Heterogeneous Enhanced Energy Efficient Protocol with Static Clustering in WSN- Research Paper

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Abstract: The sensor network is decentralized in nature due to which malicious nodes enter the network which are responsible to trigger various active and passive attacks. Due to the presence of malicious nodes in the network, the base station gets false information about the sensor nodes. Among the earlier proposed techniques distance based secure node localization technique efficient in terms of energy consumption. In this work, technique of cache node is used with the distance based technique for the secure node localization. The proposed improvement increase the network lifetime and also reduce the energy consumption.

Keywords: LEACH, RFID, HARP,

I. INTRODUCTION

Within a wireless sensor network, there are numerous nodes spread across an area for monitoring the surroundings present. There is a sensor hub present within the network that comprises of sensors, actuators, memory, and a processor and facilitates communication amongst the nodes [1]. The wireless mode of communication is utilized for transmitting the data across the sensor nodes with the help of radio frequencies, infrared etc. and does not include any wired connections within it. Energy consumption can be diminished by building automation framework, all things considered by somewhere around 5% and 15% more for which are inadequately kept up and more seasoned structures [2]. To give great information resolution over the environment, better gadget integration and utilization of control systems, only an adequate number of sensors are required, beyond most wired building sensor networks can give. For sparing the energy of sensor nodes one of the clustering methodology is utilized. Through productive network organization every one of the nodes in sensor network can be partitioned into little groups is called clusters [3]. In every cluster has a cluster head and rest nodes are individual from that cluster. Clustering results in a two-level order in which cluster heads shape the higher level while part nodes frame the lower level. The clustering includes grouping nodes into clusters and choosing cluster heads periodically such that individuals from a cluster can speak with their cluster heads and these cluster heads send aggregated data received from its individuals to a base station [4]. The clustering procedure is utilized to minimize the energy consumption. By utilizing clustering, it reduces the packet collision and channel contention it increases the network throughput under high load. Clustering enhance the network lifetime of the sensor networks. Lifetime is the essential element to assessing the execution of the sensor networks [5]. The clustering approaches can't directly apply to wireless sensor networks, in light of the fact that these networks has one of a kind deployment and operational qualities. Wireless sensor networks are sent in ad hoc way they have a bigger number of nodes. Clustering algorithms for wireless sensor networks can be further separated into two principle classifications depending on cluster formation criteria and parameters utilized for cluster head election [6]. The first is the Probabilistic (random or hybrid) clustering algorithm. Low Energy Adaptive Clustering Hierarchy (LEACH), Energy-Efficient Hierarchical Clustering (EEHC), etc. belong to this classification. The second is the Non probabilistic clustering algorithm. Node Proximity and Graph-Based Clustering Protocols, Biologically Inspired Clustering Approaches are the examples of this category. Clustering in WSNs involves grouping nodes into clusters and electing a cluster head.

RFID Protocol: The contactless automatic identification that is based on the radio frequency is known as the Radio Frequency Identification protocol. This is divided into two categories. They are active RFID and passive RFID. The categorization is done in terms of the cost, size, as well as the battery management. However, there are more benefits in terms of the sensing nature, rate etc [7]. For the purpose of storing physical information and recognizing it for a longer duration of time in order to enhance the nature of framework of fundamental functions the RFID is generated. This method is the properly defined technology which involves the radio frequency.

The accessibility of tag-to-tag communication is done by the active RFID/WSN. There are less advantages of active RFID as compared to the passive RFID. Various parameters such as the size, cost and battery control of the devices are to be considered here for providing comparisons amongst these two categories. The energy of the tag is saved within the active RFID which mainly performs operations on the tag ID period as well as data collection period [8]. The energy that is consumed by the radio module is saved by reader through running operations on the tag in active as well as sleep modes. This results in minimizing the consumption of energy of tag. The collection command on numerous tags is
transmitted to the reader. Through the means of contention, the ID is delivered to the reader when the reader transmits the collection command to the numerous tags. The data on the tags is collected by the reader, which are mainly present on the tag ID collection period during the data gathering phase. This is done with the help of the respective IDs within the point-to-point method.

II. LITERATURE REVIEW

Bilal Abhu et.al [9] proposed in this paper the LEACH-SM protocol. An ideal energy-saving is provided by this protocol for controlling the spare selections within the networks. The spare selection stage is added to the LEACH with the help of drain SM. There are comparisons made related to the energy consumption and WSN lifetime of both the protocols. The experimental results show that the proposed method has provided enhancements within the previous proposed works.

Maciej Nikodemet.al [10] explained on the theoretical parts of clustering in wireless sensor networks, as an attempt to enhance network lifetime. It is investigated whether clustering its can enhance network lifetime specifically application when to non-clustered networks. They utilize integration programming to break down 1D and 2D networks, taking into record capacities of real-life nodes. Our results demonstrate that clustering itself can't enhance network lifetime so additional systems and means are required to be utilized as a part of synergy with clustering.

F.J. Atero, J.J. et al [11] proposed in this paper a new architecture known as HARP which stands for Hierarchical Adaptive and Reliable Routing Protocol. The inter-cluster and intra-cluster hierarchical trees are fabricated with the help of this clustering algorithm. This helps in minimizing the power utilization within the network. The homogenous as well as heterogeneous WSNs can both utilize this architecture as it is scalable. There is a much sorted link fault tolerance provided by the HARP algorithm. The node mobility is also handled through this process.

Dr. M.K Rai [12] proposed in this paper that the cooperative caching provides minimization of the various parameters within the network such as the non-accessibility of data, energy consumption and so on. The related information is stored within the cache memory of the nodes within this methodology. The benefits of caching on the basis of WSN sensor nodes require less power during the processing. This is less as compared to the data transmission mechanism.

D.G.Anand et.al [13] proposed in this paper a randomized algorithm which is run locally at the sensor node for overseeing its operation. There is various energy-efficient connected coverage issues which are to be mentioned related to this study. It has been seen that the energy utilization has been minimized along with the coverage of surrounding region. There have been various theoretical studies being proposed related to such sensor related coverage issues.

Maryam Soltan et.al [14] proposed in this paper a location-aware modulation plot. This technique helped in determining how the modulation selection can be straightened along with the adjustment of spatial distribution of energy dissipation over specific area. With respect to other various low-power systems, the network layers might present an execution within the conjunction with the lower power systems. The experimental results have shown that the network lifetime of the WSNs is increased with the help of this method.

III. RESEARCH METHODOLOGY

In the base paper, technique is been proposed which is the distance bases secure node localization technique. In the distance based technique, the network is deployed and base station calculates the distance from its coordinate to the last coordinate in the network. To improve the performance of this technique in terms of energy consumption and node location further improvements are required which are based on the cache nodes. In the network, the cache nodes are deployed randomly in the network. The cache nodes are responsible to cache the information of their zone. The cluster heads will pass the sensed information and also the node information to its nearest cache node. To calculate the nearest cache node the Euclidian distance formula is applied and distance of each node is compared. The cache node which has least distance from the cluster head will gather the information. The base station send the query message to the cache node and cache node will pass the latest information to the base station. The proposed technique is energy efficient because the load on the cluster head is reduced and it is secure for node localization because, on cache node maximum area than the base station to gather maximum information.

Algorithm

Input: sensor nodes and cache node  
Output: Data aggregated to base station  
1. Deploy wireless sensor network with the finite number of sensor nodes  
2. Divide the whole network into clusters using location based clustering  
3. for (i=0;i=n;i++)  
   if (energy(node(i)>node(i+1))  
      if (distance(node(i)<node(i+1)))  
         Cluster head=Node(i)  
   })}  
4. Cluster head send data to cache node  
5. if (cache has latest data)  
   Data passed to base station  
   Else {  

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Check the distance from the cluster head
Aggregate node from the cluster head which has minimum distance

6. Aggregated data passed to base station
7. STOP

START

Deploy the sensor network with the finite number of sensor networks

Divide the network into finite number of clusters according to location of nodes

Cluster heads selected in each cluster on the basis of distance and energy

Cluster head transmit the data to cache nodes

Cache has latest data

Yes

Cache node collect the data from the cluster head which has minimum distance

The collected data will be passed by applying time stamp to the data

Data passed to the base station from the cache node

STOP
IV. EXPERIMENTAL RESULTS

Figure 4.1 showing the active environment of proposed work. Magenta diamond is represented as the base station. Four other magenta nodes are the cache nodes. Blue color round nodes are normal nodes. Green stars are cluster heads. Blue, magenta, green and red lines depicts the transfer of data from cluster heads to nearby cache node. Longest red lines show the direct communication between the cache nodes and the base station.

Figure 4.2 is showing the environment in which one node is dead. Dead node is represented by the red star. Green star represented the cluster heads and the magenta diamond represented the base station. Blue, magenta, green and red lines depicts the transfer of data from cluster heads to nearby cache node. Longest red lines show the direct communication between the cache nodes and the base station.

Figure 4.3 showing the environment in which all the nodes are dead. Dead nodes are represented by the red star.
V. CONCLUSION

The Node localization is the technique which is applied to gather all the information about the sensor nodes which are in the network. The base station applies node localization to aggregate the data from each node in the network. To reduce energy consumption of the network, technique of clustering is applied in which cluster heads are selected in each cluster on the basis of distance, energy. The cluster will pass the information of its region to the base station. In this work, it is concluded that existing distance based secure node localization technique need to be improved to reduce energy consumption. To improve the performance of distance based node localization technique, the cache nodes are deployed in the network. The cluster heads gave data to its nearest cache nodes. The cache nodes will pass the latest information to the base station. The proposed technique leads to reduction in energy consumption and increase in network throughput.

REFERENCES