ABSTRACT

The increasing need for water quality monitoring systems in fish farming ponds is essential to support the sustainability of the ecosystem and fish productivity. Manual methods to monitor parameters such as temperature, pH, and water turbidity are often inefficient and prone to human error. In the digital era, Internet of Things (IoT)-based systems offer modern solutions, but many existing systems lack the flexibility and scalability to handle increasing data. The main problem in this study is how to build an efficient, real-time, and reliable water quality monitoring system using IoT technology.

This study offers a solution in the form of implementing an IoT-based microservice architecture integrated with water quality sensors to monitor important parameters in real time. Microservices enable data processing to be more flexible, distributed, and scalable so that it can handle various operational scenarios. Data obtained from sensors is sent to Cloud Firestore as a cloud-based database service for further storage and processing. This microservice architecture divides certain tasks into several containers, such as pH, temperature, NTU, Redis, and frontend containers, so that the system can handle data efficiently, flexibly, and isolated.

The test results show that the system can monitor water parameters with an average accuracy of 92.47% for pH, 98.27% for temperature, and 97.46% for turbidity. The system also shows low internet quota usage on ESP32 of 5.8 MB per day with fast response time with an average latency of 499 milliseconds in sending data to the dashboard. In conclusion, the implementation of IoT-based microservices is effective in improving the efficiency of water quality monitoring and has the potential to be widely applied to the fish farming sector.

Keywords: Fish farming, Internet of Things, Water quality, Microservice, Monitoring system