AquaCare: A Real-Time Drinking Water Quality Monitoring System to Reduce Contamination Compared to Traditional Periodic Testing Methods

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Access to clean drinking water is essential for public health, yet traditional periodic testing delays contaminant detection, leading to increased health risks and higher remediation costs. AquaCare aims to bridge this gap by providing a real-time water quality monitoring system that ensures immediate detection and rapid intervention. AquaCare employs a Raspberry Pi 4 integrated with advanced sensors to continuously measure key water quality parameters such as pH, turbidity, conductivity, and total dissolved solids. Data are processed in real time and displayed via an intuitive web interface, while immediate alerts are sent through SMS, Telegram, and LED indicators. The system also utilizes predictive analytics and is housed in a weather-resistant, solar-powered enclosure to ensure scalability and reliability. Initial testing shows that AquaCare reliably detects even minor deviations in water quality and promptly alerts stakeholders, facilitating rapid responses to potential contamination events. The continuous monitoring confirms that the system maintains safe drinking water conditions across various environments. AquaCare offers a robust, cost-effective, and scalable solution that overcomes the limitations of traditional water testing methods by enhancing early contaminant detection, reducing waterborne disease risks, and lowering remediation costs. Its innovative approach has the potential to significantly improve water safety management for communities worldwide.

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