A REVIEW STUDY ON WSN IN MARINE ATMOSPHERE

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ABSTRACT

A large variety of human activities have caused the destruction of the marine environment, due to rising social and economic growth. Increasingly, the need to protect the marine environment has resulted in a growing amount of research and development focus. Over the last decade, many marine monitoring systems have been created, particularly in regards to environmental conditions in the oceans. Using an oceanographic research vessel to collect data on the maritime environment is costly and time-consuming, and it offers a low-resolution picture of time and space. WSNs are now being regarded promising as a monitoring system for the maritime environment, since they offer many benefits such as being unmanned, being deployed easily, doing real-time monitoring, and being relatively inexpensive. This study presents a complete look at the state-of-the-art monitoring methods used in the maritime environment. WSN oceanographic monitoring systems have a standard architecture in which a data processing unit is implemented in an Application Specific Integrated Circuit (ASIC) on a standard platform and communicates with oceanographic sensors using radio technology. Following this, it discusses several projects, systems, strategies, methods, and algorithms that connect to it. Wireless sensor networks for maritime environment monitoring is discussed as well.

KEYWORDS: WSN, Marine Environment, Application

INTRODUCTION

WSNs use several sensor nodes with both sensing and processing capabilities, which can monitor and detect physical characteristics and wirelessly send data to a central location. An uncontrolled environment, geometric restrictions, and limited resources for energy and processing capacity are all hallmarks of WSNs [1]. When a WSN is deployed, sensors are often deployed in higher numbers than the ideal site in order to increase system dependability and fault tolerance [2-9].

WSNs have found a broad range of applications during the past decade, including monitoring of water, forests, industrial facilities, agriculture, combat scenes, vehicles, houses, and animal behaviour. This monitoring technique is undoubtedly capable of being used to the oceans [13-15].

A civilization and economy with many people has naturally evolved more and more individuals becoming concerned about the marine environment. Human activities such as industry, tourism, and urban growth have a significant impact on marine environment systems. Research boats used to monitor marine habitats, such as oceanographic research boats, are a highly costly and time-consuming procedure that have a limited spatial and temporal resolution. An WSN-based strategy offers improved access to real-time data encompassing huge geographic regions and lengthy periods of time for maritime environment study. Tateson et al.[16] state that using WSNs instead of typical oceanographic research vessels would be at least an order of magnitude cheaper [17-18].

Different sensors are utilised to monitor and measure various physical and chemical characteristics such as water temperature, pressure, wind direction, wind speed, salinity, turbidity, pH, oxygen density, and chlorophyll levels in a WSN-based marine environment monitoring system.

The issues that are relevant for the design and deployment of a sustainable and scalable WSN for maritime environment monitoring are distinct from those that are relevant for the design and deployment of a lasting and scalable WSN on land.

AREA OF APPLICATION

A wide array of marine environmental monitoring applications are supported by WSN-based environmental monitoring, such as water quality monitoring, ocean sensing, and monitoring of coral reefs and fish farms. WSN system topologies, communication technologies, and sensor technologies vary based on the application domains.

When it comes to ocean bays, lakes, rivers, and other water bodies, a water quality monitoring system is generally built to measure the various water conditions and attributes such as temperature, pH, turbidity, conductivity, and dissolved oxygen (DO). A water monitoring system for ocean conditions and other environmental indicators uses an ocean sensing and monitoring system. A self-contained, real-time, and in-situ wireless sensor network for monitoring coral reef environments is generally placed in coral reef monitoring systems. To monitor water conditions and qualities, including temperature and pH, a marine fish farm monitoring system is designed, and the quantity of faecal waste and uneaten feed is reliably quantified.

WSN COMMUNICATION

The design and implementation of a WSN should consider the applications, the environment, and the topology. To get a greater level of data accuracy and better system communication, a number of sensor nodes are installed close together. However, a dense deployment of sensor nodes has a few drawbacks. Data collisions, interferences, and excessive energy consumption are a few of them.

RELIABILITY

Measuring physical characteristics accurately and efficiently, as well as extending the system's lifespan, is a matter of widespread study in order to combat the system instability and unreliability issue in wireless sensor networks. As observed by, who examined the data reliability and message delay for cooperative wireless distributed sensor networks when there are random network failures, cooperative wireless distributed sensor networks have excellent data reliability and short message delays. examined the factors that affect the dependability and availability of wireless multi-hop networks, which includes the possibility of experiencing random failures to links. proposed an approach for network reliability assessment utilising a topology control mechanism. In the paper describes an approach for evaluating the reliability and availability of wireless sensor networks in typical industrial situations by using an autonomous fault tree creation process. For a maritime environmental monitoring system, we need to get a handle on system resilience by deploying wireless sensor networks.

CONCLUSION

Monitoring of the maritime environment has recently been a hot study topic. There are a lot of opportunities in the maritime environment for using wireless sensor networks. One reason is because wireless sensor networks are quite simple to build and provide real-time monitoring, with the added bonus of running automatically. This study gives a state-of-the-art overview of maritime environmental monitoring applications that use wireless sensor networks. WSN-based maritime environment monitoring is initially explained in terms of fundamentals: applications, a WSN architecture, a sensor node architecture, sensor types, and wireless communication. The methodology next examines relevant scientific literature according to various marine environment monitoring projects, systems, applications, network routing mechanisms, algorithms, methodologies, and methodologies. According to this assessment, there are still some noteworthy developments and applications in the fields of sensor network deployment and development. Oceanographic sensors protection, including sophisticated buoy design, energy harvesting systems design, and system stability and dependability, all need environmental monitoring.

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