

Innovative Approaches to Real-Time Water Quality Management: A Comprehensive Review [†]

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Abstract: Water quality plays a significant role in various sectors, including development, agriculture, manufacturing, and sustaining life on Earth. However, challenges such as limited resources, population growth, and pollution from various sources have caused a decline in water quality globally. New monitoring systems utilizing microcontrollers and basic sensors offer cost-effective, real-time, precise, and accurate data collection. This review article mainly focuses on the importance of water quality monitoring, challenges faced by drinking water facilities, and the role of IoT (Internet of Things) and RS (Remote Sensing) techniques in providing precise and accurate data collection and analysis. In water quality monitoring, special devices called sensors measure parameters like pH, turbidity, and temperature precisely and accurately. The utilization of paper-based sensor μ PADs and a specialized smartphone app, which enables on-the-spot testing by capturing color changes in the paper devices by submerging them into the water, is being researched. The review also signifies that the Neuro-Fuzzy Inference System and Artificial Intelligence-based Neural Networks are prominent models utilized for water quality assessment, particularly in surface water monitoring. Along with that, the integration of Graphical User Interface (GUI) for the real-time enhancement of water monitoring strategies has great scope.

Keywords: water quality; pollution; microcontrollers; IoT (Internet of Things); artificial intelligence; remote sensing; GUI (Graphical User Interface).

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Conflicts of Interest

The authors declare no conflict of interest.