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Study of 3D Wireless Sensor Network Based on Overlap Method

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Abstract: Wireless sensor network as a new information acquisition technology has profound impact on people's work and life style, has the very high research value. Energy issues important factor restricting the development of the deep WSN is node, sensor nodes for processing data collected information and communication between nodes will speed up the energy consumption of nodes. Cover the deployment strategy is directly related to the optimal distribution of target area monitoring the degree of perception and limited resources of wireless sensor network, determines the service quality of the wireless sensor network to improve the. How to design an efficient coverage algorithm directly affects the coverage and network lifetime, because the actual environment of 3D wireless sensor network is more close to people, so the 3D WSN. Covering research has more realistic significance. At present, about the research of wireless sensor network many 3D covering literature, according to the general configuration of nodes is divided into deterministic coverage and random covering two aspects. This paper presents a wireless sensor network node for 3D scene coverage model and its deployment method, based on analyzing the common regular polyhedron models used in 3D space coverage, proposed a model based on covering the structure, on the basis of this theory to derive a quantitative relationship between coverage model and node sensing radius, more based on the quantitative relationship between the further calculation of network area remains fully covering the minimum number of nodes are required, the network regional 3D mesh finite mesh node coverage model in accordance with the deployment.

Keywords: Wireless sensor network, 3D, Algorithm, Nodes.

1. Introduction

With the rapid development of embedded system, wireless communication and computing technology. Wireless sensor network as a new information acquisition technology has profound impact on people's work and life style, has the very high research value [1]. WSN is composed of a large number of resource constrained (e.g. CPU, battery energy, communication bandwidth) consists of sensor nodes, the sensor node real-time monitoring the perception of the target area, all kinds of information acquisition and perceptive object (such as air humidity, ground temperature and pollutant concentration), and then the collected information and data processing, and the processed data through wireless communication in multi-hop transmission way to network or observer terminal, thereby effectively to the physical world, computer network and real world, give people provides a new observation of the physical world [2].

Wireless sensor network is integration of sensor techniques emerging and embedded technology, the traditional wireless communication technology and distributed information processing technology, the effective implementation of the mass monitoring and tracking service complex [3]. As a new information perception and acquisition technology, WSN

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technology has been involved in various aspects of people's lives, is widely used in many important fields of military applications, medical care, environmental monitoring, space exploration, especially in the bad environment of regional or unattended monitoring area in information collection show unique advantages [4, 5]. At present, in the promotion of technological development and social progress based on the advantages of wireless sensor network, has become the domestic and international a new research hotspot, and achieved certain results.

WSN technology is the main task of sensing and monitoring the target region, to achieve a variety of environment or object in the target area for sensing and monitoring, the first job is to cover the effective control to the target area [6]. WSN coverage control problem is that sensor nodes by adjusting the position of their own to monitor the target area, and execution of the target object perception task, it reflects the degree of perception of the designated area monitoring WSN fundamentally. At the same time, the sensor node sensing range and communication with the battery consumption gradually reduce the monitoring performance and service life directly affects the network. Communication energy Co., limited energy, computation ability of finite resources characteristics greatly influence the service quality of WSN, how to use various resource allocation optimization method to control the appropriate coverage of WSN can improve WSN quality of service has become an urgent problem to be solved for WSN technology [7-9].

In general, WSN coverage is through the deployment of nodes and node control, to meet the requirements of WSN sensing and monitoring of the target area, reflects the network "perception" quality of service, it is a basic prerequisite of a wireless sensor network work. Only in this way, the observer can obtain all the information needed. Based on this theme, in 3D Wireless Sensor deterministic coverage and random covering two aspects, respectively, two control algorithms are proposed from the two aspects of coverage. Deterministic coverage problem can be regarded as the target region size determination, state fixed predetermined time, the topological structure of the network and to determine the position of the node, then the node deployment to meet the needs of coverage network [10]. In view of this situation, this paper presents a model based on covering the structure, and the theory of 3D calculations derive known completely cover the required number of sensor nodes, the network regional 3D mesh finite mesh node coverage model in accordance with the deployment of [11].

2. Wireless Sensor Network

2.1. Gateway Function Analysis and Design

The gateway of wireless sensor network in wireless sensor network plays an important role in wireless sensor network gateway [12]. The main functions are as follows: collecting information through WSN network coordinator; the gateway for wireless sensor network processing unit according to the application requirements for gathering information for initial treatment; the processing of data via an external network communication module for forwarding to the application server. The gateway can be added new auxiliary functions, such as the Short Message Service (SMS) gateway alarm function. The traditional WSN gateway network set data with the help of networked PC wireless sensor network. According to the characteristics of wireless sensor network and agricultural monitoring applications, and fully consider the gateway practicality, compatibility and scalability requirements [13, 14]. We design a kind of oriented agricultural monitoring wireless sensor network gateway, the plan is as follows: In the ARM processor uC/OS-II operating system transplant, the ZigBee radio frequency module to complete ZigBee network and receiving sensor to collect the data. After a certain data storage strategy, by GPRS wireless or Ethernet wired to the acquisition of the environmental data transmission to the remote monitoring center [15].

The hardware requirements: gateway hardware platform should have the high performance MCU, memory, Ethernet interface chip, GPRS module, SgBee module, a clock circuit and a reset circuit. Software requirements: selection can be cut, transplant embedded operating system easily, application layer supports the WSN data collecting, protocol conversion, forwarding functions. Gateway is the bridge to build a wireless sensor network sensor node and a remote monitoring center communication, and it is the core part of wireless sensor network. The gateway system coordinator is responsible for wireless sensor network sensor data acquisition nodes to communicate, gateway communication by GPRS wireless or Ethernet cable and remote monitoring center [16].

The gateway of wireless sensor network and sensor acquired data communications between the nodes by extending the ZigBee module, GPRS module and Ethernet interface chip. With GPRS as connecting to the remote monitoring center and the gateway of wireless transmission, to network interface chip as connecting to the remote monitoring center and gateway Ethernet wired transmission mode [17]. The hardware part is mainly composed of ARM microprocessor, ZigBee module, GPRS module which used for wireless communication, Ethernet interface chip memory chip, Flash memory chip, power supply circuit module [18]. The gateway hardware structure diagram is shown in Fig. 1.

Recently, advancement in wireless communications and electronics has enabled the development of low-cost sensor networks [19]. The wireless sensor network as a new kind of technology has been researched by many universities and institutes, and also been used in many areas [20].

Wireless ad hoc networks as a product of integration of network technology and wireless communication technology, can be separated from the wired infrastructure (such as the base station), multi-hop networks with self-organizing way. Its composition is shown in Fig. 2(a), it is different with the visible and the structure of the traditional WLAN which is shown in Fig. 2(b).

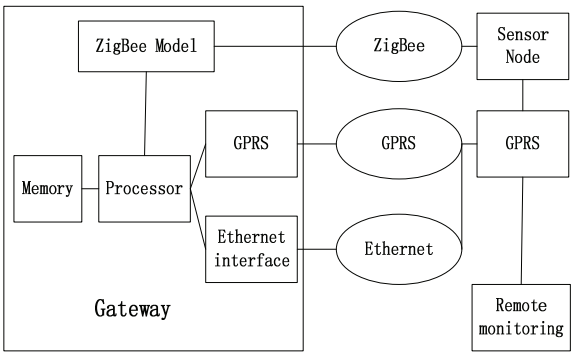
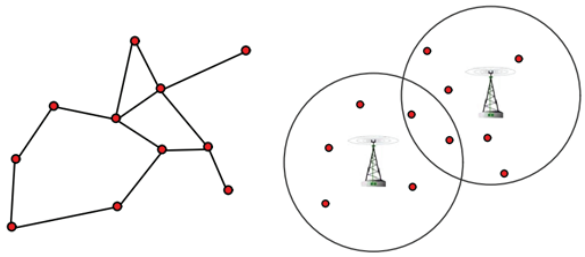


Fig. 1. The gateway hardware structure diagram.



(a) (b)

Fig. 2. (a) Structure of MANET, (b) Structure of WLAN.

Developers use this basic communication capacity to implement protocols that let the collection of nodes transport and process information and coordinate their activities [21]. A basic capability in such networks involves disseminating information over many nodes. This can be achieved by a flooding protocol in which a root node broadcasts a packet with some identifying information. Receiving nodes retransmit the packet so that more distant nodes can receive it. However, a node can receive different versions of the same message from several neighboring nodes, so the network uses identifying information to detect and suppress duplicates. Flooding protocols use various techniques to avoid contention and minimize redundant transmissions. Reliability also follows a different pattern. Increasingly, sensor networks will deploy disruption-tolerant networking approaches in which they transfer bundles of data reliably, hop by hop, in contrast to the Internet, which sets up an end-to-end connection using byte or packet matching between the original source and destination to determine reliability. The DTN model better suits the variable connectivity that results from dynamic environments and the need to duty-cycle.

2.2. The System Structure of Wireless Sensor Network

According to the requirements of the application of WSN, wireless sensor network node current mainly by the data collection unit, data processing four parts unit, data transfer unit and power management unit. The hardware structure of sensor node most companies or research institutions to develop the same, there are subtle differences only in special demand function component. A typical sensor node hardware structure was shown in Fig. 3.

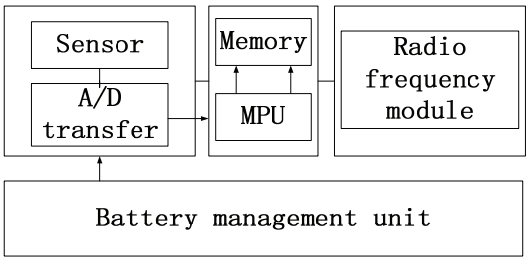


Fig. 3. A typical sensor node hardware structure.

The data collection unit comprises a sensor module and analog/data conversion module, sensor for collecting the object of observation information and then through the digital-analog conversion is transferred to the data processing unit. According to the different collection object needs to choose different sensor equipment in actual use, a node may device a plurality of sensor devices.

Power management unit usually means a small battery, responsible for the sensor nodes to other unit normal operation to provide the necessary energy to support. The data processing unit from the memory, microprocessor and embedded OS module, the processor operates at a different frequency or different voltage directly affects the energy consumption of sensor nodes with different. At the same time, the processing unit determines the topology selection and processing speed and the ability of network nodes, routing algorithm of sensor data. Data transmission unit consists of a RF module, responsible for sending and receiving data exchange between nodes and control information, and a wireless gateway digital signal acquisition transmission to the monitoring center, to the observer analysis. In wireless sensor networks, the use of different communication protocols will directly affect the communication range of sensor nodes and node energy consumption of different. Communication is currently widely used in WSN include common RF communication using GSM band and with the

ZigBee protocol and Bluetooth communication protocol, RF communication.

This network consists of sensor nodes, Sink (sink node), intermediate transmission network (satellite communication network or the Internet) and the observer. Many inexpensive miniature sensor nodes scattered deployment in or in the vicinity of the sensing area, these nodes by self-organizing, adaptive wireless communication network, in a collaborative manner perception, acquisition and processing network covering the specific object information area, after processing a plurality of nodes and eventually passed to the sink node. Users can directly access the sink node or the intermediate transmission network using indirect management of sink nodes, reverse control and management of the sensor node, and realizes the monitoring and management of remote monitoring area.

Sink node is responsible for bridging WSN and satellite communication network or Internet intermediate transmission network must have strong computation, storage and communication ability and sufficient energy supply. The Sink node has abundant port resources can easily add new hardware implementation of integration with the existing network facilities, a full-featured special sensor nodes can be used as a Sink node, a special gateway device with only wireless communication interface, can also be used as a Sink node. Monitoring system of WSN as a new information acquisition technology compared with traditional has many obvious advantages such as WSN nodes with no fixed infrastructure significantly reduces the cable cost, node with computing and self-detection function greatly improve the system performance and stability.

2.3. Development and Key Technology Research of Wireless Sensor Network

Wireless sensor network as a new information acquisition technology effectively implement large-scale monitoring and tracking service complex, has the profound influence people's way of life and work. The United States business weekly and MIT Technology Review in forecasting the future technology development report, respectively, the wireless sensor network is one of the top 10 technology 21 most of twenty-first Century and change the world.

Application of the United States Department of defense for the first WSN in the last century 70's, will be dedicated to wireless sensor network is extended to the future military war. The United States Department of Defense Advanced Research Program (DARPA) began to study funded by the Carnegie Mellon University set up a distributed sensor network working group of distributed sensor network in 1978, this is seen as a WSN prototype. The United States military department at the WSN research fruits, the period of 2001~2005, the United States Army put forward "smart sensor network communication" plan, the sensor and the robot system as a unified network, using a dynamic understanding of the battlefield of the network timely in military operations, adjust the operational plan. The United States Navy recently for the establishment of a set of real-time database management system to carry out a "sensor network system" project, the system uses a dedicated portable sensor device, can coordinate the air and ground monitoring equipment, access and data information to deploy to all levels of command unit.

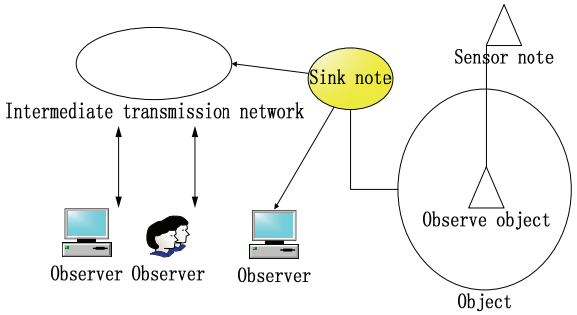


Fig. 4. The network structure of a typical wireless sensor.

The network structure of a typical wireless sensor was in Fig. 4 above. With the rapid development of WSN, WSN has been involved in various aspects of people's lives, has been widely used in military applications, medical care, environmental monitoring, space exploration and other fields, WSN technology into the technology of the Internet of things has become a trend in current research.

The node location information directly affect the WSN data acquisition node effect, the necessary condition of normal operation of the wireless sensor network is to determine the formation of a stable network node position in WSN. Through the positioning technology, deployment of nodes in the target area can determine its location information, WSN can dynamically select some specific sensor node consists of a dynamic set to complete the task, in this way reduces the number of working nodes and greatly reduce system energy consumption. According to the characteristics of sensor nodes have limited battery energy, random deployment, easy failure, the requirements of positioning technology can meet the energy efficiency, self-organization, distributed computing and robustness requirements. At present common positioning technology, including centralized positioning technology and distributed positioning technology.

In WSN, the topology control technology directly affects the topology of the network, the use of topology control technology can not only improve the efficiency of MAC protocol, but also can provide adequate routing updates. Topology control to provide the necessary support time synchronization technology and target positioning technology, in order to WSN limited resources efficiently using the

network coverage and connectivity in the case, effectively prolong network lifetime. Implementation of topology control algorithm will consume the energy of the node, and storage capacity, processing power and communication capabilities of sensor nodes are limited, so the topology control algorithm for complex is not suitable for WSN network. At present, there are two main research directions: one is to choose the appropriate transmission power of sensor nodes; two is the conversion control sensor nodes between working state and sleep.

WSN nodes are deployed in the area of communication, nodes are prone to failure, the deployment of regional security can't be guaranteed, and the nodes using wireless communication transmission without special equipment, which will cause the security problems of WSN. The main goal of WSN network security is the guarantee of confidentiality, data integrity and the authenticity of the message. Aiming at these problems, the general practice is by means of encryption, to prevent the attacker communication information between nodes, so that an attacker cannot effectively attacks and malicious damage. At the same time, the need for and remote control of the wireless sensor network information legally users open access.

Cover the deployment strategy is directly related to the optimal allocation of monitoring sensing requirements of target area and limited resources of wireless sensor network, determines the service quality of the wireless sensor network to improve the. WSN coverage control problem involves many key technologies, network model, sensor node hardware and software system, covering algorithm can directly affect the effect of covering WSN. Wireless sensor network to access object perception information for the purpose of application, has strong correlation, so according to different application requirements, WSN coverage control should be used in conjunction with the coverage of different techniques and strategies.

2.4. Research on Coverage in Wireless Sensor Networks

The coverage problem in wireless sensor network, is adjusted by controlling the node deployment position, the optimal distribution of WSN network node energy, network communication, network data storage and processing power limited resources, in order to improve the network of various quality of service, prolong the network life purpose. In general, WSN coverage is through the deployment of nodes and node control, meet the WSN network and the monitoring of the target area requirements, reflects the network service quality.

For the different perception of different target monitoring area requirements, WSN coverage can be divided into 3 categories: coverage, line coverage and area coverage. Coverage refers to the sensor node to the target area of the specified target object to satisfy the coverage requirements, ensure that each target object discrete is at least one sensor node monitoring at any time. Covering about from all sensor nodes in selecting nodes with sensor nodes and ensure minimum meet the coverage requirements for all specified point target. A typical coverage model was shown in Fig. 5, the deployment of 10 sensor nodes in the rectangular target area, in order to monitor to the 7 point target within the target region, covering does not require all nodes perform coverage task requires only 3 sensor nodes perform work that can cover all the need to monitor the point target.

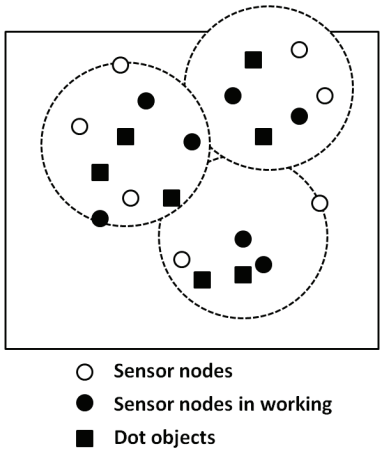


Fig. 5. A typical coverage model.

Line overlay (coverage) refers to the sensor node to all point of a path on the target area to satisfy the coverage requirements, line covering about monitoring area of a moving target through the sensor nodes, the probability to be detected or not detected. The model shown in Fig. 6 covers a typical line, black curve in the diagram of moving target through the whole process of trajectory monitoring area, sensor nodes 3 work in a state of complete a target is detected through the rectangular monitoring area.

Regional coverage is a WSN covering the most common, it requires cooperation among sensor nodes complete coverage of a target area and ensure that every point within the target area can be WSN coverage monitoring. Area coverage is concerned with the combinatorial optimization problem of WSN nodes, the basic idea is to use all the sensor nodes are divided into several different sets of nodes, each set can independently complete the specified coverage task target area at any time, as long as there is a set is in the working state can ensure the target area is WSN cover. According to the network coverage of the target in different regions, regional coverage is divided into two surface coverage and 3D spatial coverage. A typical two-dimensional surface coverage was shown in Fig. 6. The deployment of 20 sensor nodes in the rectangular target area, using 7 sensor nodes to form a working set can completely cover the target area in order to complete the monitoring task.

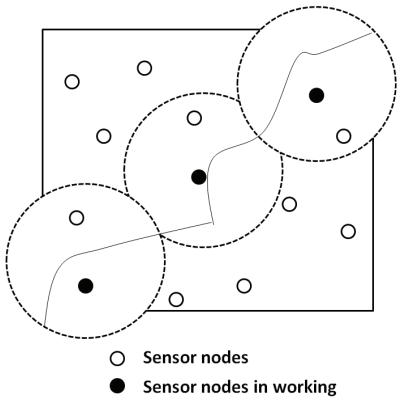


Fig. 6. A typical two-dimensional surface coverage.

WSN coverage strategy on one hand can control the sensor nodes from the global work to improve the network covers the whole perception effect, but also can avoid unnecessary energy consumption, on the other hand, WSN coverage strategy will also bring the computational treatment increases and the cost of network communication to increase the burden. Coverage of the assessment standard reflects the basic requirements of coverage of WSN, considering the different needs of coverage, to provide the necessary support for the analysis of an effective coverage strategy. Coverage criteria can help us understand the WSN coverage of the key and difficult points, analysis can also help us better coverage algorithm at present between different species of the advantages and disadvantages of.

The coverage quality (perceived quality) is WSN coverage of the most important indicators, to reflect the WSN to the target area of sensation and perception, is the primary measure of a wireless sensor network coverage quality. The coverage quality mainly include the basic factors of the following: coverage, coverage uniformity, coverage level, covering the time and the average moving distance.

3. Result and Discussion

3.1. Deterministic WSN Full Coverage of the Deployment Algorithm for 3D Space

Cover the deployment strategy is directly related to the optimal allocation of monitoring sensing requirements of target area and limited resources of wireless sensor network, determines the service quality of the wireless sensor network to improve the. With the deepening of theoretical research and application demand unceasing expansion, the three-dimensional WSN close to the reality of the physical world is attracting more and more attention, such as three-dimensional network as the background of the underwater acoustic sensor networks and atmospheric monitoring sensor network.

If the advance informed the three-dimensional induction zone size and shape, you can plan the network topology in advance according to the 3D model, then according to the coverage requirements to calculate the position of the node and the node deployment, in this case, the deterministic deployment method can effectively reduce computing less number of nodes, and the nodes deployment time. At present, most of study on the method of 3D spatial coverage problem is pumping into three-dimensional space three-dimensional ball cover, that is to say, the sensing range of each sensor node as a node is the center of the sphere, and then uses a plurality of coverage overlap sphere covering the entire three-dimensional monitoring area. In order to reduce the number of nodes in the work to save the network energy angle, coverage optimization problem corresponding to the maximum of how to use the minimum number of spheres to the 3D space coverage.

This chapter uses the ball for a 3D spatial coverage coverage model design covering method, the model of a cuboid structure based on the theory, this chapter deduces the quantitative relationship between coverage model and node sensing radius, further based on the quantitative relationship between the computing network area to keep sufficient minimum number of nodes needed to cover the network, finally regional 3D mesh finite mesh node coverage model in accordance with the deployment of. In three-dimensional space, we define a coverage model, was shown in Fig. 7.

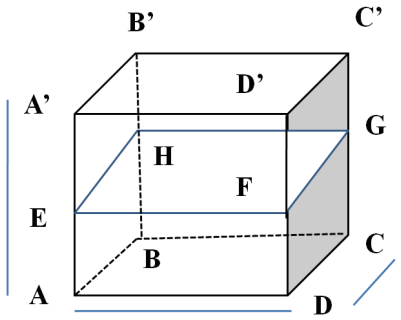


Fig. 7. A coverage model.

Among them, the tetrahedral ABCDA'B'C'D' is a long, width and height respectively, X, Y, Z cuboid; middle plane EFGH in cuboid ABCDA'B'C'D', with the bottom surface ABCD parallel, and in the Z/2, I is a planar EFGH center; node deployment in E respectively, E, F, G, H, I five positions of the place a sensor node. Coverage density equal to the volume ratio of the sensing radius of five r sensor node sensing the total range of space and the cuboid ABCDA'B'C'D' coverage model, denoted as R, V, and type set:

$$\sigma(r,V) = 20\pi r^3 / 3V \quad (1)$$

According to the geometrical symmetry, we can put the whole cover covering the whole three-dimensional cuboid is mapped to 2D rectangular ABCD. A sensor node sensing radius is Sr, then the node is a circle in the plane ABCD sensing range, the region of radius Rs are:

$$R_S = \sqrt{Rs^2 - \frac{z^2}{4}} \tag{2}$$

The best conditions of rectangular ABCD full coverage of the corresponding to the overlay model 5 sensor nodes in the rectangular ABCD on the intersection. According to the length of X, width of Y and the sensing radius S. The relationship between R, when x>2Rs, y>2Rs as shown in Fig. 8.

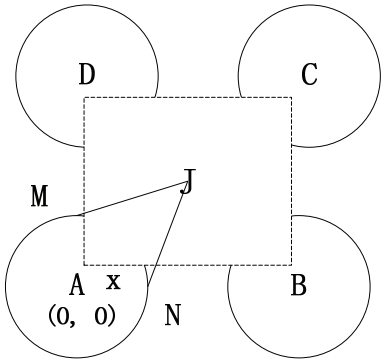


Fig. 8. The relationship of x and y.

3.2. Coverage Control Algorithm for UWSNs

Underwater sensor networks (UWSNs) is a hot area of research in recent years WSN. UWSNs on the oceans, lakes, and other fields to provide real-time, accurate an efficient target detection and data acquisition. Underwater sensor network consists of a large number of underwater sensor nodes and a limited number of located on the surface or the base station node itself autonomous receivers, with acoustic equipment, nodes communicate by sound, and use the data collected will be transmitted to the radio base station receiver or autonomous. The application prospect of UWSNs is very extensive, including the discovery of enemy submarines, small vehicles, detection, coastal pollution detecting tsunamis and send alerts etc.

Three-dimensional sensor networks UWSNs is different from the traditional, because the waters in the sea, lake environment is often unknown, so the resulting deterministic coverage strategy difficult to implement. Random coverage does not need to receive location information for all nodes in advance, only need to cover the network can complete the sensing task by nodes forming a self-organizing, so underwater sensor networks are mostly use the random coverage strategy. The 3D underwater environment, the commonly used approach is first to use the aircraft or ship sensing device is random distribution to the surface of the water, and then through the horizontal position covering algorithm node adjust certain and vertical depth, the sensing device to sink underwater target area, the formation of topological structure of the network eventually. Network topology generation process directly affects the network coverage and energy consumption, and the influence of network coverage and life cycle period. The literature provides a method for the underwater 3D Wireless Sensor Networks deployment strategy, the purpose is to use the minimum number of sensor nodes in the overlay target area and to ensure that the sensing and communication. In underwater acoustic sensor networks (UWSNs), Akkaya et al proposed a distributed node coverage algorithm, the algorithm uses the graph coloring of node number and clustering, and chooses the neighbor nodes of the node as cluster head number. Because the nodes in the cluster of the highest degree of coincidence between the cover, so the nodes in the cluster to be assigned to different depth to reduce the coverage of coincidence degree. The cluster head node to calculate the depth position of each packet of cluster nodes will be adjusted to the last packet, the depth adjustment.

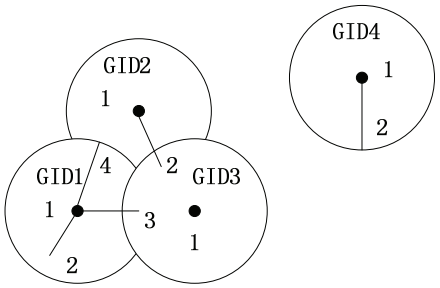


Fig. 9. Schematic diagram of network packet.

The sensing radius assume that sensor nodes are randomly selected for SR, a node, the node searching neighbor nodes within the range of SR to form a cluster, and set the node for the cluster head. Then, a cluster as a group, and ID number of the group, the depth of the adjustment of cluster head node is responsible for all nodes within the group. At the end of the level of other ungrouped nodes according to the method of grouping, until all nodes are in groups. Grouping common was shown in Fig. 9.

In order to effectively reduce the coverage overlap and maintain connectivity, we consider the coverage of the first 3 nodes. Cover the sensing range of each sensor node is assumed spherical space, and the sensing range of each node in the network is the same, the communication range of nodes is not less than two times of the sensing range of circumstances, if a group of nodes can completely cover a convex region, is between the set of nodes will be

communicated. Therefore, in this condition only meet the coverage requirements can also guarantee the network coverage and connectivity.

The depth of the adjustment, from different groups of nodes may move to the same depth, there are still covered in overlapping area between them. So the optimization cycle can realize this kind of joint in the vertical direction away from each other, to further reduce the coverage overlap. And it is in the same depth of the neighbor node is calculated for each node distance, is it right? Check the neighbor nodes in the sensing within it, if there is an overlap with the node, readjusting the neighbor node depth, remote and the nodes in the vertical distance.

3.3. Experimental Results and Simulation

In order to study on application of ICC-3D algorithm in the actual environment, we deployed nodes sensing radius SR =10m in 3D water 120 m × 100 m × 60 m in area, in accordance with the implementation steps of the algorithm, simulation, ICC-3D algorithm and random deployment algorithm of network coverage rate were compared, the experimental results show the effectiveness of the ICC-3D algorithm.

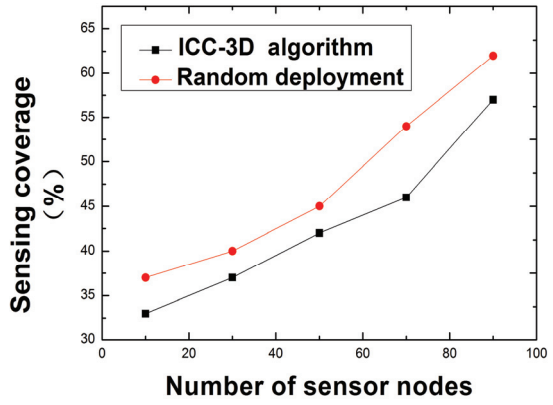


Fig. 10. The region of deployment of nodes is not the same coverage changes.

Fig. 10 shows the region of deployment of nodes is not the same coverage changes, ICC-3D algorithm rate is obviously higher than that of random node distribution coverage, and with the number of nodes increases the coverage rate effect is more obvious, because the ICC-3D algorithm for mobile nodes in the vertical direction between adjacent nodes, reduce the sensing area overlap.

Coverage control is a key problem of the application of wireless sensor networks, especially the certainty in 3D underwater environment deployment is often difficult to implement. This chapter considers the particularity of mobile node in the underwater environment, improve the coverage rate from the point of view, this paper proposed a distributed suitable for underwater wireless sensor network coverage control algorithm ICC-3D (Increased CoverageControl-3D), ICC-3D algorithm is divided into groups, effective depth of the adjustment, optimization of cycle three steps, a series of simulation experiments the ICC-3D algorithm can effectively improve the network coverage.

4. Summary

For the underwater wireless sensor network (UWSNs) 3D coverage problem, according to the particularity of mobile node in the underwater environment, put forward a coverage control algorithm node of a distributed ICC-3D algorithm (Increased Coverage Control-3D). The assumption that nodes initially deployed on the surface of the water, the algorithm first depth control, then the loop control in the 2D plane, finally realizes the effective coverage of 3D sensor networks. A large number of experiments show that, ICC-3D algorithm can obviously eliminate the overlap region, effectively meet the coverage requirements. How to design an efficient coverage algorithm directly affects the coverage and network lifetime, because the actual environment of 3D wireless sensor network is more close to people, so the 3D WSN. Covering research has more realistic significance. At present, about the research of wireless sensor network many 3D covering literature, according to the general configuration of nodes is divided into deterministic coverage and random covering two aspects. This paper presents a wireless sensor network node for 3D scene coverage model and its deployment method, based on analyzing the common regular polyhedron models used in 3D space coverage, proposed a model based on covering the structure, on the basis of this theory to derive a quantitative relationship between coverage model and node sensing radius, more based on the quantitative relationship between the further calculation of network area remains fully covering the minimum number of nodes are required, the network regional 3D mesh finite mesh node coverage model in accordance with the deployment.

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