ABSTRAK

Krisis air global serta kondisi geografis kampus dengan perbedaan elevasi bangunan memicu ketidakmerataan tekanan air dan risiko kebocoran tersembunyi. Permasalahan ini secara nyata terjadi di Fakultas Vokasi Universitas Sanata Dharma, di mana pengawasan volume air masih dilakukan secara manual sehingga pemborosan air akibat kebocoran pipa sulit dideteksi secara cepat dan menimbulkan kerugian operasional. Oleh karena itu, penelitian ini bertujuan untuk merancang dan membangun sistem monitoring debit dan volume air berbasis *Internet of Things* (IoT) pada 6 titik aliran air di area kamar mandi gedung vokasi.

Sistem ini menggunakan *sensor flow* air (FS300A G3/4) untuk mengukur laju aliran dan volume air secara akurat. Data pulsa dari *sensor* diproses oleh mikrokontroler ESP32 sebagai pusat kendali yang mengirimkan data melalui jaringan Wi-Fi ke platform Blynk secara *real-time*. Pemutusan dan penghubung aliran air secara manual maupun otomatis diatur menggunakan modul *relay* 8-*channel* yang terhubung ke *solenoid valve*. Sistem ini dirancang secara efisien dengan memanfaatkan suplai daya langsung tanpa komponen *step-down converter*, sehingga mampu memangkas kompleksitas rangkaian.

Hasil penelitian menunjukkan bahwa sistem ini mampu menyajikan data penggunaan volume air secara kontinu dengan tingkat akurasi pembacaan *sensor* di atas 96% dan batas *error* berkisar antara 1,00% hingga 4,00%. Pengelola dapat mengelola data parameter *Flow Rate* (L/menit) serta *Total Liter* secara efektif, sekaligus mendeteksi anomali kebocoran secara proaktif melalui visualisasi grafik garis dinamis (*Live Chart*) berbasis waktu pada platform Blynk. Selain itu, fitur interupsi katup jarak jauh via aplikasi memiliki waktu respons rata-rata ±2 detik untuk menghentikan aliran air yang terbuang, sehingga efektif mendukung gerakan merawat bumi melalui penghematan air.

Kata Kunci *Internet Of Things*, *Sensor flow*, *ESP32*, *Relay* 8-channel, *Real Time*.

ABSTRACT

The global water crisis and the geographical conditions of the campus, which feature building elevation differences, trigger uneven water pressure and risks of hidden leaks. This issue explicitly occurs at the Faculty of Vocational Studies, Sanata Dharma University, where water volume monitoring is still conducted manually, making it difficult to promptly detect water waste due to pipe leaks and causing operational losses. Therefore, this study aims to design and develop an Internet of Things (IoT)-based water flow and water volume monitoring system at 6 flow points within the vocational building's bathroom area.

The system utilizes water flow sensors (FS300A G3/4) to accurately measure flow rate and water volume. Pulse data from the sensors are processed by the ESP32 microcontroller, serving as the central controller and data transmitter via Wi-Fi to the Blynk platform in real-time. The connection and disconnection of the water flow are controlled either manually or automatically using an 8-channel relay module connected to a solenoid valve. The system is efficiently designed by utilizing a direct power supply without a step-down converter, thereby reducing circuit complexity.

The results demonstrate that the system can present continuous water volume data with an average sensor reading accuracy above 96% and an error rate ranging from 1.00% to 4.00%. Managers can effectively manage Flow Rate (L/min) and Total Liters parameters while proactively detecting leakage anomalies through time-based dynamic line graphs (Live Charts) on the Blynk platform. Furthermore, the remote valve interruption feature via the application achieves an average response time of ±2 seconds to immediately stop wasted water flow, successfully supporting the earth-keeping movement through water conservation.

Keywords Internet Of Things, Sensor flow, ESP32, Relay 8-channel, Real Time.