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# Effective implementation of Energy Aware Routing for Wireless Sensor Network*

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**Abstract**

The Wireless Sensor network has placed its inevitable position in monitoring and surveillance purpose. The remote and unattended condition of Wireless Sensor network seeks a new energy efficient algorithm. Enhancing the lifetime of Wireless sensor network has become the primary need to prolong the network lifetime. This paper envisage the increase in lifetime of nodes by properly selecting the cluster head based on the residual energy state and total number of frames transmitted to the sink. The role of sensor node is modelled as Finite State machine and realized as markov process. The process helps in scheduling the role of the sensor node and in the process of cluster head selection. Lifetime enhancement is achieved by selecting optimal cluster head among eligible cluster members. The proposed algorithm outperforms the other algorithms in terms of lifetime and throughput when compared to other protocol. The results supports that Energy aware routing increases the lifetime of the network and serves as the better solution for energy consumption.


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*Keywords:* Wireless Sensor Network (WSN), Energy aware routing (EAR), Finite state machine (FSM)



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## 1. Introduction

The Wireless Sensor Network (WSN) has wide range of applications in the field of surveillance, monitoring, consumer electronics, remote monitoring of patients etc.[1].The functionalities of sensor network are increasing day by day with advancements in technologies. The size of the sensor node is reducing, with the increase in applications. However, miniaturization of the sensor node influences the size of the battery [2]. The storage capacity of the battery is reduced as the size of the sensor node is reduced. The sensor network consists of group of sensor nodes which are deployed in the region of interest is shown in Fig 1.

The nodes are deployed in the remote environment, which is hardly possible for the humans to replace the node. The capacity of the battery is limited due to the size of the sensor node. Thus, the energy management with the available resources has become the major constraint of sensor network. The lifetime of the sensor network depends on the lifetime of each individual node. Each sensor node plays a major role in increasing the survivability of the network.

The clustering mechanism in sensor network enables efficient transmission of information from end nodes to the sink. The selection of cluster head reduces the congestion due to data transmission from all nodes and data loss. Many energy efficient clustering and routing protocols are available which concentrate in improving the lifetime by considering the residual energy of the battery[3]. Hence the energy efficient routing should perform without compromising the size of the battery.

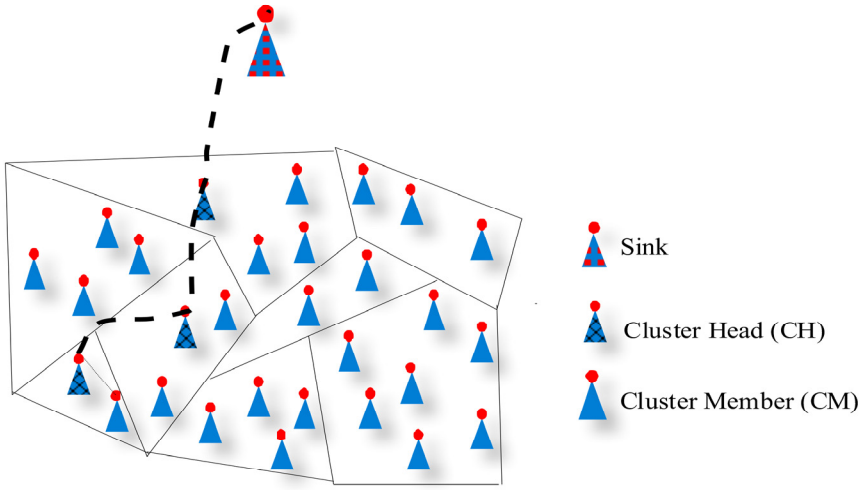


Fig. 1 Wireless Sensor Network (WSN) architecture

## 2. Related works

In [4] the battery friendly schemes are proposed by considering the internal battery characteristics. In [5] the expected residual energy of a node is determined which is the predicated remaining energy for a node to be cluster head. The estimation of lifetime of the node by considering battery characteristics is discussed in [6]. The battery characteristics such as self-discharge, discharge rate, ageing effects are analyzed to estimate the lifetime of the node. The mathematical model is proposed by measuring battery parameters under different environmental conditions. Though, many clustering schemes are proposed, improper clustering may isolate the nodes from cluster head [7]. These nodes consume more energy for communication hence an energy-