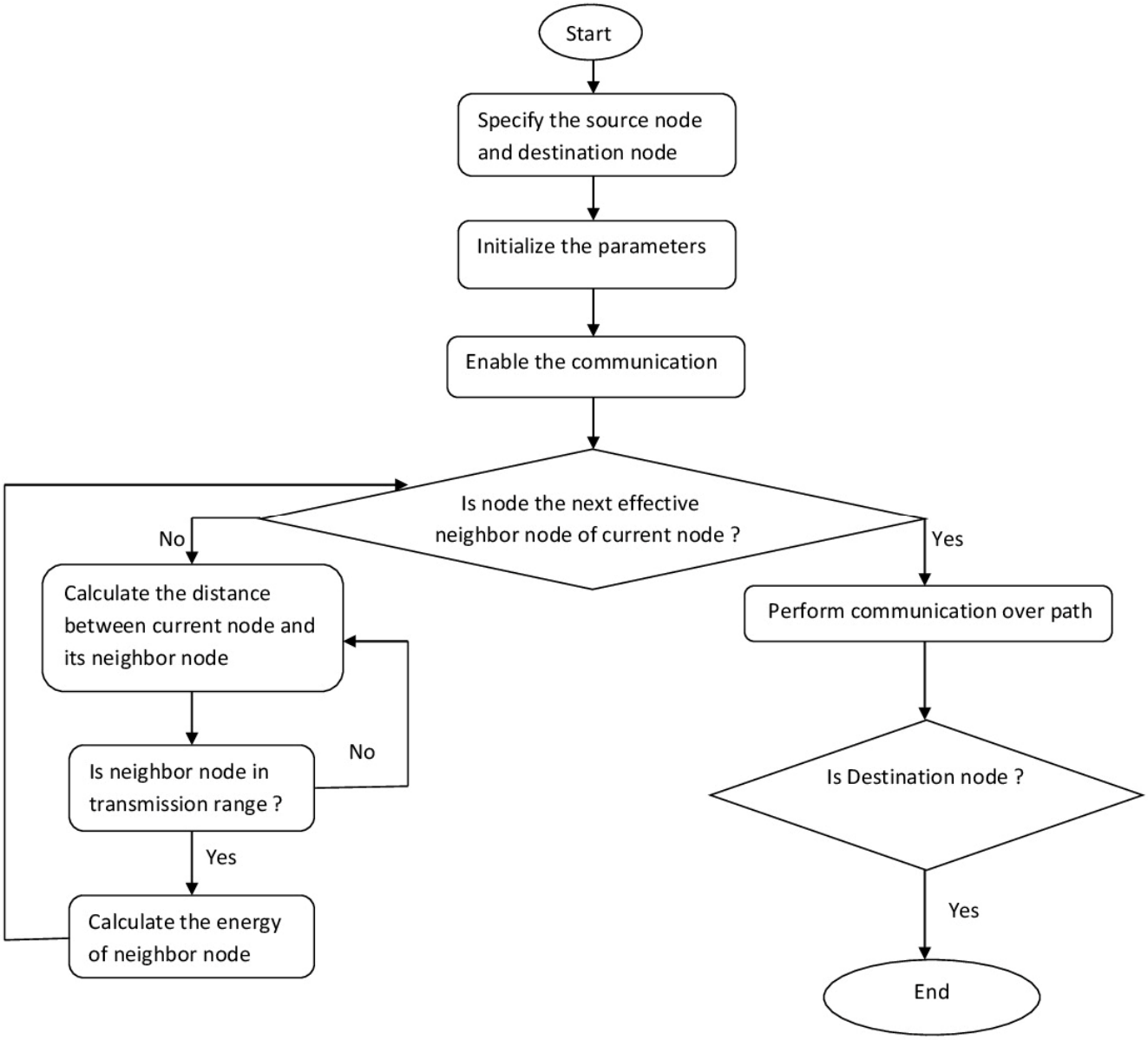


Fig. 2 Proposed approach algorithm

V. SIMULATION

The proposed work is about to find the optimal solution of any broken link or data loss in a Wireless sensor network. The proposed work is about the generation of such an approach that will dynamically compensate the problem of link failure and provide the optimize solution without any data loss. The proposed system will give the benefit in terms of Efficiency and accuracy. The main goal is to achieve minimum energy consumption and maximum coverage range to improve network lifetime. The sensor nodes perform the communication using MHMR algorithm and finding minimum hop path between source and destination node.

The simulation is performed using MATLAB software. MATLAB is a high-level technical computing language and interactive environment for algorithm development, data visualization, data analysis, and numeric computation. Using the MATLAB product, any can solve technical computing problems faster than with traditional programming languages, such as C, C++ and Fortran.

VI. CONCLUSION

In this proposed work we have defined a minimum hop energy effective communication path over the sensor area network. The work is defined for wireless sensor area network with fixed placement of network nodes. These nodes are defined at fixed position

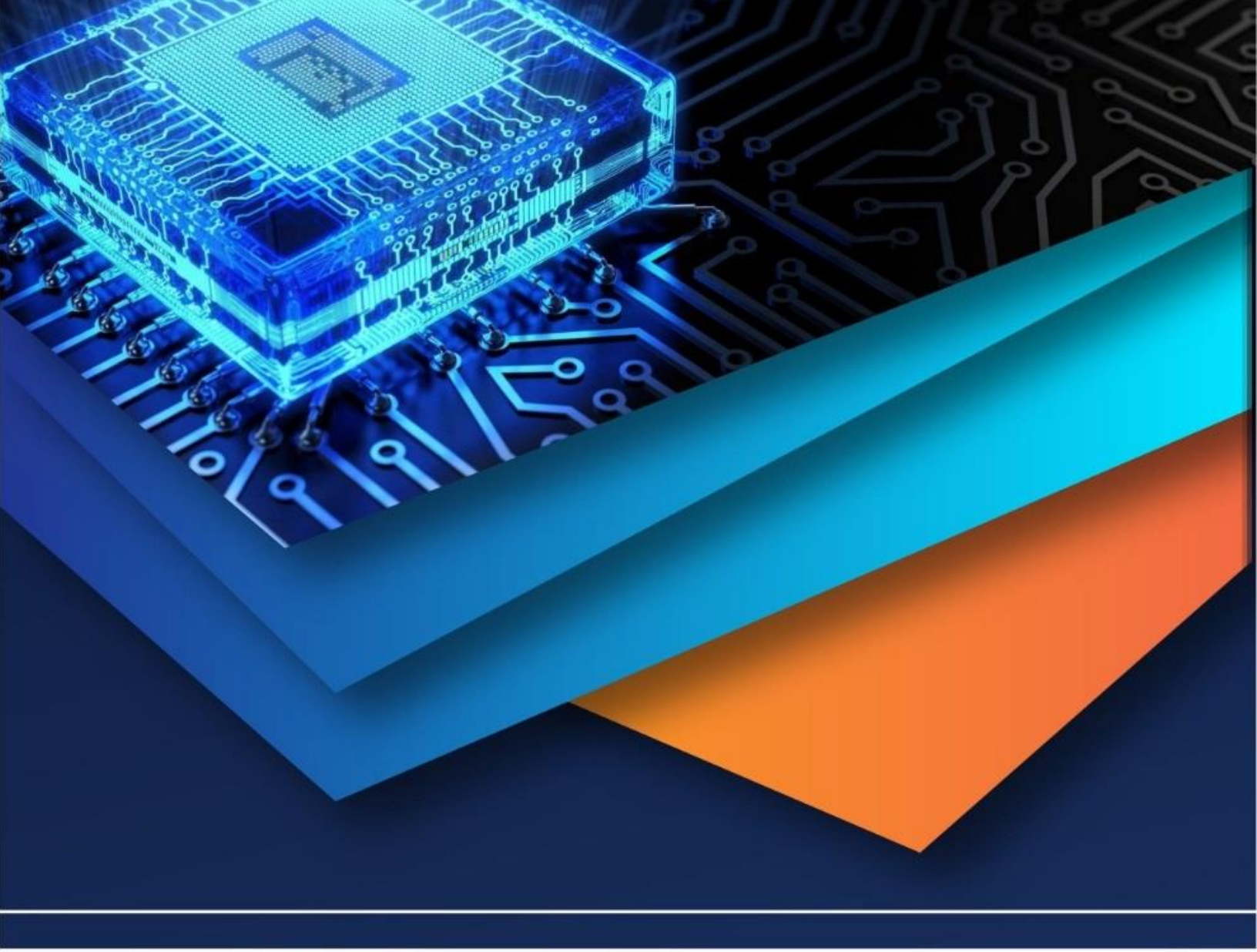
and with energy specification. The work has presented a multiple parameters based approach to generate the effective communication path with minimum number of hops over the route. The work is about to generate a path that will use minimum number of intermediate nodes so that the energy consumption over the route is reduced. The improvement to the work can be done in different direction.

VII. ACKNOWLEDGMENT

I would like to express my greatest gratitude to HOD in ECE department and Principal, GITAM, Kablana, Jhajjar for providing opportunity to do research work. And I also thanks to the people who have helped & supported me throughout this research.

REFERENCES

[1] Isabel Dietrich, Falko Dressler, “On the Lifetime of Wireless Sensor Networks”, ACM Transactions on Sensor Networks, Vol. 5, No. 1, January 2009, Pages 1-38,
[2] Jiann-Liang Chen, “Adaptive Routing Protocol for Reliable Wireless Sensor Networking”, ICACT 2010 ISBN 978-89-5519-146-2.
[3] Yawen Dai, “MEBRS: Energy Balancing Route Scheduling in Centralized Wireless Sensor Networks”, 1st Int'l Symposium on Quality Electronic Design-Asia 978-1-4244-4952-1/09 ©2009 IEEE.
[4] Vinay Joseph," Joint Power Control, Scheduling and Routing for Multicast in Multihop Energy Harvesting Sensor Networks", 9781-4244-3941-6/09@2009 IEEE
[5] L. Cheng, J. Niu, J. Cao, S. Das, and Y. Gu, “Qos aware geographic opportunistic routing in wireless sensor networks”, IEEE Trans. Parallel Distrib. Syst., vol. 25, no. 7, pp. 18641875, Jul. 2014.
[6] Xinbing Wang, Sihui Han, Yibo Wu, and Xiao Wang, “Coverage and Energy Consumption Control in Mobile Heterogeneous Wireless Sensor Networks”, IEEE Transactions On Automatic Control (Volume: 58, Issue: 4, April 2013), DOI: 10.1109/TAC.2012.2225511,
[7] Aneesh K.V.N., Ayana Ajith, “Hole and Border Detection Methods and Coverage Enhancement in WSN: A Survey”,International Journal of Advanced Research in Computer Science and Software Engineering, Volume 5, Issue 6, June 2015 ISSN: 2277 128X.
[8] Ataul Bari, “Maximizing the Lifetime of Two-Tiered Sensor Networks”,2006 IEEE
[9] Yu Gu, “Joint Scheduling and Routing for Lifetime Elongation in Surveillance Sensor Networks”, 2007 IEEE Asia-Pacific Services Computingnference 0-7695-3051-6/07 © 2007 IEEE.
[10] Chunsheng Zhu, “A Geographic Routing Oriented Sleep Scheduling Algorithm in Duty-Cycled Sensor Networks”, IEEE ICC 2012 - Wireless Networks Symposium 978-1-4577-2053-6/12 ©2012 IEEE.
[11] Yuanyuan Zeng, “Joint Power Control, Scheduling and Real-time Routing in Wireless Sensor Networks”, 978-1-4244-5848-6/10 ©2010 IEEE.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY