ABSTRACT

Groundwater quality degradation in former rice field residential areas is often caused by high levels of total dissolved solids (TDS), turbidity (NTU), and other chemical parameters that exceed quality standards. This research aims to design and implement a multi-stage recirculating filtration system based on the Internet of Things (IoT) to improve water quality. The system consists of four filtration stages: a sediment filter, granular activated carbon, CTO activated carbon, and a ultraviolet (UV) lamp, which are all controlled by an Arduino Uno R4 WiFi. Water quality parameters measured include pH, TDS, and turbidity using calibrated sensors, while chlorine content is tested using the orthotolidine reagent method.

The recirculating filtration system automatically initiates filtration if the measured results do not meet the standards of pH 6.5–8.5, TDS < 1000 mg/L, and turbidity < 25 NTU. The measurement data is sent to the ThingSpeak platform for remote monitoring. Testing was conducted on ten water samples from various sources, with some samples requiring one to three filtration cycles depending on their initial condition.

The test results show that the system can reduce turbidity by 40–80%, lower TDS by 3–15% and maintain pH within the standard range. The IoT system has stable performance with an average latency of 1 second, a refresh rate of 16 seconds, low jitter (0–2 seconds), and 0% data loss. The implementation of this system is proven to be an effective, efficient, and reliable way to automatically improve water quality for continuous monitoring needs.

Keywords: *water filtration, Internet of Things, pH, TDS, turbidity*