

# PHYSICAL LAYER SECURITY IN THREE TIER WIRELESS SENSOR NETWORK A STOCHASTIC GEOMETRIC APPROACH

<sup>1</sup>R. Latha, M.Phil Scholar, Bharathiyar Arts And Science College For Women, Deviyakurichi, Thalavasal, Salem,

<sup>2</sup>R. Vasugi, Asst. Professor, Bharathiyar Arts And Science College For Women, Deviyakurichi, Thalavasal, Salem.

## Abstract:

Security and privacy have become increasingly significant concerns in wireless communication networks, due to the open nature of the wireless medium which makes the wireless transmission vulnerable to eavesdropping and inimical attacking. The emergence and development of decentralized and ad-hoc wireless networks pose great challenges to the implementation of higher-layer key distribution and management in practice. Against this background, physical layer security has emerged as an attractive approach for performing secure transmission in a low complexity manner. This thesis concentrates on physical layer security design and enhancement in wireless networks. First, this thesis presents a new unifying framework to analyze the average secrecy capacity and secrecy outage probability. Besides the exact average secrecy capacity and secrecy outage probability, a new approach for analyzing the asymptotic behavior is proposed to compute key performance parameters such as high signal-to-noise ratio slope, power offset, secrecy diversity order, and secrecy array gain. Typical fading environments such as two-wave with diffuse power and Nakagami-m are taken into account.

**Keywords:** nakagami, Layer, fading.

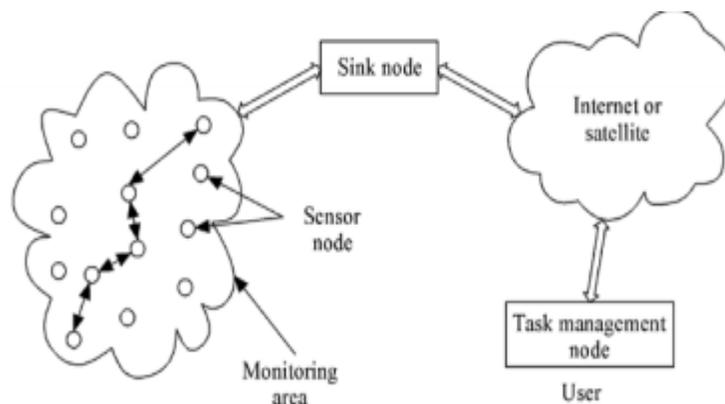
## 1. INTRODUCTION

However, the traditional wireless sensor network has the disadvantages of a large number of nodes, large scale, high power consumption, high cost, large volume and others in the practical application process, and its communication capacity and stability are also subject to certain restrictions. In order to meet the increasing demand of wireless sensor networks, routing protocols for wireless sensor networks with high accuracy, low cost, low power consumption and low delay are needed [5]. On the other hand, the combination of machine learning and wireless sensor network routing protocol can better realize the adaptive adjustment of the network and greatly improve the performance of the network. Based on the analysis of the geographical location information of the existing beacon nodes, the known information is used as the training sample to train the samples, and the location of the unknown nodes is predicted. In this paper, a hierarchical GBHR routing protocol based on machine learning is proposed, and NS2 software is used to simulate and compare it with the GPRS and LEACH protocol, so as to understand the performance of the protocol. In this way, machine learning is one of the most important applications of artificial intelligence, which is a major breakthrough in artificial intelligence after the expert system. Similar to artificial intelligence, machine learning is based on the process of human learning, which is simulated by computer. In the process of simulation, the machines can learn and acquire relevant knowledge and skills,

so as to constantly improve themselves [6]. Research on machine learning generally includes the following aspects: (1) learning system, that is, according to the specific requirements of the task to establish the corresponding learning system; (2) the learning mechanism refers to the study of the mechanism of human learning, which includes the acquisition of knowledge, skills, and the ability of abstract concepts; (3) learning methods, that is, people will explore a variety of possible learning methods in the process of learning and establish a specific application of learning algorithms. The research and application of biological learning mechanism is the basis of realizing the machine learning, which can be realized by the method of calculation.

## 2. RELATED WORK

The process of machine training is to extract the features of the training data, and generate feature vectors used in machine learning algorithms, in order to realize the process of training, in which the algorithms include neural network, Bias decision and support vector machine. The machine learning algorithm consists of two processes: the training and the test, so that most of the algorithms are very complex. In order to accomplish such a complex algorithm, a lot of hardware resources are needed. When the distributed processing takes a long time in the sensor nodes, it takes more time to determine the location. Therefore, in order to realize the machine learning algorithm, it is necessary to have enough resources to gather nodes, and adopt distributed processing method to locate the nodes. to form a self-organizing network system. The purpose of wireless sensor network is to collect and process the information of the object in the coverage area of the network, and send it to the user.



**Fig.1. Wireless Architecture**

There are many forms of sensor nodes, which can be used to measure the radar, thermal, infrared, seismic waves in the surrounding environment, so as to measure the pressure, noise, humidity, temperature and other data. In the general wireless sensor network system, the task management node and the Sink node are different from the sensor nodes with common structure, which are data that does not require induction. Compared with the ordinary sensor nodes, Sink nodes have a stronger storage, communication and processing capabilities, with more memory and computing resources [14]. In general, the energy of the sensor nodes is limited. So when the energy is exhausted, the ordinary nodes can no longer continue to work and be abandoned by the network. When the user releases the task, he can use the Sink node to release the corresponding command to the entire sensor node network. The sensor node is allocated reasonably after the request of the user.

### 3. PROPOSED SYSTEM

At present, wireless sensor networks are widely used in many fields, such as environmental monitoring, smart home, and military and so on. With the continuous development of wireless sensor network technology, there are more and more applications in human life. In the application of the military, the sensor network can be used to detect and monitor the enemy, and to evaluate and search the battlefield [19]. We can collect all kinds of accurate battlefield information very quickly and covertly, so as to gain the advantage of battlefield. In the environmental monitoring, the sensor network can be used to monitor air quality, livestock growth environment, area measurement and control, flood monitoring and so on, which has a very important significance for earthquake prevention and disaster prevention. The most typical application in the life is the application in the intelligent Home Furnishing.

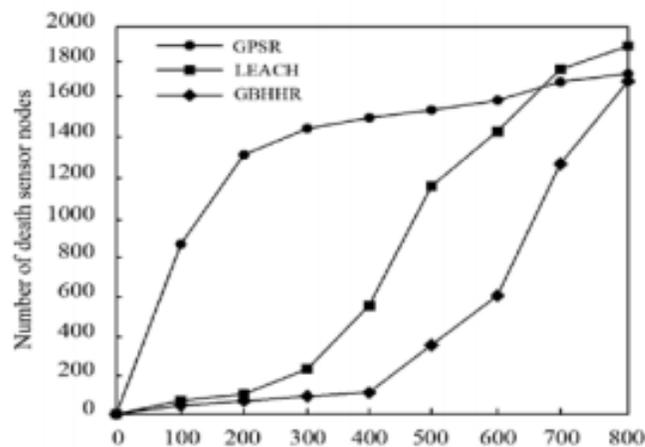


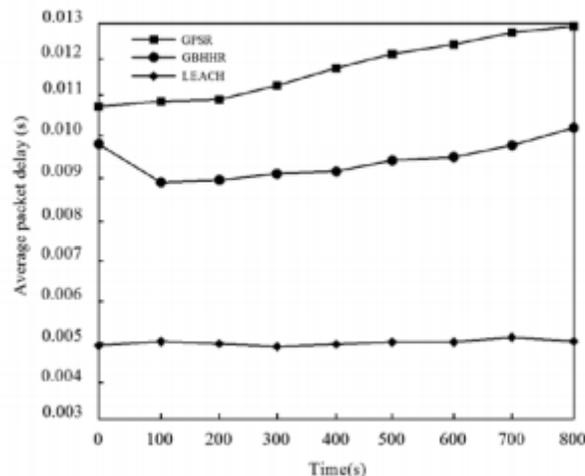
Fig.2.Comparative chart

By monitoring the temperature, humidity, air and light in the room, automatic control of indoor air conditioning, doors and windows can be realized so as to realize the automatic control of home environment. According to the complexity of machine learning algorithm, the calculation method of network nodes can be considered according to the amount of computation and network traffic. There are three stages in the process of network communication: training, broadcasting and positioning. In the training phase, the simplest protocol can be used to determine the geographic information between each other, which is finally aggregated to the sink node. The training algorithm is used to train the sample data with the sink nodes, and the corresponding parameters are calculated. In the broadcast phase, the learning algorithm model from the sink node is broadcast to each node. In the last location phase, each unknown node can estimate the location information by using the relative position of the known node.

### 4. ANALYSIS

The use of NS2 for simulation analysis of the network needs to extend the component library. So we need to embed the simulation model. In order to better set up the new simulation model in OTcl, it is necessary to combine the OTcl model with the simulation model. According to the needs, the simulation scenes are set up for the corresponding verification and testing of the simulation program. On the basis of machine learning, the GBHHR routing protocol is chosen. This protocol is a hierarchical routing protocol based on geographical location information. In this protocol, the network coverage area is divided into several grid nodes, and each node is classified into clusters. The collected data is transmitted to the cluster

head to carry out inter cluster relaying until the Sink node is finally reached. If the positioning mechanism is based on distance measurement, it is necessary to establish a very broad network. In this network, some beacon nodes are known, but the nodes can only receive signals from the beacon nodes in the communication range.



**Fig.3.Output Chart**

The whole network area is divided into a number of small instances of the same size, and a specific small grid represents a class which machine learning algorithms can determine. Thus, the beacon node category is now known. When the machine learning algorithm is used to learn the class of known beacon nodes, the contents can be used to classify the unknown nodes. That is to say, the location of the unknown node is determined by the machine learning algorithm, and the small grid centroid is used as the position coordinate of the unknown node. Since the communication radius and the transmit power of all the nodes in the routing protocol are fixed; only the number of hops should be considered. In the specific operation process, each sensor node transmits the collected data to the cluster head. The cluster head node fuses the received data and sends it to the Sink node. Because the routing algorithm for geographic information is used to realize the data routing, the data must be matched with the geographic information. And the existing geographic information is used to optimize the path.

## CONCLUSION

The traditional wireless sensor network is difficult to meet the needs of modern wireless sensor networks because of its long delay, poor adaptability and low coverage. In this paper, the routing protocol based on geographic location information was used as the research object, and the machine learning was applied to get better routing protocol performance. On the basis of machine learning, GBHHR routing protocol was chosen to study, which was a hierarchical routing protocol based on geographic location information. The workflow of designed GBHHR routing protocol had three stages of starting, running and updating, which could be fused with the machine learning.

## REFERENCES

1. Yu F, Chang C C, Shu J, et al. Recent Advances in Security and Privacy for Wireless Sensor Networks. *Journal of Sensors*, 2015, 2015(3):1-2.

2. Chang X, Huang J, Liu S, et al. Accuracy-Aware Interference Modeling and Measurement in Wireless Sensor Networks. *Mobile Computing IEEE Transactions on*, 2016, 15(2):278-291.
3. Jung S G, Kang B, Yeoum S, et al. Trail-Using Ant Behavior Based Energy-Efficient Routing Protocol in Wireless Sensor Networks. *International Journal of Distributed Sensor Networks*, 2016, (2016-4-6), 2016, 2016(4):1-9.
4. Liu Y, Dong M, Ota K, et al. ActiveTrust: Secure and Trustable Routing in Wireless Sensor Networks. *IEEE Transactions on Information Forensics & Security*, 2017, 11(9):2013-2027.
5. Khan I, Belqasmi F, Glitho R, et al. Wireless sensor network virtualization: A survey. *IEEE Communications Surveys & Tutorials*, 2017, 18(1):553-576.
6. Ying H L, Jing Y X, Lin T, et al. SVM-Prot 2016: A Web-Server for Machine Learning Prediction of Protein Functional Families from Sequence Irrespective of Similarity. *Plos One*, 2016, 11(8):e0155290.
7. Kivinen J J, Williams C K I, Cho K H, et al. Artificial Neural Networks and Machine Learning – ICANN 2011. *Lecture Notes in Computer Science*, 2011, 7552(1):2409–2410.