

## ABSTRAK

Kualitas air kolam renang merupakan faktor penting yang harus dijaga untuk menjamin kenyamanan dan kesehatan pengguna. Pemantauan kualitas air secara manual dinilai kurang efektif karena memerlukan pemeriksaan secara langsung dan tidak dapat dilakukan secara berkelanjutan. Penelitian ini bertujuan merancang dan membangun sistem monitoring dan pengendalian kualitas air kolam renang berbasis *Internet of Things* (IoT) menggunakan Arduino Uno. Sistem menggunakan sensor pH, sensor suhu DS18B20, sensor kekeruhan TSD-10, dan sensor ultrasonik HC-SR04 untuk mengukur parameter kualitas air. Data hasil pengukuran diproses oleh Arduino Uno dan dikirim melalui modul WiFi ESP8266-01 ke aplikasi *Blynk* sehingga dapat dipantau secara real-time. Selain itu, sistem dilengkapi relay dan pompa air yang bekerja secara otomatis berdasarkan batas parameter yang telah ditentukan. Metode penelitian meliputi perancangan perangkat keras dan perangkat lunak, pembuatan *prototype*, serta pengujian setiap sensor dan komunikasi data sistem. Hasil pengujian menunjukkan bahwa sensor pH memiliki tingkat kesalahan sebesar 0,11%–0,25%, sensor suhu DS18B20 memberikan hasil pembacaan yang stabil pada seluruh pengujian, sensor ultrasonik HC-SR04 memiliki rata-rata kesalahan sebesar 0,44%, sedangkan sensor kekeruhan TSD-10 mampu membedakan tingkat kekeruhan air berdasarkan nilai NTU dengan hasil pembacaan yang konsisten. Pengujian komunikasi data menunjukkan seluruh data berhasil dikirim ke aplikasi *Blynk* dengan waktu respons berkisar antara 1,02–1,06 detik dan tingkat keberhasilan pengiriman mencapai 100%. Berdasarkan hasil penelitian, sistem monitoring dan pengendalian kualitas air kolam renang berbasis *Internet of Things* (IoT) berhasil direalisasikan dan mampu melakukan pemantauan serta pengendalian kualitas air secara otomatis dan real-time. Sistem ini diharapkan dapat menjadi solusi yang efektif dan efisien dalam membantu pengguna memantau kondisi kualitas air kolam renang secara berkelanjutan.

*Kata kunci: Internet of Things, kualitas air, kolam renang, Arduino Uno, Blynk.*

## ***ABSTRACT***

Swimming pool water quality is an important factor that must be maintained to ensure the comfort and safety of users. Conventional water quality monitoring is considered less effective because it requires direct inspection and cannot be performed continuously. This study aims to design and develop an *Internet of Things* (IoT)-based swimming pool water quality monitoring and control system using an Arduino Uno. The system employs a pH sensor, DS18B20 temperature sensor, TSD-10 turbidity sensor, and HC-SR04 ultrasonic sensor to measure water quality parameters. The measured data are processed by the Arduino Uno and transmitted through the ESP8266-01 WiFi module to the *Blynk* application for real-time monitoring. In addition, the system is equipped with relays and water pumps that operate automatically based on predetermined parameter thresholds. The research method consisted of hardware and software design, *prototype* development, sensor performance testing, and system communication testing. The experimental results showed that the pH sensor achieved an error ranging from 0.11% to 0.25%, the DS18B20 temperature sensor provided stable measurements throughout the tests, the HC-SR04 ultrasonic sensor achieved an average error of 0.44%, and the TSD-10 turbidity sensor consistently distinguished water turbidity levels based on NTU values. Communication testing demonstrated that all sensor data were successfully transmitted to the *Blynk* application with a response time ranging from 1.02 to 1.06 seconds and a data transmission success rate of 100%. The results indicate that the proposed *Internet of Things* (IoT)-based swimming pool water quality monitoring and control system was successfully implemented and is capable of performing automatic and real-time monitoring and control. Therefore, the system can serve as an effective and efficient solution for continuous swimming pool water quality monitoring.

*Keywords:* Internet of Things, water quality, swimming pool, Arduino Uno, Blynk.