iJRASET
International Journal For Research in Applied Science and Engineering Technology



# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 4 **Issue:** XI **Month of publication:** November 2016

**DOI:**

www.ijraset.com

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

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

# Energy Efficient Routing Protocols for Wireless Sensor Networks

Lakshmanarao Battular[1], Dr. P. Vamsikrishnaraja[2]
[1]Assistant Professor, [2]Professor, Department of Computer Science and Engineering,
Kakinada Institute of Technology and Science, Divili, Kakinada, AP, India

***Abstract*— Energy optimization is a major constraint in designing and developing a routing protocol for Wireless Sensor Networks (WSNs) due to their limited resources. This survey paper focuses on the enhancement of lifetime of WSNs by reducing the energy utilized for data gathering and data aggregation of sensed data to be traversed from a source node to a destination node by reviewing various energy efficient routing protocols along with the QoS requirements. The first energy efficient hierarchical cluster based routing protocol in WSNs is LEACH (Low Energy Adaptive Clustering Hierarchy). In LEACH protocol, cluster head are elected each round without any consideration to the residual energy available with each node.***
***Keywords—Wireless Sensor Networks, Energy Optimization, Routing, QoS, Lifetime.***

## I. INTRODUCTION

In recent years Wireless Sensor Network (WSN) are fast developed due to their light weight and ease of operation. WSNs are capable of self-organising in case of any node or link failure. WSNs can be deployed in large numbers and finds it use in many real time applications. The figure 1. Defines the various components of Wireless sensor Network (WSNs).

## II. APPLICATIONS

WSNs are used when constant monitoring / sensing and detection of events is required.

*A. Military Field*
*1)* Battle Field Surveillance and Monitoring,
*2)* Guidance systems and intelligent Missiles.
*3)* Detection of Attack by Weapons of mass destruction such as nuclear, chemical, biological.

*B. Environmental*
*1)* Forest Fire and flood detection
*2)* Weather Monitoring

*C. Patient Monitoring and Diagnosis*
*1)* For Monitoring heart rate, blood pressure,
*2)* Doctor is altered on detection of an anomaly in patient monitoring
*3)* Prevents wrong diagnosis
*4)* Correctly identify allergies.

*D. Commercial*
*1)* Used in Oven, refrigerator, vacuum Cleaner to interact with each other and be remote controlled.
*2)* Lighting, Music and Ambience in the room can be automatically controlled.
*3)* Temperature and airflow can be automatically controlled.
*4)* Warehouse: The inventory control is performed by installing sensors on the products to track the movement.

## III. ROUTING CONSIDERATIONS FOR WSNS

Various key parameters are to be considered while developing a routing protocol for WSNs.


©IJRASET: All Rights are Reserved

*A. Network Dynamics*

WSNs are being wireless can be either mobile or fixed nodes based on the application sector used.

*B. Scalability*

The proposed routing protocol should be well suited for enlargement in the network size if required.

*C. Energy Consumption*

WSNs are battery powered devices which cannot be recharged when required, so the designed protocol should consume less power.

*D. Data Fusion*

Sensor nodes transmit their sensed data to their neighbouring nodes for further data processing called data fusion where the redundant data are suppressed.

*E. Network Lifetime*

The lifetime of a node is effectively determined by its battery life. The main loss of life is due to data transmission, reception and processing.

*F. QoS*

To obtain network performance QoS parameters such as reliability, life time, and latency should be fulfilled by the routing protocol.

*G. Coverage Area*

This is defined by the number of nodes alive per unit defined time period.

*H. Data Fusion*

Sensor nodes transmit their sensed data to their neighbouring nodes for further data processing called data fusion where the redundant data are suppressed.

*I. Packet size*

It is a predefined factor which determines the energy and time required for data transmission and processing between the transmitter and the receiver.

## IV. ENERGY EFFICIENT ROUTING PROTOCOLS IN WSNS

The routing protocols in WSNs are classified into four main categories.

*A. Network Structure*

Flat and hierarchical based protocols. In case of Flat, all the nodes in the network are equally involved in the data sensing & data gathering process. But in case of Hierarchical, sensor nodes are grouped into clusters and one node is elected as cluster head which has the responsibility of data gathering & data processing.

*B. Communication model*

Query-based protocols, Coherent, Non-Coherent based protocols and Negotiation –based protocols. All these protocols are used identify the neighbouring nodes for data transmission and processing.

*C. Topology based*

Location based and Agent based protocols. These protocols are used to identify the neighbouring nodes location for easy transmission. Incase of Location based each node is aware of its neighbouring node and in case of agent based, the sensor uses a agent to identify its neighbour.

*D.* QoS based

It is used to achieve certain set of parameters in order to meet the network performance.



©IJRASET: All Rights are Reserved

Volume 4 Issue XI, November 2016
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

## V. FIGURES

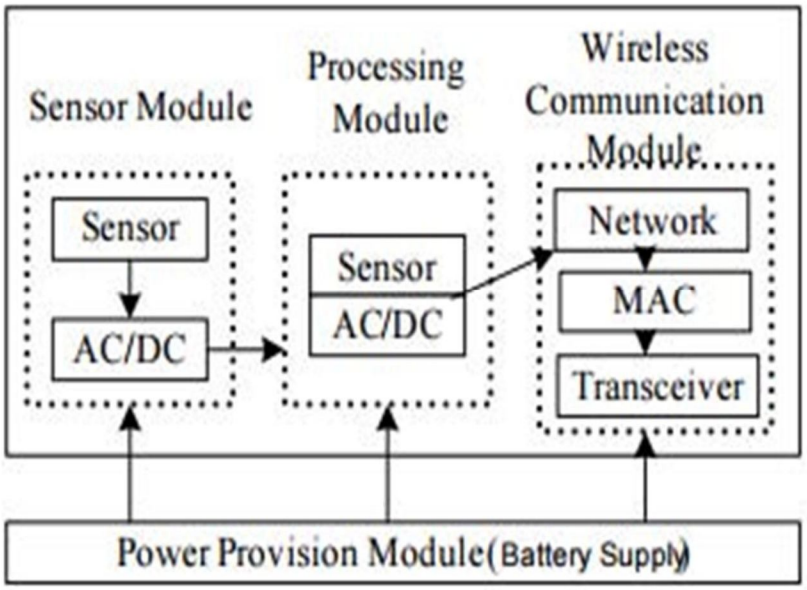



Fig.1. Components of WSN

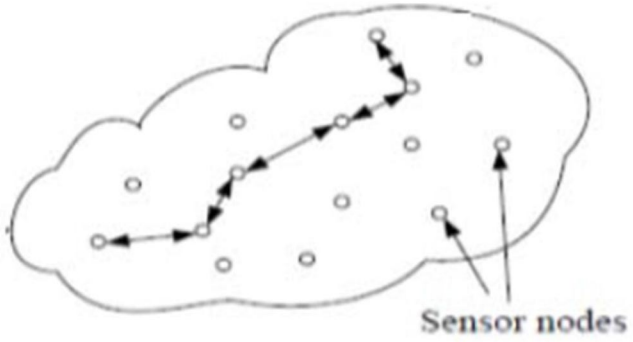



Fig. 2 Random deployment of sensor Nodes

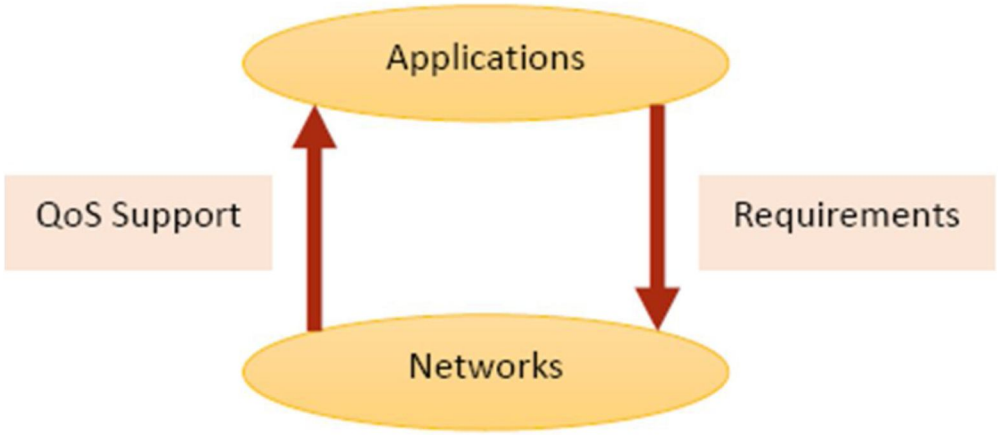



Fig. 3. QoS Model


©IJRASET: All Rights are Reserved

Volume 4 Issue XI, November 2016
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

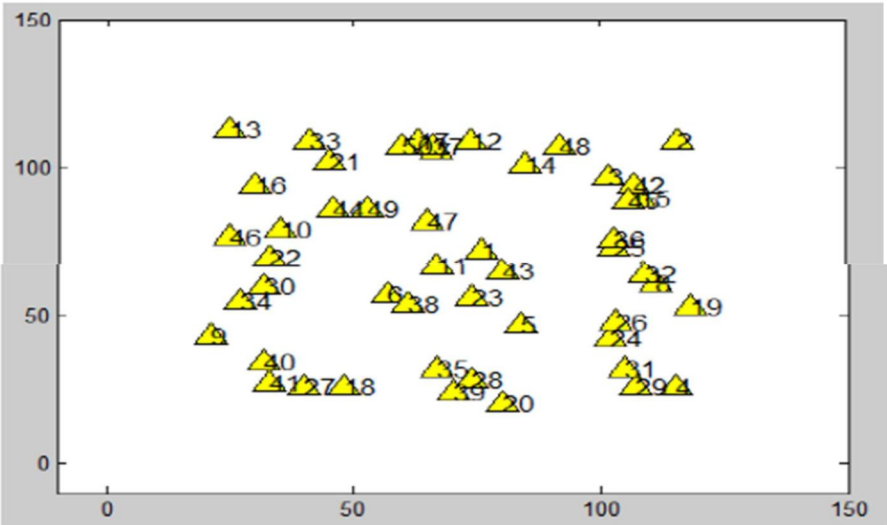



Fig. 4. Deployment of 50 sensor nodes in random

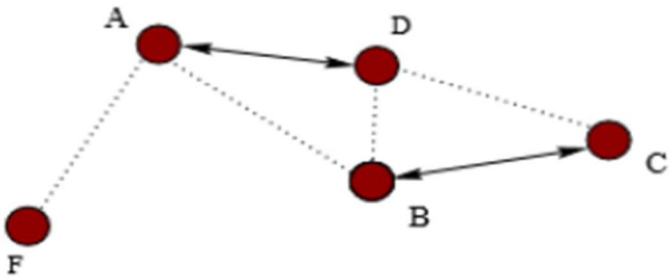



Fig.5 Node Topology

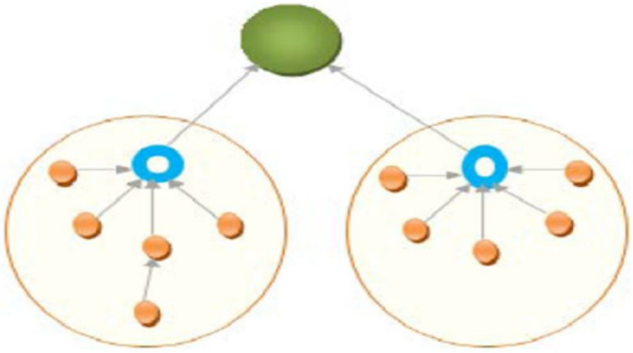


Fig. 6. Existing method of cluster selection to minimize energy

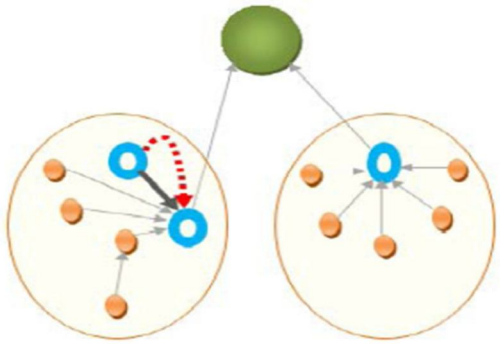


Fig. 7. Proposed method of Head selection to minimize energy and to enhance life time



©IJRASET: All Rights are Reserved

## VI. CONCLUSIONS

Wireless Sensor Networks are powered by the limited capacity batteries which cannot be recharged as and when needed. These property impose a most challenging phase to the development of routing protocols. Here we focused on the various parameters to be considered while developing a routing protocols along with the types of routing protocol model available. By combining any two of the proposed models along with satisfying the QoS constraint will definitely provide a way to design and develop a energy efficient routing protocol which minimize the energy used and enhance the network life time.

## REFERENCES

[1] Imad S. AlShawi, Lianshan Yan – Senior Member, IEEE; Wei Pan – Member , IEEE; Bin Luo - Member , IEEE , "Lifetime Enhancement in Wireless Sensor Networks Using Fuzzy Approach and A-Star Algorithm ", IEEE Sensors Journal, Vol.12, No.10, October 2012
[2] Sang H. Kang – Senior Member, IEEE and Thinh Nguyen Member, IEEE, " Distance Based Thresholds for Cluster Head Selection in Wireless Sensor Networks ", IEEE communications Letters, Vol.16, No.9, September 2012
[3] Nikolas A. Pantazis, stefanos A. Nikolidakis and dimitrios D. Vergados, "Energy-Efficient Routing Protocols in Wireless Sensor Networks: A Survey",IEEE Communication Surveys and Tutorials, 2012 pp 1-41.
[4] Bhaskar Bhuyan, Hiren Kumar Deva Sarma, Nityananda Sarma, Avijit Kar, Rajib Mall, " Quality of Service (QoS) Provisions in Wireless Sensor Networks and Related Challenges ", Scientific Research,2010 ,2,pp861-868.
[5] M. Aykut Yigitel, Ozlem Durmaz Incel, Cem Ersoy, "Qos-aware MAC Protocols for wireless Sensor Networks: A survey", Computer Networks 55 (2011) 1982-2004 journal on ELSEVIER.
[6] M.Asim, M.Yu, H.Mokhtar, M.Merabti, "A Self configurable Architecture for Wireless Sensor Networks," IEEE Developments in E-systems Engineering (DESE), pp. 76-81, Nov 2010.
[7] Aria Nosratinia , Todd E.Hunter , Ahmadreza Hedayat , " Cooperative Communication in Wireless Networks,"IEEE Communication Magzine ,pp. 74-80, October 2004.
[8] Cui, S., Goldsmith, A. J., and Bahai, A., "Energy-efficiency of MIMO and cooperative MIMO techniques in sensor networks," IEEE J. Select. Areas Commun.,vol. 22, no. 6, pp. 1089-1098, August, 2004.
[9] Alberto Cerpa , Deborah Estrin , "ASCENT: Adaptive Self-Configuring sensor Networks Topologies," IEEE Transactions on Mobile Computing ,vol.3,july 2004
[10] I.F. Akyildiz ,Weilian Su, SankaraSubramaniam , E.Cayirci, "A survey on sensor networks " Communications , pp 1-14,August 2002.

## BIBLOGRAPHY



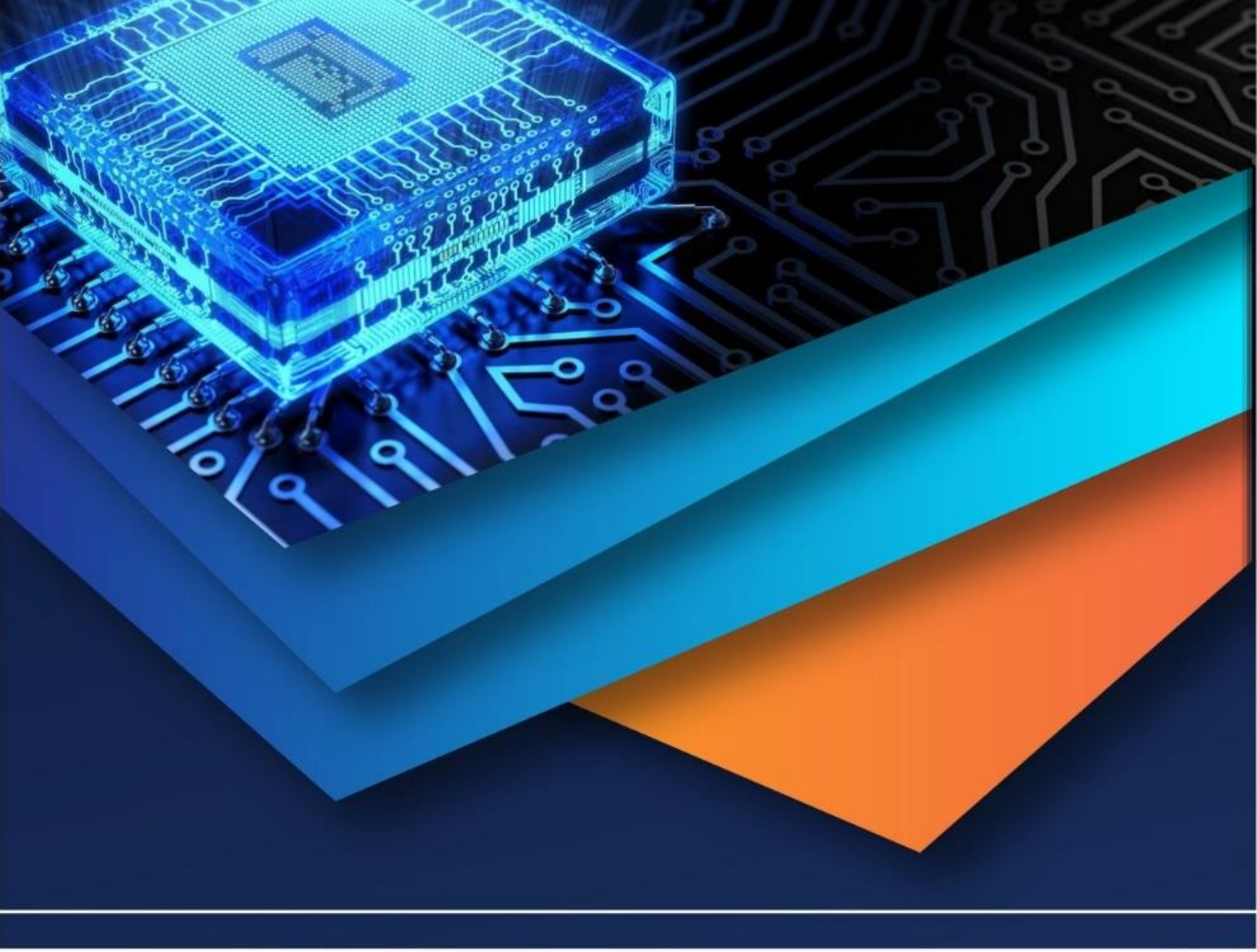
LakshmanaRao Battula Currently working as Assistant Professor Department of CSE in Kakinada Institute of Technology and Science (Kits), Tirupathi (V), Divili, Peddapuram (M), East Godavari Dist, Andhra Pradesh. His current research interest includes Computer Networking, Network Security and Cryptography.



Dr. Penmetsa V. Krishna Raja did his PhD from JNTU, Kakinada. He received his M.Tech (CST) from A.U, Visakhapatnam, and Andhra Pradesh, India. His research areas include Network Security, Cryptography, Intrusion Detection, Neural networks, Data mining and Software Engineering.



©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)