ABSTRACT

In Wireless Sensor Networks (WSN), energy efficiency is an important issue, since the sensor nodes act as both data originator and data router. The sink functionality typically include gathering sensing data from sensors in the network via multihop relays performing data processing. The nodes which are closer to the sink have to take heavier traffic load and thus deplete their energy quickly leading to energy hole around the sink. If the problem is not properly handled, then the energy hole may cause failure in the sensor network and cause large coverage hole.

By sink repositioning the energy hole problem can be avoided. Sink repositioning can be performed using multiple sink deployment and sink mobility. Relocating or repositioning the sink is very challenging during the regular network operation. It is very difficult in a multi-hop network environment to find an optimal location. The fundamental issues are (i) where the sink should move (ii) how the data traffic will be handled.

Tracking in sensor networks mainly focus on identification of an object by its particular sensor signature and detection of a path over a period of time. It is necessary to deploy the sensor networks within a period of time during tracking in remote or unreachable locations, in spite of its low cost and simplicity of deployment there is a need for accurate tracking system and a lower missing target probability.

Localização refers to the ability of determining the position of a sensor node, with an acceptable accuracy. It is also relevant to the network main functions such as communication, geographical routing, cluster creation, network coverage. Most of the existing localization solutions have low accuracy in obstructed environments and did not consider the resource limitations of WSN.

To rectify the issues of sink repositioning, this thesis presents a K-Partitioned Minimum Depth Tree (k-PMDT) using the optimal search for placing optimal number of sinks in sensor networks. Initially, the optimal number of sinks is determined using the optimal sink algorithm satisfying the h-hop constraint. K-Partitioned Minimum Depth Tree (K-PMDT) is constructed for positioning multiple sink nodes and setting up the routes. After determining the optimal number of sink positions and routing,
best sink reposition is selected by optimum search method. Sink movement is done by using the intelligent movement and it limit the sinks movements while maintaining their direction to the optimal positions.

In order to solve the issues of localization and tracking, a Cluster-Based Architecture for Localization and Tracking is proposed. The target localization and tracking is performed in three phases. In the first phase, a cluster-based architecture is developed. The entry of the target into the cluster is detected and then based on the RSS, a priority table is created at the base station. Only the cluster head with the greatest priority is allowed to transmit data. In the second phase, prediction based target tracking is performed. Trisensor pattern of the received signal is formed and stored in the database for analysis. The pattern which keeps repeating many times and has high confidence value is predicted the next time. In phase 3, data from sensor nodes is compressed by the cluster head to reduce the delay involved in data signal transmission.

The performance of the new techniques are implemented using Network Simulator (NS2). Simulation results show that the proposed technique do better performance as compared to the existing technique in terms of the metrics such as average packet delivery ratio, delay and energy consumption.