

# Enhancing the Target Coverage and Data Collection in Wireless Sensor Network

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**Abstract** - Target coverage and data collection are the major problem in wireless sensor network. There are two types of nodes used to data collection process and target coverage. One is leaf node another one is parent node. Parent node used to collect the sensed data from leaf node. The leaf nodes used only perform the monitoring task. Extra work load create node failure. so parent node failure occurred. To proposed Particle swarm optimization method used to both target coverage and data collection using clustering method. Particle swarm optimization with simulated annealing used to data gathering process. Cluster formation and cluster head selection to avoid the more work load balancing and also present the distributed running time recovery of the cluster head failure.

**Keywords:** wireless sensor network, clustering, particle swarm optimization, simulated annealing, Network lifetime, Black hole technique, cluster head recovery

## 1.INTRODUCTION

A wireless sensor networks consists of spatially circulated self-directed sensors to monitor environmental or physical environment, such as temperature, pressure, and etc., and to cooperatively pass their data through the network to a main locations [1]. The more modern networks are bi-directional using Euclidean distance, also enabling control of sensor security of data gathering. Wireless sensor networks were motivated by military applications such as field surveillance, and control, machine health monitoring, and so on [2].

The WSN is built of "nodes" from a hundreds or thousands, where each node is connected to one sensor. Each sensors

network node has typically several parts: radio transceivers with the internal antenna or connection to an external antenna, a microcontroller, an electronic circuit for interfacing with the sensors, usually a battery or an embedded from of energy harvesting [3]. Clustering method is very efficient. It can reduce the energy consumption. The sensor nodes are grouped into small number of clusters. Each cluster using one cluster head to collect the data and send the transmitted data to base station. The advantage of clustering increase scalability and bandwidth and also increase network lifetime [4].

Coverage and data collection tree used to both target coverage and data collection. Here every leaf node only monitoring task. The parent nodes perform the data gathering task [2]. But here some non leaf node also perform monitoring task. One parent node have only one leaf node. Due to heavy workload the parent node failure the leaf node cannot transmit the data. The leaf node may appear at intermediate node [5].

But clustering method sometimes due to extra workload affected some cluster heads. So cluster head failures reduce the network lifetime. Particle swarm optimization mainly used hardware and software device [6]. In this optimization method mainly focused on deployment, localization, clustering and data aggregation LEACH of Heinzelman, et. al. is the first hierarchical or clustering based protocol selected in the cluster heads randomly[8].

Other improvements proposed for LEACH are LEACHC [3], HEED [4] September [5], ALEACH [6]. DEEC [7] is cluster-based algorithm selected in the cluster heads on the basis of the probability of the ratio of the residual energy network.

These algorithms, nodes with more energy have more chances to be a cluster head. It extends the life of the network. TDEEC scheme that follows the thoughts of DEEC. This scheme chooses the cluster heads of the high energy nodes energy efficiency and lifetime of the network to improve network lifetime and each step very easy process. But can't increase lifetime [9].

## II. RELATED WORK

The centralized coverage algorithm focused on monitoring schedule was first determined on the base station. The scheduling approach is requiring very low processing power from the sensor nodes that usually limited processing power. The main drawback in scheduling approach is the fact that the location of the sensors must known in advance, that the sensors must equipped with a global positioning system. That this algorithm controls the active node density and may not provide full coverage[10].

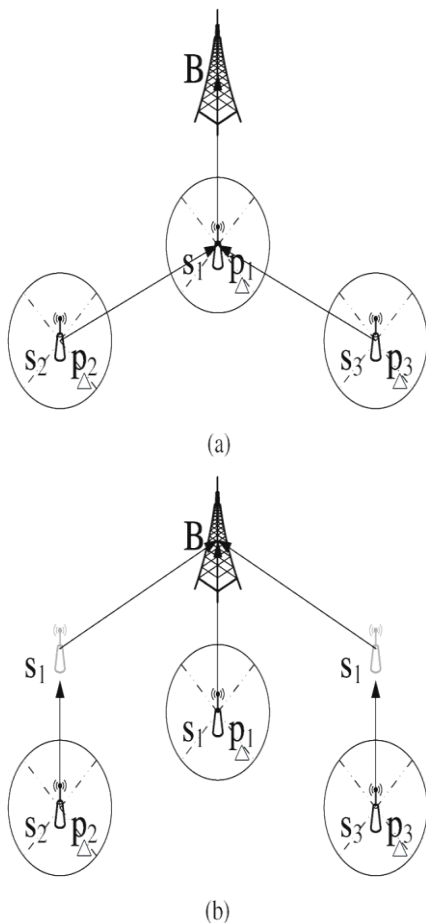


Fig. 1. Coverage and data collection tree.  
(a) CDCT. (b) Sensor repeated CDCT.

Mostly clustering techniques used to reduce energy consumption. Many types of clustering algorithm for example LEACH (Low Energy Adaptive Clustering Hierarchy) is used to create the cluster head. Main drawback of this

protocol is randomly selected the cluster head, also each and every cluster head used to check the cluster node they drop 10% of energy and again form the data gathering process[11]. Many researches have to use some special node called gateways or relay nodes, these also provide some more energy [13]. The gateway are like treated as the cluster leader (or cluster head) and moreover responsible for the same functionality. Gateways or relay nodes are battery powered. It is very crucial for long run operation the gateways for cluster formation are very important by consider the remaining energy of the gateway [14].

The cluster head perform data gathering of all received data from its cluster members and then forwards it to the sink in a multi hop manner. The time slot is index finite for sending one data packet[15]. And it is set according to the maximum retransmission number, the transport delay becomes retransmission number becomes very large. The time slot is not set, may conflicts may occur in retransmission. The retransmission first considers the reliability and then designs the delay optimization strategy [16]

Data collection network mainly focused some states: Source present in region but network not sense. This is termed "failure of coverage" in sensing range. Source present and network sensing while satisfying user dictate constraints. This state is termed "dynamic" sensing range. Source at hand and network sensing but not filling user dictate constraints. This state is termed "quality loss" in sensing range. No source present in the region [17].

Thus LEACH protocol has two phases: Setup phase and Steady phase. First phase the selection of cluster-head is done in the second phase the cluster heads collects and send to the data to the base station. The drawback of this technique is that it confines the scalability of the nodes in network. The non-cluster nodes have to send data in the selected time. The cluster head may not be uniformly distributed over the network.[18]

Distributed clustering algorithm called DFCA used gateway for cluster formation. The sensor nodes that have steady state phase and setup phase. Setup phase used cluster formation and also using proposed algorithm. Steady state phase convert the schedule into number of rounds. Overhearing technique also used to fault detection [19].

In my existing system mainly focused on target coverage and data collection. Polynomial time constant factor approximation scheme used where the density of the target point is bounded. And coverage and data collection tree used to both target coverage and data collection at the time interval OTI. The every leaf node in a CDCT performs only monitoring task. Parent node perform to transmit the sensed data from leaf node.[20]

### III. PROPOSED SYSTEM

Target coverage and data collection used to optimize the sensor using particle swarm optimization method. The particle swarm optimization methods select and solve the optimize problem global area. Particle swarm optimization behavior of a flock of birds. PSO is a Meta heuristic as it makes few or no assumptions about the problem being optimized and can search very extension spaces of candidate solutions. Here particle means some object such as size, shape and also structure. Particle swarm optimization improve the candidate solution (candidate solution is a member or set of possible solution to a given problem).

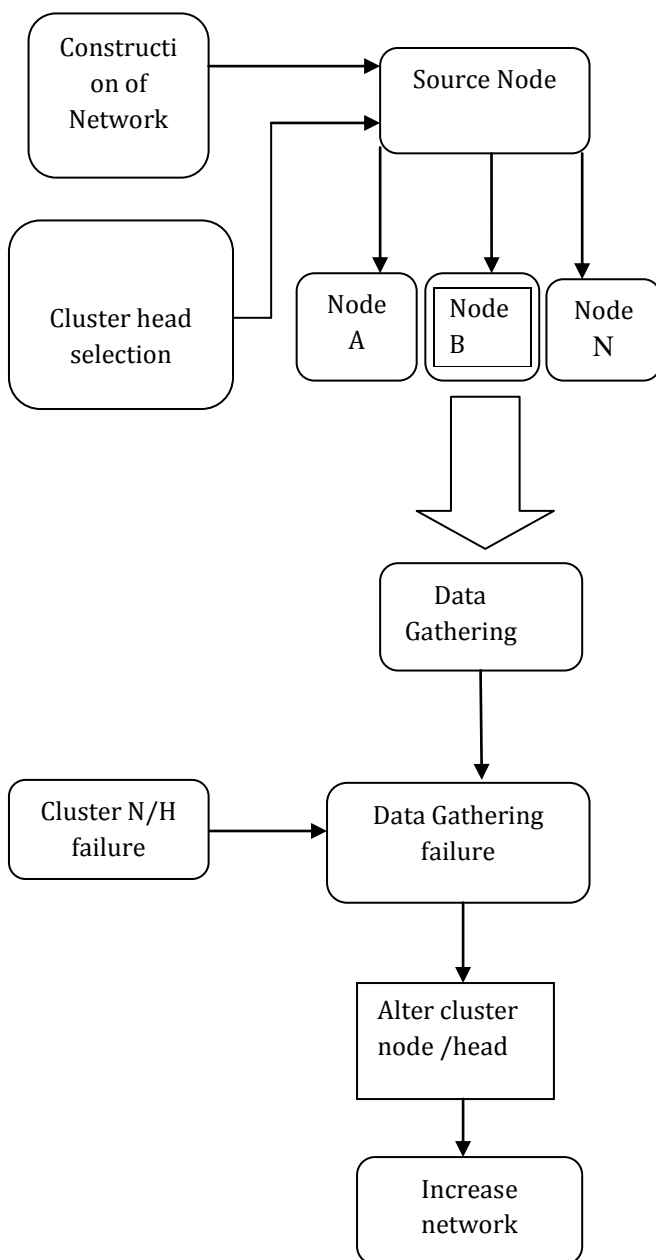


Fig 2. System Architecture

The clustering technique used to create cluster formation and select cluster head. Wireless sensor network divides cluster each cluster having a coordinator dependable for gathering the data from the nodes and sending it to the sink. Each sensor nodes sends data to the cluster head and then cluster head perform collection process on the received data and then send it to base station. K nearest neighbor algorithm (KNN) to avoid the traffic loss.

Sensors are repeatedly deployed densely to satisfy coverage requirement. Cluster head selected randomly or based on some criteria. Cluster head have more residual energy, maximum no of nodes. Smallest distance from base station. Here particle swarm optimization used to both optimization techniques and also target coverage. Simulated annealing used for data gathering process and collect all the sensed from cluster head to base station. The KNN algorithm mainly used to nearest neighbor connected to some nodes. This method ensures that no two nodes in the same cluster are at a more than optimum Euclidean distance from cluster head. Cluster head selection focused on weight based function.

Black hole refers to places in the network where incoming or outgoing traffic is silently discarded without informing the source that the data did not reach. But black hole technique used to recover cluster head dynamically at running time. If the CH does not hear a node for a pre-defined timeout, it may assume that it has died. However, the CH need not take any action except for re-calculating the mean sleep time and announcing it to the other nodes.

If the current CH dies, ordinary nodes will notice there is no cluster super frame to synchronize with. (Note that the BS will also note the absence of the traffic from the affected cluster.) The BS can initiate re-clustering of the entire network, but this procedure is lengthy and requires that all nodes are informed so that they can be awake. A cheaper (i.e., more energy efficient) solution is to simply assign the orphaned nodes to a different cluster. It's a important process to collect the data form source to base station.

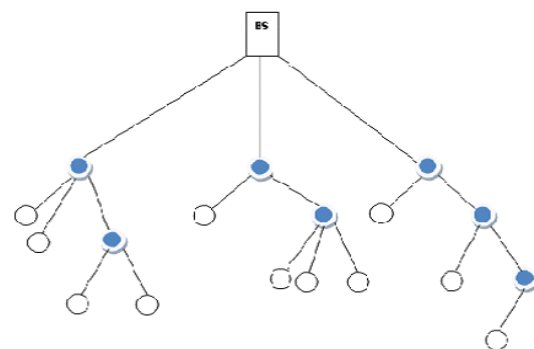


Fig 3. Recovery of cluster head failure in WSN

#### IV. CONCLUSION

The particle swarm optimization method used to solve optimization problem and cover the targets and simulated annealing used to data collection increase the data collection from cluster head to base station. Black whole techniques and detect cluster head failure at running time and also increase the scalability and used global optimization.

#### V. REFERENCE

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