

Novel Approaches for Data Routing and Clustering In Wireless Sensor Network

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Abstract - In the wireless sensor network, for the different operation of communicating within the node or sending data to the receiver node from the sender node the energy is required. Therefore, data transmission in wireless sensor network reduces the network lifetime, while broadcasting the data in the sensor network, it is necessary to enhance the network lifetime by reducing the energy consumption. At the time of communication, a cluster head is noted as an aggregation node for the cluster, these cluster head perform the function of communicating with the cluster members of the clusters, therefore, cluster head is required more energy than the cluster members. In the existing system cluster head is selected randomly from the cluster which cuts off that node from the network if not have enough energy hence results in reduced network lifetime of that sensor network. To overcome the issues from the existing system, in the proposed system we will improve the network lifetime of the system. To improve the lifetime of a sensor we need to reduce the energy consumption of a sensor. In this system user can select alternate cluster head if current cluster head is affected by the attacker, using algorithm one by one cluster head can be selected if the current cluster head is affected by the attacker. The comparison between the existing system and proposed system is with considering the energy and distance as parameters.

Keywords: WSN, Data Routing, Clustering, Network.

I. INTRODUCTION

Wireless Sensor Networks (WSN) can be defined as a group of specialized dispersed and particularly devoted

sensors to monitor and evaluate the physical conditions of the environment i.e. atmosphere and organize the collected data at a central location called Gateway Sensor Node (GSN) or Base station (BS) [1]. WSNs monitor or calculate the environmental conditions like temperature, wind direction, sound, sound intensity, humidity, pollution levels, and so on. Improvements in electronics as well as wireless communication techniques, have empowered the implementation of large-scale wireless sensor networks (WSNs) that comprise of distributed, autonomous, low-power, low-cost, small-size sensor nodes to gather data as well as agreeably transmit information via wireless networks without infrastructure [2].

The main idea behind the wireless sensor network was the military applications like surveillance of the battleground, as well as at that point the advances on miniaturization, circuit design with low cost, communication techniques which are low power also maximized small scale energy provides opened the huge application possibilities of WSN [3], which includes various applications in healthcare areas automation of homes and offices, traffic control and so on.

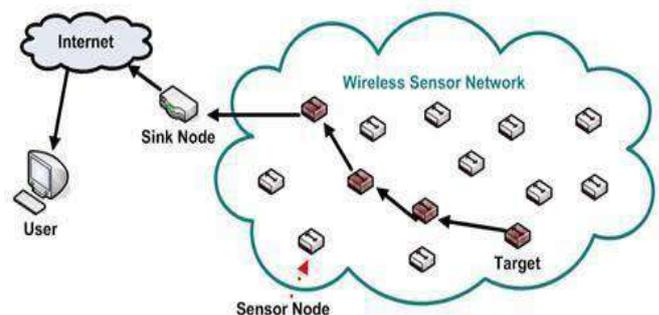


Figure-1: Wireless Sensor Network

In last few years WSN has been novel as well as the hot area in software engineering as well as technology also has a wide application future. It has empowered the advancement of a sensor node with a minimal cost processor, low power, as well as lightweight. The wireless sensor networks comprise of sensor nodes ready to catch light, sound, temperature, motion, an intelligent computing device which empowers the preparing of information gathered from sensors, as well as the ability to communicate with different nodes using wireless networks [4]. Sensors can be self-organizing to create a network as well as transfer data from one node to other by using wireless communication interfaces as well as send to the destination as multi-hop. In the sensor network with huge size, there can be hundreds or maybe thousands of nodes are scattered randomly in a sensing area.

In WSN applications, security has an important role. Because of the special attributes, the security methods which are used in common network can't be utilized in WSN. Sensor nodes are extremely sensitive to assembling expense. Therefore, most sensor nodes are limited resources such as energy, memory, computation, as well as communication capabilities. Typically, sensor nodes are controlled by batteries, as well as recharging batteries is infeasible much of the time. At that point, energy utilization turns into an essential thought for most sensor system conventions [6].

Also, sensor nodes might be sent in hostile areas without participation that makes sensor nodes helpless against a various type of physical attacks by enemies. Commonly, adversaries are thought to have the capacity to undetectable take control of the certain segment of sensor nodes also retrieves every single protected information inside the nodes. Hence, beforehand genuine nodes may transform into being malignant. Finally, sensor systems utilize remote transmission channels without supports of infrastructure as well as the vast majority of communications are conveyed in an ad-hoc, multi-hop way. Every one of them forces imposing difficulties with the end goal that current security systems are lacking as well as new methodologies are requested.

II. EXISTING APPROACH

Recent advancements in large scale integration and wireless communication technologies have enabled the development of small size, low cost, and multi-functional devices known as sensor nodes. Sensor nodes are capable of sensing the desired environmental parameters within their vicinity, such as temperature, pressure, moisture, and pollutants, etc., converting the sensed variable to electrical signal and transmitting the sensed data to the desired destination. To achieve these objectives, sensor nodes are equipped with sensors, microcontrollers/microprocessors, and wireless trans-receivers. When these sensor nodes are deployed in large number to monitor an area, they form self-organizing cooperative wireless ad-hoc network, known as wireless sensor network.

The wireless sensor networks are mostly deployed in remote and hazardous locations, where manual monitoring is very difficult or almost impossible. Due to deployment of wireless sensors in unattended harsh environment, it is not possible to charge or replace their batteries [7]. Therefore, energy efficient operation of wireless sensors to prolong the lifetime of overall wireless sensor network is of utmost importance. Due to their low power radio, wireless sensor nodes cannot transmit the data to large distance in single hop, which makes multi-hop communication essential in case of real life deployment. However, in multi-hop cases, if the energy consumption of sensor nodes is not managed properly it may create energy-hole problem in the network. In literature, a number of protocols have been proposed to manage and reduce the energy consumption of sensor nodes [8]. Grouping sensor nodes into clusters has been widely used to achieve this objective. In clustered networks, one of the sensor nodes is elected as cluster head for each cluster. Sensor nodes in each cluster transmit data to their respective cluster head and the cluster head in turn forwards the data after aggregation/fusion to sink node through single/multi-hop transmission. This protocol, the clusters are formed, based on received signal strength. The role of cluster head is periodically rotated amongst the sensor nodes present in the cluster to ensure balanced energy consumption of sensor nodes. This algorithm becomes

very inefficient in case of large area sensor networks due to single hop communication of cluster heads to the sink.

III. PROPOSED APPROACH

Proposed the method which reduce the Energy Consumption of the sensor by efficiently selecting the Cluster Head of the clusters during the transmission and assign new Cluster Head in case of the attack on Cluster Head. Energy cost of transmitting a single bit of information is approximately the same as that needed for processing a thousand operations in a typical sensor node. Thus, a practical way to prolong a wireless sensor network lifetime is to reduce the sensor energy consumption in data transmissions. Clustering is an efficient way to minimize energy consumption on sensors. Our system is use to for energy conservation. Our system improved the Cluster head selection process to reduce energy consumption of the sensors and thus, increase network lifetime.

In wireless sensor network, clustering and data routing play an important role. In the existing system, the cluster head selection is based on energy. It also selects Cluster head randomly. Cluster head changes periodically to balance between all the sensor node. In our system, Cluster head selections is based on close to the centroid and also consider the distance from Base station. In existing system, If CH is selected that is at the corner or at the edge of the cluster area, Energy required to send data from each Cluster member is high as compare to proposed system. For recovery of data, each CH should send data to every other CH in the network that is they should be connected in mesh topology but it will increase energy consumption, reduce network lifetime and increases overhead to have avoided it in proposed system to make system efficient. The proposed system considering the encrypted data to be sent over at the cost of security [9]. It will increase energy consumption because of the increase in the size of data packet but will ensure the security. Security is important in many applications like military and Health Care. Security will overcome the disadvantage of length of data. Confidentially is another main concern of the Wireless sensor network.

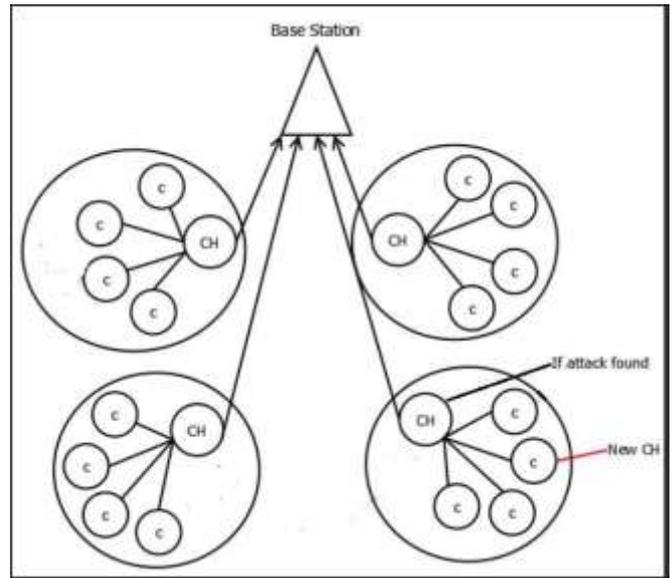


Figure-2: The Proposed Architecture

In proposed system the CH selection has done on the basis of energy and distance parameters. In proposed system, if attack occurred on CH then proposed systems allocates new CH and send data to the Base station. If Base station does not get data from all of the cluster head after some duration of the time, Base station allocate new CH considering the current CH is affected by the attacker. In this way, data continuity will be maintained.

FLOW CHART

For Energy conservation the proposed system should select the alternate cluster head when the current cluster dies. The Cluster Head is selected based on two parameters that are energy and distance from base station. The CH selected using this criterion will have more energy and less distance from base station. By selecting CH close to the centroid will guarantee that the energy required for collecting, aggregating and sending to BS will be less as compare to existing system.

Proposed algorithm is all about CH selection process. At the start, deploy number of nodes which are required. Divide the total area into optimal clusters; generally take 3-6% of the total nodes as a cluster. The system's stop working if one of the nodes dies because of the energy consumption. Need to check whether all the deployed nodes are alive or not. If they are alive, then the proposed system can continue to select the cluster head for further rounds.

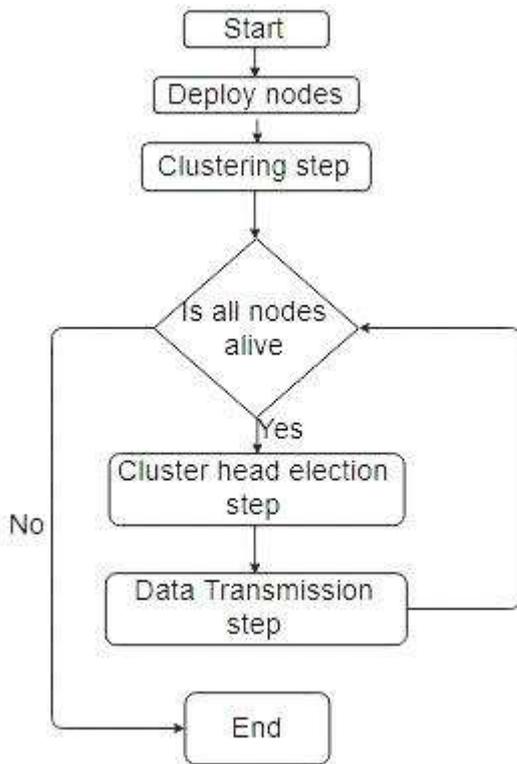


Figure-3: The Proposed Flow Chart

Otherwise, the process needs to be stopped because of the first node dies. A sensor has limited resource power. Energy consumption is an important research topic. Clustering process greatly reduces the Energy consumption of the sensor as a whole. Efficient selection of Cluster head will ensure the energy conservation of the sensors.

IV. EXPERIMENTAL RESULT

The system is built using Java framework on Windows platform. The Net bean IDE is used as a development tool. The system doesn't require any specific hardware to run; any standard machine is capable of running the application.

No. of Nodes	First Node Die Time		No. of Rounds Completed	
	Existing system	Proposed system	Proposed system	Proposed system
40	26 sec	53 sec	17	28
60	61 sec	80 sec	30	29
80	89 sec	97 sec	27	30

Table-1: Comparison Table

Table given provides the comparison of the Existing system and proposed system based on two parameter which are first node die time and number of rounds completed by nodes. Carried out experiment on multiple numbers of the nodes i.e. 40, 60, 80 and taken the values for the respected parameter. Table given shows the network lifetime graph of the proposed system and existing system. Table shows the values for different number of nodes and total time of the network.

No. of Nodes	Network Lifetime (in joule)	
	Existing system	Proposed system
40	25036	31091
60	44686	48742
80	51436	66336

Table-2: Network Lifetime

V. CONCLUSION

In the wireless sensor network, the main issue tackles by the network system are network lifetime and energy consumption by the network, assuming the sensor nodes are stationary. In this system the technique in which network selects the cluster head on the basis of close to the centroid of the cluster, from which system consumes less energy as compared to the randomly selected cluster head. Thus, saving the energy of the entire Cluster member by minimizing the distance to send the data to increase the network lifetime of the system. In this paper, these two points are achieved.

- Cluster Head selection process showing efficient energy consumption.
- Base Station acknowledgment helps to detect attacks on cluster head after sending data from all cluster heads.

Also, prevent data loss by assigning new cluster head if any of the cluster head doesn't send data to the base station BS. Future work is to compare the existing system and proposed system for the energy consumed by the network. The system calculates the energy consumption for the different number of Nodes. From the experimental graph, it concludes that the proposed system has consumed less energy than the existing system.

VI. FUTURE ENHANCEMENT

In the future enhancement of the network lifetime in dynamic clustering when the sensor isn't stationary can be done. Recovery of the Cluster head after it gets attacked by the attacker.

REFERENCES

- [1] A Jorio, S El Fkihi, B Elbhiri, and D Aboutajdine, "An Energy-Efficient Clustering Routing Algorithm Based on Geographic Position and Residual Energy for Wireless Sensor Network," *Journal of Computer Networks and Communications* Volume 2015, Article ID 170138, 11 pages, 2015.
- [2] Alka singh, Shubhangi Rathkanthiwar and Sandeep Kakde, "LEACH based-Energy efficient Routing protocols for Wireless Sensor Networks" *ICEEOT IEEE*, 2016.
- [3] K. Gowtham, Mr. S. Dhanasekar, "A Literature Survey on Security and Clustering in Wireless Sensor Networks," *International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE)* Volume 3, Issue 12, 2014.
- [4] Kriti Thakur, Ravikant Sahu, "To Enhance The Lifetime Of Wireless Sensor Network Using A Novel Approach Based On Clustering", *International Journal of Computer Science and Mobile Computing*, Vol.3 Issue.3, 2014.
- [5] Kyung-Ah Shim, "A Secure Data Aggregation Scheme Based on Appropriate Cryptographic Primitives in Heterogeneous Wireless Sensor Networks," in *IEEE transactions on parallel and distributed systems*, vol. 26, NO.8, 2015.
- [6] Maria Gabriela Calle Torres, "Energy-Efficient Communication Protocol for Wireless Microsensor Networks", *University Of Pittsburgh, School Of Information Science*, April 2006.
- [7] Metin Koc and Ibrahim Korpeoglu, "Controlled Sink Mobility Algorithms for Wireless Sensor Networks", *Hindawi Publishing Corporation IJDSN*, Article ID 167508, 12 pages, 2014.
- [8] Milica Pejanovic, Zhilbert Tafa, Goran Dimic and Veljko Milutinovic, "A Survey of Military Applications of Wireless Sensor Networks," *IEEE Embedded Computing*, August 2012.
- [9] Monika, Sneha Chauhan, Nishi Yada, "LEACH-I Algorithm for WSN", in *International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)*, Vol. 4, Issue 3, 2016.

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