Construction of ring monitoring network for river and lake environmental monitoring system

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Abstract: With the continuous improvement of the level of science and technology in China, people's desire for green water and blue sky is becoming more and more intense. Water pollution, air pollution, soil pollution and other issues always affect the lives of residents. Environmental detection is the basic work of environmental protection. In this paper, based on the problems of environmental monitoring of rivers and lakes, we set up a ring network for environmental monitoring of rivers and lakes. The system is mainly composed of sensor nodes and monitoring center to monitor the main indicators of river and lake environment. In order to ensure people's high requirements and high standards for the environment. To realize the complete monitoring of rivers and lakes.

1 Monitoring objects of river and lake environmental monitoring system

The monitoring objects of rivers and lakes are classified into water quality monitoring, air monitoring, soil monitoring and solid waste monitoring

Monitoring, biological monitoring and biological pollution monitoring, ecological monitoring, noise monitoring, electromagnetic radiation monitoring, radioactive monitoring

In addition, it can also be used to monitor the environment, heat pollution, light pollution and sanitation.

A water quality monitoring

Water environmental quality monitoring includes surface water and groundwater. The monitoring items include physical and chemical pollution indicators and related biological indicators, as well as hydrological parameters such as flow velocity and discharge.

B air monitoring

It is divided into air environmental quality monitoring and pollution source monitoring. At present, more than 100 kinds of pollutants have been listed as air pollution monitoring items. Wind direction, wind speed, air temperature, air pressure, humidity and other meteorological parameters are often measured in air monitoring.

C soil monitoring

Soil pollution is mainly caused by industrial wastes and the use of chemical fertilizers and pesticides. The key monitoring items are heavy metal elements, harmful non-metal elements and residual organic pesticides that affect the soil ecological balance.

D solid waste monitoring

Solid waste includes industrial waste, health care waste, agricultural waste, radioactive solid waste and municipal solid waste. The main monitoring items are the hazardous characteristics of solid waste and the characteristics of domestic waste, including the determination of the composition and content of toxic and harmful substances and toxicological experiments.

E biological monitoring and biological pollution monitoring

Biological monitoring is the use of biological monitoring of environmental pollution. Biological pollution monitoring is the use of a variety of detection methods to monitor the toxic and harmful substances in organisms, the main monitoring items are heavy metal elements, harmful non-metallic elements, pesticide residues and other toxic compounds.

F ecological monitoring

Observing and evaluating the response of ecosystems to natural and man-made changes is a measure of the spatial and temporal patterns of the structure and function of ecosystems, focusing on the changes of biological communities and populations.

G physical pollution monitoring

It refers to the monitoring of physical factors causing environmental pollution, such as noise, vibration, electromagnetic radiation, radioactivity, etc. Noise monitoring includes environmental noise monitoring and noise source monitoring. Environmental noise includes urban environmental noise and traffic noise.

The monitoring nodes of rivers and lakes form a ring structure.

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Figure 1 Schematic diagram of ring structure of monitoring node layout

2 Monitoring target classification of monitoring system

The detection targets can be divided into public welfare environmental monitoring and public affairs environmental monitoring. Public environmental monitoring is the main responsibility of environmental monitoring stations at all levels to complete monitoring, purposeful monitoring and research monitoring. Environmental monitoring of public affairs mainly includes engineering monitoring, consulting monitoring and service monitoring.

A. surveillance monitoring

Monitoring monitoring includes pollutant concentration, total emission and pollution trend. Environmental quality monitoring includes the monitoring of air, water quality, soil and noise, which is the main body of monitoring work and the main work of monitoring center. The purpose is to master the environmental quality status and pollutant sources, evaluate the effect of control measures, judge the implementation of environmental standards and the progress of environmental improvement.

B purposeful monitoring

It can be divided into pollution accident monitoring, arbitration monitoring, assessment and verification monitoring and consulting service monitoring.

Pollution accident monitoring refers to the emergency monitoring of the impact of pollution accidents on the environment. This kind of monitoring mostly uses monitoring vehicles, monitoring ships, simple monitoring, rapid monitoring, low altitude aerial survey, remote sensing and so on.

Arbitration monitoring is mainly aimed at pollution accident disputes and contradictions in the process of environmental law enforcement. This kind of monitoring should be carried out by the Department designated by

the state with quality certification qualification to provide data with legal liability for arbitration by law enforcement departments and judicial departments.

Assessment and verification monitoring mainly refers to target assessment and verification monitoring, such as environmental impact assessment status monitoring, pollutant discharge permit system assessment and verification monitoring, project acceptance monitoring, pollution control project completion acceptance monitoring, total pollutant control monitoring, urban environmental comprehensive improvement assessment monitoring.

Advisory service monitoring is a kind of advisory service monitoring provided for various social departments and units, such as green living environment monitoring, indoor air monitoring, environmental assessment and resource development and protection.

C research monitoring

Scientific research monitoring is a high-level monitoring for the specific purpose of scientific research. In order to carry out this kind of monitoring, we must make a careful research plan in advance, and cooperate with multiple departments and disciplines to complete it. Regional monitoring refers to the environmental monitoring of water body, atmosphere, sea area, river basin, scenic area and tourist area by regional environmental protection department.

3 Composition of environmental monitoring system for rivers and lakes

The monitoring system is used for real-time monitoring of water quality changes in lakes, reservoirs, drinking water sources, groundwater observation points, etc. the system integrates environmental monitoring, integration and early warning technologies, and adopts integrated and integrated linkage operation mode to strengthen the

ability of water pollution, abnormal accident prevention and pollution discharge supervision. Through the construction of lake water quality information network, we can analyze the dynamic trend of water quality in the region, effectively strengthen regional management, provide scientific basis for pollution dynamic research, lake eutrophication prediction, water pollution control of lakes and reservoirs, and provide scientific and effective technical support for water environment management and decision-making.

The environmental monitoring system consists of environmental monitoring nodes and environmental monitoring center.

The environmental monitoring node samples the environmental information of rivers and lakes to the node, which is simply processed and stored by MCU, and does the necessary output and display. The information is transmitted to the collection node through the communication module

Figure 2 composition diagram of monitoring node M

The environmental monitoring node m collects the environmental information, and then transmits the information to the environmental monitoring center. The environmental monitoring center receives the

information from the environmental monitoring nodes and processes and analyzes the environmental information.

Figure 3 environmental monitoring center and monitoring nodes

The monitoring center is composed of wireless network communication system, environmental data processing system, environmental information database and monitoring system platform. The wireless communication system receives the monitoring data from the monitoring node and stores it in the database. The environmental data processing system processes and analyzes the monitoring data. The monitoring system control platform completes the control, scheduling and coordination of the monitoring system to ensure the coordinated and orderly work of the monitoring system.

Sensor network integrates sensor technology, embedded computing technology, modern network and wireless communication technology, distributed information processing technology, etc. it can monitor,

sense and collect information of various environments or monitoring objects in real time through various integrated micro sensors, and process information through embedded system, And through the random self-organizing wireless communication network, the perceived information is transmitted to the user terminal in the way of multi hop relay.

The composition and function of sensor network node include the following four basic units: sensor unit (composed of sensor and analog-to-digital conversion function module), processing unit (composed of embedded system, including CPU, memory, embedded operating system, etc.), communication unit (composed of wireless communication module), and power supply. In addition, other functional units that can be selected

include positioning system, motion system and power generation device.

In sensor networks, a large number of nodes are deployed in or near the perceived objects in various ways. These nodes form a wireless network through self-organization, and perceive, collect and process the specific information in the network coverage area in a cooperative way, which can realize the collection, processing and analysis of information in any place at any time. A typical sensor network structure includes distributed sensor nodes (clusters), sink nodes, Internet and user interface

Sensor nodes can communicate with each other, form a network and connect to sink (base station node) through multi hop mode. Sink node receives data and completes the connection with public Internet network through gateway. The whole system manages and controls the system through task manager. The characteristics of sensor network make it have a very wide range of application prospects, and its ubiquitous characteristics make it an indispensable part of our life in the near future.

In addition to one or more sensors, each node of sensor network is also equipped with a transceiver, a small microcontroller and an energy source. The size of a single sensor node is as large as a shoe box and as small as a grain of dust. Sensor networks mainly include three aspects: sensing, communication and Computing (hardware, software and algorithm). The key technologies include wireless database technology, such as query used in wireless sensor network and network technology used for communication with other sensors, especially multi hop routing protocol.

The sensor layer of the Internet of things collects a large amount of data, which needs to be processed. The purpose of data processing is to transform the original data into useful information. Data is the input or raw value of data processing. The output of data processing is information, and the output can be presented in different forms, such as text file, data file, chart, spreadsheet or image.

4 Conclusion

This paper discusses the main technical indexes of environmental monitoring system. This paper discusses the system architecture of environmental monitoring node and environmental monitoring center. To provide technical guarantee for the establishment of environmental monitoring system. Environmental monitoring is developed with the emergence of environmental pollution. The establishment of automatic monitoring system and ecological monitoring system, the use of computer technology, network technology and Internet of things technology, continuous observation of air and water pollution changes and changes in the ecological environment, prediction of future environmental quality, expanding the scope of environmental monitoring and monitoring data acquisition, processing, transmission The ability of application provides strong technical support for

dynamic monitoring of regional environmental quality and ecological environmental quality, and greatly promotes the modernization of environmental monitoring.

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