

Development of Underwater Water Quality Intelligent Monitoring System Based on Internet of Things Technology

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Abstract With the continuous development of Internet of Things (IoT) technology, underwater water quality intelligent monitoring systems have become one of the important means to ensure water quality safety and environmental protection. This paper aims to introduce the development of an underwater water quality intelligent monitoring system based on IoT technology. This system adopts a variety of sensors, including cameras, pH, water temperature, conductivity, turbidity, water pressure and other sensors, to achieve comprehensive monitoring of the underwater environment. The system realizes real-time collection, transmission and analysis of sensor data through IoT technology, and combines artificial intelligence algorithms to achieve intelligent analysis and prediction of water quality data. This system has the advantages of strong real-time performance, high data accuracy, and simple operation. It can be widely used in fields such as water environment monitoring and water resource management, providing effective technical support for ensuring water quality safety.

KEYWORDS: Internet of Things, Smart Hydrology, System Development

1. Preface

With the global water resources increasingly threatened by pollution and overexploitation, water quality monitoring and management have increasingly become key issues for environmental protection and sustainable development. Against this background, the rapid development of Internet of Things (IoT) technology provides a brand-new solution for underwater water quality monitoring. This paper aims to introduce the development of an underwater water quality intelligent monitoring system based on IoT technology, aiming to achieve real-time monitoring, data analysis and prediction of water quality conditions, and provide effective technical support for water environmental protection. Water is the source of life, and changes in water quality are directly related to human health, ecological balance and economic development. However, traditional water quality monitoring methods have problems such as low monitoring frequency and difficult data acquisition, which are difficult to meet the real-time and comprehensive requirements of water quality monitoring. Therefore, the development of an underwater water quality intelligent monitoring system based on IoT technology has important practical significance and application value.

Through Internet of Things technology, we can install various sensors in the hull. The hull dives underwater to realize multi-dimensional and real-time monitoring of water quality underwater. At the same time, with the help of cloud computing and big data analysis technology, rapid processing and analysis of massive monitoring data can be achieved, providing timely and reliable basis for decision-making. In addition, combined with artificial intelligence algorithms, intelligent analysis and prediction of water quality data can also be realized. Abnormal situations can be detected early and corresponding measures can be taken to effectively ensure water quality safety. This paper will introduce the design and implementation process of this underwater water quality intelligent monitoring system, including the overall design of the system, the design and implementation of the main modules of the system, the system operation and debugging, and the key technical solutions for data collection and transmission. We believe that this underwater water quality intelligent monitoring system based on Internet of Things technology will bring new development opportunities to the field of water quality monitoring and management and make positive contributions to the sustainable development of human society.

2. Overall System Design

The underwater water quality intelligent monitoring system is a water quality management tool based on Internet of Things technology, sensor technology and 4G communication technology, aiming to analyze water resources in areas such as reservoirs and rivers. The system uses cameras to collect water quality image information, preprocess the water quality image information, extract features and analyze the water quality. The microprocessor adopts ESP32 and has a built-in high-precision ADC to sample data from sensors such as turbidity, water temperature, conductivity and depth. When the hull dives underwater and the 4G signal is interrupted, the microprocessor locally stores the data of each sensor. When the hull floats to the surface and the 4G signal is stable, the sensor data is uploaded to the server through the 4G network. Through real-time monitoring and analysis of the data, users can understand important information such as the situation of water resources, water quality

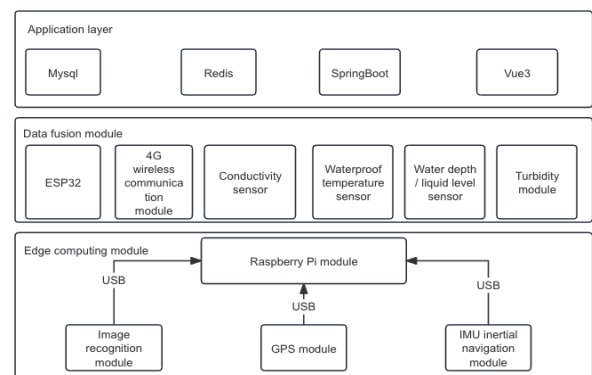


Figure 1: Overall structure diagram of the underwater water quality intelligent monitoring system