OPTIMUM CONTROLLING OF THE SAUVE-QUI-PEUT
ENERGY USING THE CAFA TECHNIQUE

7.1 INTRODUCTION:

Wireless Sensor Networks (WSNs) consist of spatially spread out unique sensors to monitor several important attendable and unattendable environments. The use of data in the network set of sensors is precious in the dangerous mission. In the updated century, healthcare, architecture, space, mechanical, electrical and electronic industries, and so many other environments, which are small scale or large scale industries, enjoy unforeseen improvements, because of WSN. It is an excellent platform which provides ample opportunities to apply the innovative concept. Real time variables are collected in a predetermined, projected and estimated way, and the observations are channelized towards the base station for further computational use.

The work analyses various real time parameters which start from initial sensing upto the last process and analyses all the important protocols for the energy saving in the WSN with new CAFA (Constant Analysing Factor Agent) concept. Sensors can be defined in general as compact battery operated equipment’s. In communication process it consumes more energy than all other computation parts. Hence, it plays an important role in conserving energy, and so researchers focus on solving such crucial issues. There should be an energy awareness at all the layers of networking protocol. The issues are common for all kinds of sensor applications. Therefore, the research on these areas mainly focused on the software-level power awareness such as dynamic region selection based CAFA technique with the low duty cycle issues, system network and analysing
related issues. At the network layer, the main aim is to find ways for the energy-efficient route set up with the minimum hop, and reliable relaying of data from the sensor nodes to data and from some agent to the sink.

Lifetime of the network is maximized when the present algorithm is applied. Routing in the sensor networks is a very vital exercise due to the several real time characteristic values that distinguish them from the other. Generally, if the automated standalone WSN is used for the large scale with limited speed, in the small scale applications like healthcare to monitor patients with complex problems, it is very important to monitor critical cases at a high speed data rate with accuracy. The data received may not be with clear output signal of the concerned category, and so, it is necessary to monitor each and every attribute, big or small, in overall Wireless Sensor Network.

The present research shows that low utilization of energy has resulted in high output with more accuracy, and is useful under limited resources. So, analyzing the network constraints in Wireless Sensor Network is crucial. Before selecting the set of data sensor nodes, the network constraints are to be considered. Thereby, the data collection will be carried out efficiently. Before selecting a sensor node for data collection, the method has to be identified, and the number of supporting nodes present in the network between the sink and sensor node have to be considered.

Similarly, before using the intermediate sensor nodes for the data collection, the energy constraints of the intermediate nodes have to be verified. Subsequently, the data availability in the sensor node and the amount of data retrieved from the sensor have to be identified before selecting a sensor for the data collection. All the results are routed to the Wireless Sensor Network for a coordinated exercise.
7.2 PROBLEM IDENTIFIED:

Wireless Sensor networks are thick networks of little, ease sensors, which gather and disperse natural information and in this way encourage observing and controlling of physical condition from Wireless areas with better exactness. The real test is to accomplish energy productivity amid the correspondence among the nodes. This work goes for proposing an answer for scheduling the node's exercises to decrease the energy utilization. It proposed the development of a decentralized lifetime amplifying tree inside clusters.

It goes for limiting the separation of transmission with minimization of energy utilization. Wireless correspondence are high-development regions in the interchanges field. An expanding great quantity of process capacity is accessible in handheld frameworks, and enhanced support for Wireless correspondence interconnects these adaptable stages with each other, and also with fastened desktop PCs or servers. The fundamental concentration of portable processing has been on frameworks like information accumulation and phones expected for direct human utilize.

The undeniably centered, be that as it may, around frameworks with more constrained human intercession, Wireless sensor networks are a key illustration said and done, sensor networks will be frameworks in which various process and detecting gadgets are dispersed inside a situation. Sensor networks have been recommended for a scope of designing, logical and resistance applications. Adaptable sensor directing conventions can be arranged into topology based and position based methodologies. In topology based approach, utilize just data about existing neighborhood joins, yet not give about land data. Be that as it may, in position based approach, it incorporates data about the land data.

There are different sequences in which the sensor readings are exchanged from the sensors to a focal area. Typically, the readings taken by the sensor nodes
are handed-off to a base station for handling utilizing the specially appointed multi-jump arrange framed by the sensor nodes. While this is unquestionably an achievable method for information exchange, it makes a bottleneck in the network. The nodes close to the base station hand-off the information from nodes that are more Wireless away. This prompts a non-uniform exhaustion of network assets and the nodes close to the base station are the first to come up short on batteries.

In the event that these nodes pass on, the network is for all pragmatic purposes separated. Intermittently supplanting the battery of the nodes for the expansive scale organizations is additionally infeasible. Information collection conventions can decrease the cost of correspondence, in this manner broadening the lifetime of sensor networks. Earlier work on information total conventions has concentrated on tree- based or group based organized methodologies.

Although organized methodologies are suited for information gathering applications, they acquire high upkeep overhead in element situations for occasion based applications. The objective of its work is to plan strategies and conventions that prompt proficient information collection without express support of a structure. As bundles need to meet spatially and transiently for information accumulation, it recommended two relating components - Information Mindful any cast at the layer and Randomized Holding up at the application layer. It demonstrates the execution of the consolidated convention that utilizes both the methodologies and demonstrate’s that its investigation matches with the reproductions. Utilizing broad re-enactments and investigations on a tried network, it concentrates the execution and capability of sans structure information conglomeration.

7.3 CURRENT REGION SELECTION:

Region selection entirely depends upon the application. It is a fixed environment like forest fire prevention, disaster rescue and so on. If it is a static
period, updating the method is important for a variety of purposes. Basically, it adopts to all kinds of regions, static or dynamic. It considers the dynamic region. The entire geographic area is divided into smaller sections according to the network topology. The technique is applied section-wise.

![Diagram](image.png)

**Figure 7.1 CAFA work flow for data collection**

From the architecture, several layers will be created. The research arranges them according to the prescribed number of sensors, placing CAFA Agent node at regular intervals for analyzing various real time values. These are sent to the CAFA main node via shortest path (minimum hop) for further computation.
7.4 DEPLOYMENT OF ALL THE NODES

This application is sensitive, and any form of carelessness is sure to affect the performance of the entire routing protocol. The deployment is either projected or self-arranged. In the projected situations, the sensors are manually placed and the data is routed through the projected paths after a thorough investigation. In the self-organizing systems, the sensor nodes are scattered randomly for creating an infrastructure in a dynamic region splitting technique and for application of the researcher’s methods. In the model, placing the CAFA node, Agent node, data node and sink node is a vital process. If the distribution of nodes, layering and placing important agent nodes at the prescribed geographical region is carried out accurately, the energy saving rate is automatically raised.

7.5 CONSTANT ANALYSING FACTOR AGENT NODE (CAFA)

There are a large number of selected queries which concentrate on the particular subset and use the same types of query and analyse the route, but concentrates on a different type of query. Depending on the situation, some queries are used from the algorithms grouped for the complete node participation of a network. So, a comprehensive history and current information of all the nodes are stored in an agent node at regular intervals in specific layers.

This node supplies the stored information as and when required. It is an important issue because whenever network reconstruction takes place, it has to retrieve all the information about the particular node from the topmost server node. This may lead to delay causing instability in the energy utilizing process.

Algorithm:

CAFA -Region Selection Algorithm: Input: Null

Output: Node List Ns, Route Table Rb Start
Initialize Node Count Nc.

Generate ACM Message. [Availability of waking node present allotted function for multi functional node]

Broadcast ACM Message. Initialize Broadcast Timer Ti. while Bt is running

Receive ACMREP message.

if ACMREP.DNode==True then Add NodeIf to Node List Nc. Nc =

Extract the route to reach the node. Rb =

End
End
Stop.

It suggests the CAFA node placement in the prescribed distance to collect information from all the leaf nodes. It practices multilevel experiment at the constant time interval to get information regarding the attributes, using the series of query processing and using the existing data report collected. At last a projected routing protocol is prepared as soon as the sensed signal reaches the particular node or each channel reaches the prescribed density of data, so that, it signals to the CAFA node. The signal will be transmitted instantly using the projected minimum hop routing protocol with the low duty cycle.

7.6 ENERGY HARVEST BASED DATA COLLECTION:

During the creation of the model, the process of setting up the experimental step is greatly influenced by the energy considerations. Since the transmission power of a wireless radio is proportional to the distance of the sensed target which is of very high order in the presence of troublesome season, multi-hop routing will consume less energy than direct transmission. However, minimum/multi-hop routing introduces significant overhead for the topology management and medium access control.
7.7 SIMULATION RESULT:

In this section, the results produced by the suggested method are discussed, and the comparative study on the quality of service parameters is made. Direct transmission will perform effectively if it is a small area and all the nodes are near the sink. Most of the time, sensors are scattered randomly over a section of the large area and sensing becomes unavoidable. Data aggregation is carried out with the help of the query processing, according to the density of the data from the different agent node by using the functions such as filtering (eliminating duplicates), low, high and medium. Some of these functions are performed regularly in each sensor node, by allowing the sensor nodes to conduct the decrease in network data volume due to duplication. Considerable energy savings are obtained through data querying process. This technique is used to achieve energy utilization and to remove traffic in the number of routing protocols. In the network model, all the analytical functions are assigned to the more powerful CAFA node and the collection functions to specialized nodes. Data collection is also feasible through signal processing techniques. In that case, it is referred to as data fusion where a node is capable of producing a more accurate signal by reducing the noise and using special techniques such as beam forming to combine the proper and clear signals. Figure 7.2 shows the snapshot of the placement of nodes in the network at the initial stage with 30 numbers of nodes.
Figure 7.2 Initial network setup

Figure 7.3 shows the snapshot of agent node identification and packet forwarding using the CAFA technique where the route discovery is performed in the specific area where the destination is located.
Figure 7.3 Agent node identification

Figure 7.4 shows the particular node region identification for tracking network at any point in time. Here the destination node has track to some other quarter. The tested simulation result is shown in figure 7.5, parameter comparison graph is shown in figure 7.6.
Figure 7.4 Data collected based on energy harvesting using node id

The proposed approach produces 99.7% Data collection efficiency which is 12% greater than existing one. Also, the proposed approach improves the scheduling efficiency by about 17% and increases the bandwidth utilization of the network by 10% when compared with the existing one. The detailed comparison of the results is given in results and discussion section of the thesis.