ABSTRACT

The rapid growth of wireless services in recent years is an indication that considerable value is placed on wireless networks. Wireless devices have most utility when they can be used anywhere at any time. Yet one of the greatest challenges is limited energy supply.

In the recent years, Wireless Sensor Networks (WSN) have gained good attention from both the research community and actual users. As sensor nodes are generally battery-energized devices, the network lifetime of WSN is widespread to sensible times. Therefore, energy management is one of the most challenging problems in wireless sensor networks.

Recent research efforts on these problems deal with techniques during the process of node deployment, searching the target node, data collection and communication. WSN advocates all these techniques for energy management. The proposed schemes namely node deployment using multi robot, aggregation routing, increasing ray based search, Voting and Polling are deployed at different points on the WSN and an analysis of these five schemes has been done. The analysis is based on the parameters of number of nodes and energy consumption by the nodes.

In this research, WSN has been established and five energy efficient schemes have been compared. The first scheme implemented is node
deployment using multi robots. In this scheme, performance analysis of energy efficient node deployment has been done using single and multi robot scheme. Energy consumption has been measured for various node densities. The energy conservation of multi robot scheme is observed to be better than that of single robot scheme. Energy conservation of multi robot deployment scheme has been found to be 4% better than the single robot deployment scheme. A limitation of this scheme is the deployment cost incurred on using many robots being high.

In order to improve the energy conservation further, a novel scheme called aggregation routing has been proposed. The analyses have been performed for different input samples. Aggregation routing scheme for mobile relay has been found to be 21% better than the static sensor nodes in terms of energy savings. Here, it is to be observed that there is an improvement in energy conservation than that of the previous schemes. A constraint of this scheme is that the mobile relay needs to stay only within a two-hop radius of the sink.

To improve the energy conservation further, a scheme called rays based approach has been proposed. Here, energy conservation of diagonal area and copies coverage based increasing ray search scheme have been found to be 26% better than that of the area and copies coverage based increasing ray search scheme. However, a restriction of this scheme is the increasing ray search searches rays sequentially one after the other and hence the latency incurred will be very high.
Next voting schemes have been applied to reduce the energy consumption in WSN. It is evident from experiment results that the consumption of energy has been reduced. Energy conservation of witness based voting scheme has been found to be 34% better than that of the one round voting scheme. Yet one limitation of this scheme is that it has a notable amount of delay.

The research has further investigated the energy conservation of WSN by providing the polling scheme. The analyses have been performed for different input samples. Based on the results obtained for the different test cases, it is observed that the polling scheme for sector partitioning is 51% better than that of the clustering scheme in energy conservation.

As per the analysis from the five schemes, it is obvious that polling scheme is much more effective in terms of reducing the energy consumption in Wireless Sensor Networks.