International Journal For Advanced Research In Science & Technology
A peer reviewed international journal www.ijarst.in
ISSN: 2457-0362

DESIGN OF AN EMBEDDED MARINE ENVIRONMENT DATA COLLECTION AND MONITORING SYSTEM

[1]DR.SREEKANTH, [2]P. SOWMYA, [3]SHAHANA MUSKAAN, [4]S. DEEPIKA

[1]R&D Head, Department Of Electronics And Communication Engineering, Malla Reddy Engineering College For Women, Hyderabad.

[2,3,4]Ug Scholar, Department Of Electronics And Communication Engineering, Malla Reddy Engineering College For Women, Hyderabad

ABSTRACT

Marine resources are very important to humanity, but humans have done relatively little in the development and protection of marine resources. The collection of marine environmental data mainly involves collecting marine environmental data such as temperature and humidity, water flow velocity and direction, wind speed and direction. These data can help us better understand the ocean, monitor the ocean, develop the ocean, and play a positive role in transportation fields such as maritime transportation support and channel optimization. In order to solve the problems of high monitoring value deviation and low detection image clarity in traditional marine monitoring systems, this paper constructs a marine environmental data collection and automated monitoring system. Integrated application in research on embedded computers, wireless sensor networks, communication technology, and spatial processing technology can achieve real-time monitoring of the marine environment, real-time data processing, and dynamic visualization display. The experimental results show that the system meets the design indicators and can effectively achieve the collection and real-time monitoring of marine environmental data. The system can accurately and effectively collect and publish marine environmental elements.

I.INTRODUCTION

The ocean accounts for about 71% of the earth's surface area, and it is rich in resources, which is a precious wealth for human survival and development. The change of marine environment has great influence on global climate, ecological environment and the development of human society. Therefore, real-time and online monitoring of marine environmental data is particularly important. Ocean station observation is one of the important applications of this system. By setting up observation stations in designated sea areas, the system can obtain marine environmental parameters in real time and provide basic data support for related research and application. The selection of observation stations needs to consider factors such as topography, water depth, water flow, etc., deploy data acquisition equipment, connect the equipment and set up regular acquisition tasks, and then record the original data and transmit it to the background data center for further processing and application. In recent years, with the rapid development of embedded technology and Internet of Things, the embedded marine environment data acquisition and monitoring system has

gradually become a research hotspot. This system can automatically complete the collection, processing, transmission and storage of marine environmental data under unattended conditions, and provide basic data support for research and application in related fields. In the early marine monitoring in China, seawater samples were collected manually and brought back to the laboratory for analysis. This method is not only time-consuming and laborious, but also the sample may have been contaminated during the collection and transportation, resulting in inaccurate final measurement results. In recent years, with the development of embedded technology, wireless communication technology and Web technology, the embedded platform is used as the monitoring system, which enables users to monitor and control in the local host computer, and can also perform remote real-time monitoring and remote equipment maintenance through the Internet. With the intelligentization of marine detection system hardware and the gradual maturity of marine detection technology, it can monitor and evaluate the marine environment reasonably and effectively protect and manage the marine ecological environment. With the rapid development of marine science and technology and the drastic increase of marine application demand, human beings are increasingly dependent on marine environmental information, which is not only manifested in the diversified demand for marine environmental data information content, but also in the demand for real-time and expressive forms of data information, that is, making full use of marine environmental data information to ensure normal fishing operations and shipping safety of human beings. This paper aims to design an embedded marine environment data acquisition and monitoring system with high efficiency, stability and reliability. The design of the system covers many aspects such as hardware composition, software design and data transmission mode, aiming at meeting the needs of different sea areas and application scenarios. In practical application, the hardware and software of the system can be optimized and adjusted according to specific requirements. For example, increasing the types and number of sensors, improving the speed and accuracy of data processing, and improving the stability and security of data transmission. At the same time, by combining advanced Internet of Things technology and big data analysis methods, marine environmental data can be deeply mined and applied, providing more accurate and reliable data support for marine scientific research, resource development and environmental protection.

II.LITERATURE SURVEY

El Mahrad B, Newton A, Icely J D, et al. Contribution of Remote Sensing Technologies to a Holistic Coastal and Marine Environmental Management Framework: A Review. Remote Sensing, vol. 12, no. 14, pp. 2313, 2020.

Coastal and marine management require the evaluation of multiple environmental threats and issues. However, there are gaps in the necessary data and poor access or dissemination of existing data in many countries around the world. This research identifies how remote sensing can contribute to filling these gaps so that environmental agencies, such as the United Nations Environmental Programme, European Environmental Agency, and International Union for Conservation of Nature, can better implement environmental directives

in a cost-effective manner. Remote sensing (RS) techniques generally allow for uniform data collection, with common acquisition and reporting methods, across large areas. Furthermore, these datasets are sometimes open-source, mainly when governments finance satellite missions. Some of these data can be used in holistic, coastal and marine environmental management frameworks, such as the DAPSI(W)R(M) framework (Drivers–Activities–Pressures–State changes–Impacts (on Welfare)–Responses (as Measures), an updated version of Drivers–Pressures–State–Impact–Responses. The framework is a useful and holistic problem-structuring framework that can be used to assess the causes, consequences, and responses to change in the marine environment. Six broad classifications of remote data collection technologies are reviewed for their potential contribution to integrated marine management, including Satellite-based Remote Sensing, Aerial Remote Sensing, Unmanned Aerial Vehicles, Unmanned Surface Vehicles, Unmanned Underwater Vehicles, and Static Sensors. A significant outcome of this study is practical inputs into each component of the DAPSI(W)R(M) framework. The RS applications are not expected to be all-inclusive; rather, they provide insight into the current use of the framework as a foundation for developing further holistic resource technologies for management strategies in the future. A significant outcome of this research will deliver practical insights for integrated coastal and marine management and demonstrate the usefulness of RS to support the implementation of environmental goals, descriptors, targets, and policies, such as the Water Framework Directive, Marine Strategy Framework Directive, Ocean Health Index, and United Nations Sustainable Development Goals. Additionally, the opportunities and challenges of these technologies are discussed. Coastal zones are among the most populated areas on the planet. As the population continues to increase, economic development must expand to support human welfare. However, this development may damage the coastal environment that is supporting human welfare for current and future generations. The management of complex coastal and marine social-ecological systems (SES) requires tools that provide frameworks with the capability of responding to current and emergent issues in these SES.

Many frameworks have been developed that address and integrate complex issues to provide solutions. For example, the Millennium Ecosystem Assessment framework, which links drivers, ecosystem services, and human welfare; the Ostrom framework, which analyses the sustainability of social-ecological systems; and the Drivers–Activities–Pressures–State change–Impact (on Welfare)–Responses (as Measures) framework, “DAPS(W)R(M)”, which relates ecosystem services to societal and economic pressures.

However, obtaining the environmental data that is necessary to use these frameworks is difficult, especially in countries where access to reliable data and their dissemination are limited or non-existent and even thwarted. Ndzabandzaba, 2015 raised awareness of the Global Sustainable Development Report regarding data sharing and their essential role in decision-making and as a key for further progress. For instance, the European Union Directives (e.g., Water Framework Directive (WFD) and Marine Strategy Framework Directive (MSFD)) require continuous environmental

monitoring and sharing data in a consistent and transparent manner, despite the complexity and cost of this obligation. Furthermore, countries worldwide that are signatories to Regional Sea conventions (e.g., OSPAR, HELCOM, and Barcelona Convention) must also monitor accordingly. For this purpose, these countries are mainly using the targets of the Sustainable Development Goals (SDGs) and the goals of the Ocean Health Index (OHI).

Traditional techniques of point sampling and observation in the environment do deliver high information content, but they are expensive and often do not provide adequate spatial and temporal coverage, while remote sensing can provide cost-effective solutions, as well as data for locations where there is no or only limited information.

III.EXISTING SYSTEM

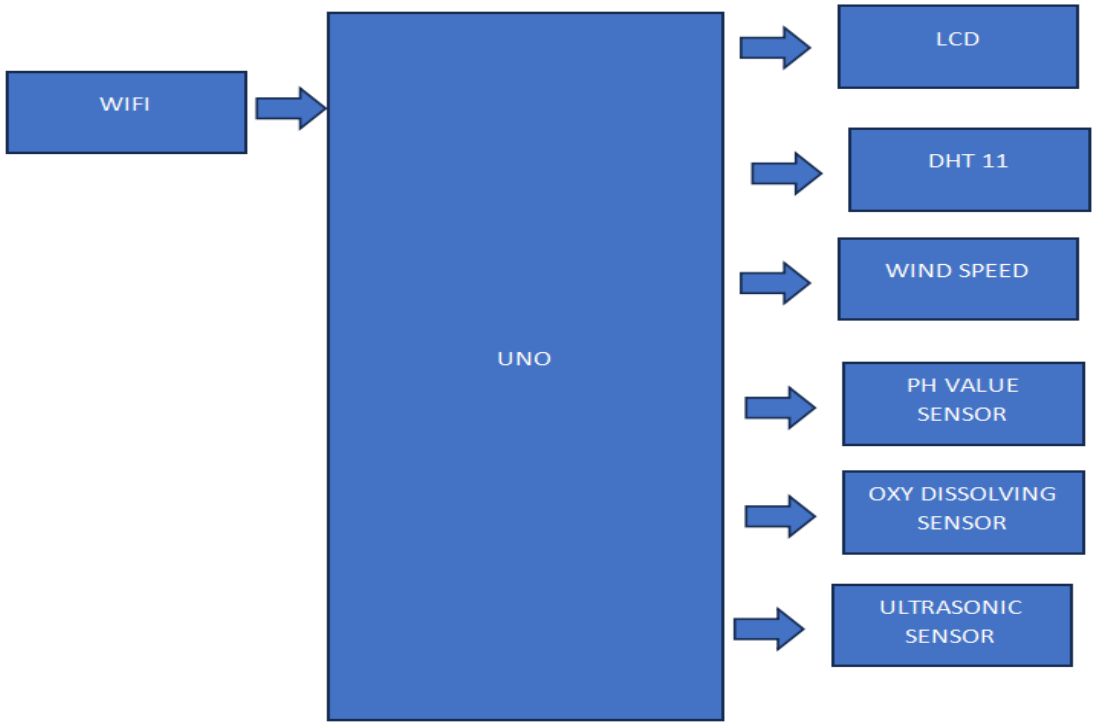
- In recent years, with the rapid development of embedded technology and Internet of Things, the embedded marine environment data acquisition and monitoring system has gradually become a research hotspot. This system can automatically complete the collection, processing, transmission and storage of marine environmental data under unattended conditions, and provide basic data support for research and application in related fields[4].
- In the early marine monitoring in China, seawater samples were collected manually and brought back to the laboratory for analysis. This method is not only time-consuming and laborious, but also the sample may have been contaminated during the collection and transportation, resulting in inaccurate final measurement results
- In recent years, with the development of embedded technology, wireless communication technology and Web technology, the embedded platform is used as the monitoring system, which enables users to monitor and control in the local host computer, and can also perform remote real-time monitoring and remote equipment maintenance through the Internet
- With the intelligentization of marine detection system hardware and the gradual maturity of marine detection technology, it can monitor and evaluate the marine environment reasonably and effectively protect and manage the marine ecological environment
- With the rapid development of marine science and technology and the drastic increase of marine application demand, human beings are increasingly dependent on marine environmental information, which is not only manifested in the diversified demand for marine environmental data information content, but also in the demand for real-time and expressive forms of data information, that is, making full use of marine environmental data information to ensure normal fishing operations and shipping safety of human beings

International Journal For Advanced Research In Science & Technology
A peer reviewed international journal www.ijarst.in
ISSN: 2457-0362

IV.PROPOSED SYSTEM

The Proposed System aim is to design an embedded marine environment data acquisition and monitoring system with high efficiency, stability and reliability. The design of the system covers many aspects such as hardware composition, software design and data transmission mode, aiming at meeting the needs of different sea areas and application scenarios. In practical application, the hardware and software of the system can be optimized and adjusted according to specific requirements. For example, increasing the types and number of sensors, improving the speed and accuracy of data processing, and improving the stability and security of data transmission. At the same time, by combining advanced Internet of Things technology and big data analysis methods, marine environmental data can be deeply mined and applied, providing more accurate and reliable data support for marine scientific research, resource development and environmental protection

Block diagram



V.CONCLUSION

With the continuous deepening of ocean development, understanding and monitoring the ocean has become a hot topic in marine science and technology research. The amount of monitoring data in the marine environment has been increasing year by year, resulting in the storage of data that cannot meet people's needs. Applying data storage technology to the monitoring system of the marine environment, on the basis of achieving basic functions, optimizes the load situation between data storage nodes, so that the system can better monitor the marine environment. The intelligent wireless network control system has medium level, short time, and low-cost energy, wireless network, high-frequency transmission, low cost, and can use multiple energy sources, and save energy when necessary. This article constructs a marine

environmental data collection and automated monitoring system. Integrated application in research on embedded computers, wireless sensor networks, communication technology, and spatial processing technology can achieve real-time monitoring of the marine environment, real-time data processing, and dynamic visualization display. The experimental results show that the system has the characteristics of low power consumption, low cost, high reliability, and strong scalability. It can effectively and timely analyze marine environmental monitoring data, which is of great significance for protecting marine development and ship safety research. Compared with traditional neural network-based monitoring systems, it has been confirmed that the automated monitoring system proposed in this article can monitor the marine environment more clearly and accurately, thereby better grasping real-time information of the marine environment and ensuring the safety and reliability of maritime navigation. In future work, on the one hand, the data collection program should gradually include various types of instruments and different file types, and on the other hand, the content of the module library should be continuously expanded to gradually achieve zero programming development of marine environmental monitoring systems.

VI.REFERENCES

[1] El Mahrad B, Newton A, Icely J D, et al. Contribution of Remote Sensing Technologies to a Holistic Coastal and Marine Environmental Management Framework: A Review. Remote Sensing, vol. 12, no. 14, pp. 2313, 2020.

[2] Song Z, Hu H. The Framework of Marine Meteorological Broadcasting System Based on Internet of Things. Journal of Coastal Research, vol. 98, no. 1, pp. 113, 2019.

[3] Yang J, Wen J, Jiang B, et al. Marine depth mapping algorithm based on the edge computing in Internet of things. Journal of Parallel and Distributed Computing, vol. 114, no. 4, pp. 95-103, 2018.

[4] UKHO Contracts Ocean Wise to Provide Marine Environmental Monitoring Systems. Environment coastal & offshore, vol. 2022, no. 1, pp. 10, 2022.

[5] Gabriele P, Michele C, Ovidio S. A Marine Information System for Environmental Monitoring: ARGO-MIS. Journal of Marine Science & Engineering, vol. 6, no. 1, pp. 15, 2018.

[6] Ondara K , Dhiauddin R .Indonesia Marine Debris: Banda Aceh Coastal Environment Identification .Jurnal Kelautan Tropis, vol. 23, no. 1, pp. 117, 2020.

[7] Hastie G D, Gi □ ick Wu, Moss S, et al. Automated detection and tracking of marine mammals: A novel sonar tool for monitoring effects of marine industry. Aquatic Conservation Marine and Freshwater Ecosystems, vol. 29, no. 1, pp. 119-130, 2019.

[8] Kryshev I I, Sazykina T G, Pavlova N N, et al. Assessment of radiation state of marine environment in the Leningrad NPP area according to long-term monitoring data (1973–2019). Marine Biological Journal, vol. 6, no. 1, pp. 41-57, 2021.

[9] Fan H, Wang J, Hu M, et al. Spatiotemporal assessment of marine environmental monitoring programme based on DIN concentration in the Yangtze River estuary and its adjacent sea. The Science of

the Total Environment, vol. 707, no. 10, pp. 135527.1-135527.8, 2020.

[10] Meng X W, Pan H J, Bi Z B, et al. Research and design of comprehensive data collector for marine environment. Rural Economy and Technology, vol. 29, no. 1, pp. 2, 2018.

[11] Hu Y, Xu Y Q. Design of marine water quality monitoring system based on narrowband Internet of Things communication. Journal of Guangzhou Institute of Navigation, vol. 029, no. 002, pp. 14-19, 2021.

[12] Yuan Y Y, Jin J H, Li H B. Design of distributed architecture of marine environmental information based on Hadoop. Marine Surveying and Mapping, vol. 39, no. 6, pp. 4, 2019.