

INTISARI

Waterq: Alat Ukur Kualitas dan Tinggi Muka Air Berbasis Internet of Things

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Pencemaran air dan dinamika hidrologi di Daerah Aliran Sungai (DAS) Citarum memerlukan sistem pemantauan yang mampu melakukan pengukuran secara kontinu, real-time, dan berbiaya operasional rendah. Penelitian ini berfokus pada pengembangan dan evaluasi subsistem sensor dan masterboard dari WaterQ, sebuah sistem pemantauan kualitas dan kuantitas air berbasis *Internet of Things* (IoT) yang dirancang untuk pengukuran multiparameter.

Evaluasi sistem dilakukan melalui pengujian laboratorium dan pengujian lapangan. Pengujian laboratorium mencakup proses kalibrasi dan validasi sensor pH, *Total Dissolved Solids* (TDS), *dissolved oxygen* (DO), *electrical conductivity* (EC), *turbidity*, serta tinggi muka air menggunakan sensor ultrasonik A01NYUB (TMA1) dan *Liquid Level Transmitter* (TMA2). Akuisisi dan pengolahan data sensor dilakukan oleh masterboard berbasis ESP32 dengan dukungan modul konversi analog-ke-digital ADS1115.

Hasil pengujian menunjukkan bahwa subsistem sensor WaterQ bekerja sesuai dengan rancangan sistem. Sensor pH dan TDS memiliki akurasi sebesar 100%, sedangkan sensor DO, EC, dan *turbidity* masing-masing memiliki akurasi sebesar 99,99%, 99,95%, dan 98,99%. Sensor ketinggian air TMA1 dan TMA2 mampu mendeteksi perubahan tinggi muka air secara konsisten pada rentang kerja efektifnya. Hasil ini menunjukkan bahwa WaterQ layak digunakan sebagai sistem akuisisi data berbasis IoT untuk pemantauan kualitas dan kuantitas air.

Kata kunci: WaterQ, *Internet of Things*, kualitas air, sensor multiparameter, pemantauan DAS.

ABSTRACT

Waterq: Internet of Things-Based Water Quality and Level Measuring Device

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Water pollution and hydrological dynamics in the Citarum River Basin require a monitoring system capable of continuous, real-time measurement with low operational cost. This study focuses on the development and evaluation of the sensor subsystem and masterboard of WaterQ, an Internet of Things (IoT)-based system designed for multiparameter water quality and water level monitoring.

The system was evaluated through laboratory and field testing. Laboratory testing involved sensor calibration and validation under controlled conditions for pH, Total Dissolved Solids (TDS), dissolved oxygen (DO), electrical conductivity (EC), turbidity, and water level using an A01NYUB ultrasonic sensor (TMA1) and a Liquid Level Transmitter (TMA2). Sensor data acquisition and processing were performed using an ESP32-based masterboard supported by ADS1115 analog-to-digital converter modules.

The results show that the WaterQ sensor subsystem performs in accordance with the system design. The pH and TDS sensors achieved an accuracy of 100%, while the DO, EC, and turbidity sensors achieved accuracies of 99.99%, 99.95%, and 98.99%, respectively. The water level sensors (TMA1 and TMA2) consistently detected water level changes within their effective operating range. These results indicate that WaterQ is reliable and suitable as an IoT-based data acquisition system for water quality and quantity monitoring.

Keywords: WaterQ, Internet of Things, water quality monitoring, multiparameter sensors.