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New technology for advanced results for security wireless sensor networks

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ABSTRACT: Designing wireless sensor networks (WSNs), which are new technologies with the potential to perceive, analyze, communicate, and send data, is difficult since it impacts the network's performance and longevity. The goals of this study are to enhance network longevity, mitigate power usage, and safeguard transmitted data. An energy-saving procedure was suggested as a means to accomplish this objective. Every node in the network uses the same amount of electricity according to this protocol. The restricted resources of the nodes are also taken into account while recommending an algorithm. Additionally, in order to provide optimal outcomes for assessing the system's effectiveness. The suggested model and the network's performance were evaluated using the Quality of Service (Q o S) metrics of Packet Loss Ratio (PLR), Network Energy Consumption (NEC), and Network Throughput Ratio (NTR). , this method ensures that the data remains intact. Additionally, we came up with a method to save electricity. This protocol ensures that all nodes in the network use an equal amount of electricity.

Keywords: WSNs , SOSUS, DARPA, DSN, WBAN, LEACH

1. INTRODUCTION

Wireless sensor networks (WSNs) have lately emerged as an exciting new frontier for the development of novel application kinds. In a WSN, a vast network of tiny sensing nodes keeps tabs on its surroundings, processes data as needed (with the help of microprocessors), and then relays that processed data to and from other nodes in the network. In centralized networks, these sensing nodes communicate with a central sink node, but in decentralized networks, they communicate with one another. A centralized network's sink is responsible for collecting data from sensors so that users may make use of it. By broadcasting information about network policies and controls, the sink may often activate sensing nodes as well [1], [2].

Civil engineering, environmental monitoring, medical monitoring, home security, transportation, and military systems are just a few of the many next-generation applications that rely on wireless sensor networks. Agricultural locations that make use of WBAN sensors to communicate humidity the third [3], [4]. Highly dependable ubiquitous applications spanning multiple threat management, such as

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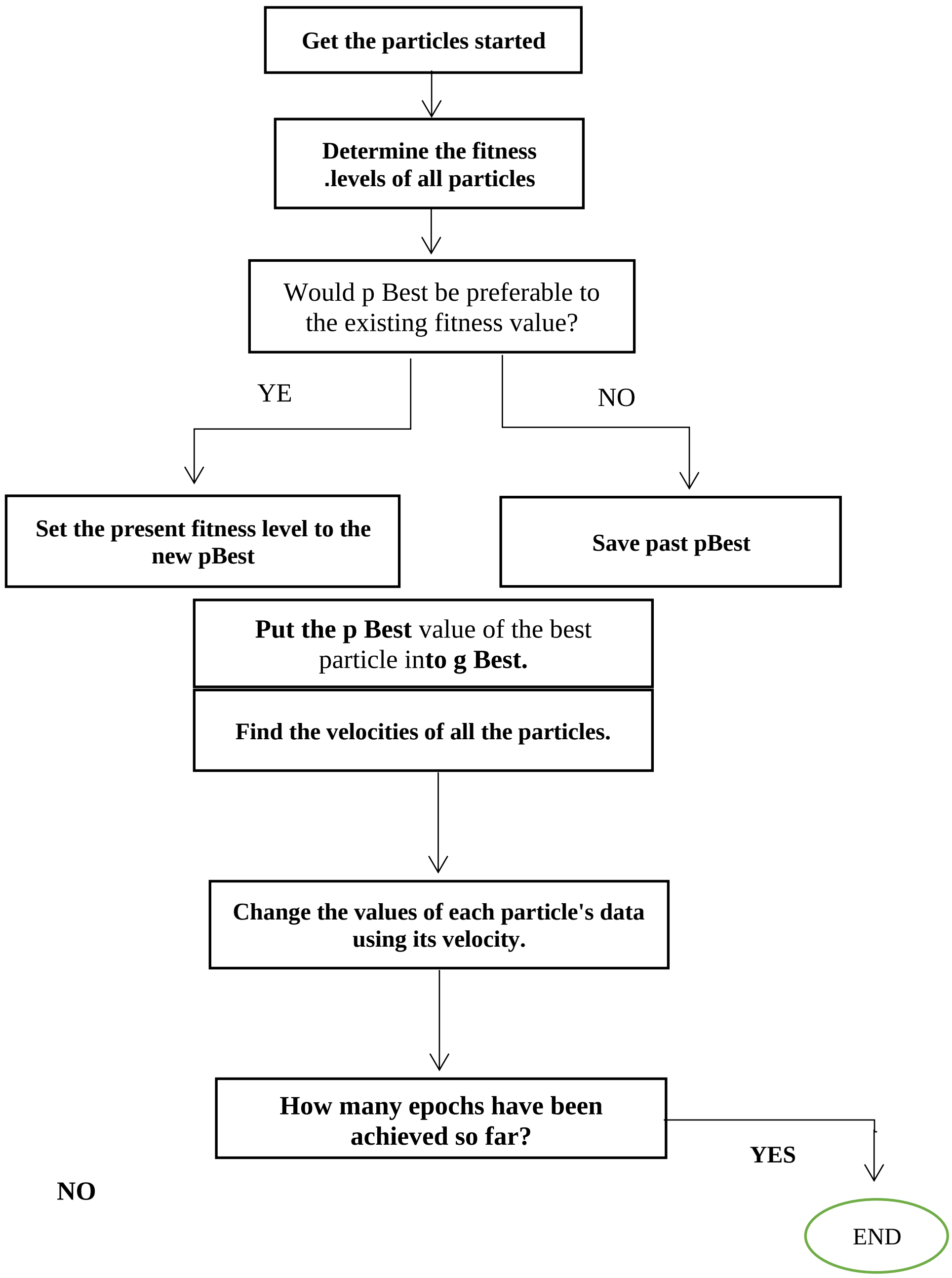
self-healing landmines, have recently piqued researchers' interests alongside cutting-edge applications. [5], [6].
In a WSN, sensor nodes (routers) communicate efficiently with one another by following a protocol that specifies the path from a source node to a destination node. The communication channels between the sensor nodes and the sink will be established via the routing protocols. The optimal lifespan of the network is anticipated to be achieved by these routing patterns. A wide variety of energy-efficient routing protocols have been developed with the goal of reducing power consumption in WSNs by spreading the workload among all sensor nodes. [7], [8].
There are two main types of routing protocols: fat and hierarchical. A fat-based routing system uses a flat structure with unique global addresses for each sensor node, whereas a hierarchical approach uses some sort of hierarchy in protocols like LEACH and C-LEACH [9].
Denial of Service (DoS) attacks are common in WSN because of several vulnerabilities, such as low processing RAM and capabilities and the broadcast transmission media. These kinds of assaults weaken WSN, making them unable to function for an extended duration. It frequently impacts the network's resource use, leading to higher energy consumption, longer delays, and lower throughput. [10] [11]. A denial-of-service (DoS) attack is an attempt to disrupt normal network operations by blocking access to a website or the entire system. Distributed denial of service (DDoS) attacks is coordinated assaults that target a network's service availability through hacked computer systems in a roundabout way, making it harder to trace the DDoS control packets [12].
Sensor nodes in a WSN work together in a predetermined region to gather data and transmit it to a central hub [13], [14]. The technical definition of a sensor is "a device that converts physical parameters or events into signals that can be measured and analyzed" [15]. Keeping tabs on environmental and physical factors is the main goal of employing WSN [16], [17].. Information is received by the Cluster Head (CH) from the sensor nodes that make up its cluster. To the CH, all cluster members transmit their data[18] .The CH then sends the aggregated data to the sink node, central node, or Base Station (BS), may be linked to the network or the Internet via a gateway, granting access to the gathered data to users located far [19],[20].

2. PROPOSED SYSTEM

Data gathering from inaccessible places is becoming more dependent on Wireless Sensor Networks (WSNs), which have seen tremendous advancements recently; nevertheless, replacing batteries and adding memory on a regular basis is neither straightforward nor viable. So, it's important to improve the WSN's performance, including making the sensors' batteries last longer and decreasing packet loss due to cluster heads' and sink nodes' overflow buffers, which increases network throughput and buffer utilization. The amount of energy that gets wasted is directly proportional to the reduction in packet loss.
The suggested method controls the data flow of all network CHs by primarily using the sink's buffer. During the following operations, the model controls and monitors the network:
1. Sensor data is collected by active nodes, which start transmitting packets to CHs.
2-The sink's buffer receives data at a set pace.
3. To maintain a suitable amount of network traffic, the controller on the buffer of the sink makes adjustments and estimations for the traffic (TR) in the next cycle.
Finding the overflow level of the network sink node is step four.
If (TR > Bmax) && (PLR > 0)
OIF = True
Else OIF =False
Where OIF is overflow Identification Flag
TR is network traffic
B*max* is the threshold of sink buffer capacity.
5- the control of overflow done by the controller that based on partial swarm optimization for control the over flow .by examining the PLR and B*occ* (buffer occupancy). if the buffer queue's maximum capacity (Bmax) is reached by the number of arriving packets (TR). Then the buffer queue overflows with data packets.

Figure (1) proposed Model



3. IMPLEMENTATION AND RESULT

The proposed models were implemented using a simulation method. The simulation method was used for many reasons, including the difficulty in applying it in the natural environment and the cost of deploying a large number of sensors in the environment. As well as to give the best results to evaluate the performance of the system. To test the efficiency of the proposed model and performance of the network, the QoS parameters which are; Packet Loss Ratio (PLR), Network Energy Consumption (NEC), and Network Throughput Ratio (NTR) were used.
The experiments performed under Windows 10 professional operating system, Intel(R) Core (TM) i7-10510U CPU @ 1.80GHz 2.30 GHz, 8 GB RAM and 64-bit system

Table (1) Simulation Parameters

Meeting place	100 meter X 100 meter
Count of endpoints	100
Multiple sinks	1
The kind of sink	static
Cluster count	4
Sink buffer size	250 packets
Max size of buffers for all nodes	50-100 packet
Encapsulated data size	800 bytes
Runtime of the simulation	250 msec.
The process of creating data packets for every base station node	5 (packet/msec)
Meeting place	In the center of coverage area (50,50)

Figure (2) Initial phase WSN before elect CHs in the clusters

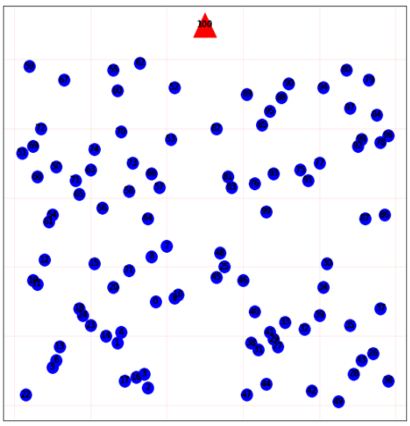
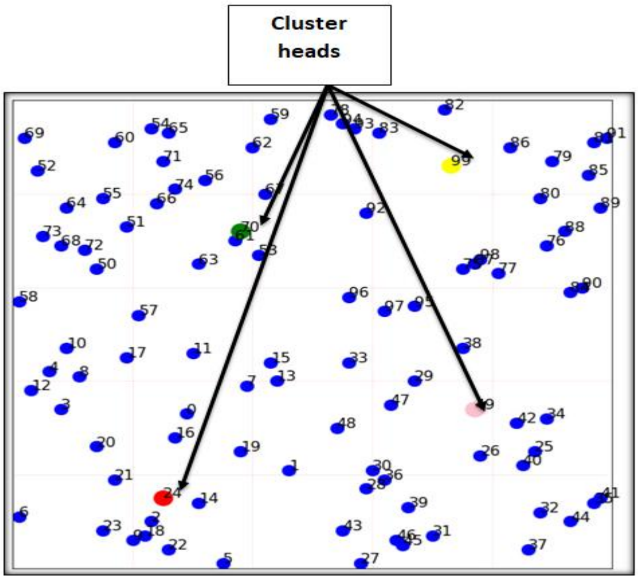


Figure (3) WSN after elected CHs in the clusters



4. CONCLUSION

Recently, wireless sensor networks have becoming increasingly common. As a result of advancements in wireless communication technology and a rapidly expanding area of research The sensory data gathered by a large number of wirelessly-enabled sensor nodes and transmitted to a central location for processing is what makes up a WSN. However, because to its prevalence and vulnerability to various threats, routing requires utmost care. This is because sent data from sensors is at risk of theft or loss and may need incomplete transmission. This has led to an increase in the demand for a reliable security mechanism that may improve data security while minimizing power consumption in WSNs. With the limited resources of nodes in mind, this message lays forth a solution. By preserving the initial size of the sent packet, this method ensures that the data remains intact. Additionally, we came up with a method to save electricity. This protocol ensures that all nodes in the network use an equal amount of electricity.

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