# A Study of Water Environment Information Measurement Remote Management System Based on Wireless Communication

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**Abstract.** The continuous provision of information about the water environment monitoring ensures the systematic monitoring and control of water pollutants. In particular, the mobile and remotely controlled robot platform enabled innovative improvement in terms of reliability and communicability by collecting real-time information that is unlimited by time and place. In this study, a water environment monitoring robot platform and a system for remote control and real-time measurement data transmission are proposed to improve the reliability and stability of the entire system.
**Keywords:** Water Measurement, Remote management system, Wireless Communication,

## 1 Introduction

The environmental pollution data are important for pollution reduction and in the decision-making stage of preparing the national environment policy, and the collection of the environment data for pollutant prediction and trend analysis is especially essential [1]. Because the environmental analysis and measurement are very important for this purpose, many institutions and organizations invest big budgets to periodically share the environment data [2]. The Korean government has tried to establish the environment measurement data collection infrastructure through studies and investments, and is now collecting and analyzing the nationwide data based on the system [3,4,5].

In this study, a water environment monitoring robot platform and a system for the remote control and real-time measurement data transmission are proposed to improve the reliability and stability of the entire system.

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## 2 Related Work

Measurement sensors for water quality monitoring are continuously being developed and distributed [6]. Accordingly, commercial stable water quality measurement sensors are used for the robot platform and remote control system in this study. The water quality information from the probe-type sensor has to be transmitted and received via wireless data transmission technology, which is to be selected by the user according to the monitoring method and distance. Table 1 shows the frequency bands and transmission distances for diverse wireless communication technologies.

**Table 1.** Wireless communication technology compares.

| Contents | Frequency range | Transmission distance |
|---|---|---|
| WLAN | 2.4G/5G | 50m~2km |
| Bluetooth | 2.4G | 10m |
| ZigBee | 2868M/916M/2.4G | 30m |
| Binary DCMA | 2.4G | 1km |
| 3G/4G | 2GHz. | Unlimited |

## 3 Design and Implementation

Fig. 1 shows the overview of the entire system. As shown in the figure, the entire system consists of the probe-type sensor for water quality measurement, the robot platform that floats on the water, and the remote control system that manages them.

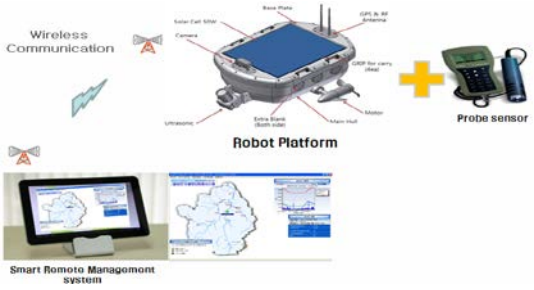


Figure 1. System Overview

The remote control system acquires the real-time image/data information via wireless communication and checks the state information. It also identifies the accurate positional information through the GPS data and Google map interconnection.

## 4 Conclusion and Future Work

The system that is proposed in this paper is a continuous and active smart water quality monitoring technology, compared with the existing fragmented and passive water quality monitoring method. This study results provide an important measure for ensuring the competitive real-time environment monitoring technology by establishing the basis of the robot platform design and remote control technologies. The existing water quality monitoring method requires high maintenance and management costs. It is expected that the proposed system will reduce the costs by more than approximately 30%. Further studies are required about the stabilized and autonomous robot platform, and the monitoring for a wider area through the development of an intelligent control system.

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