

Smart Water Quality Monitoring and Automation: LabVIEW-Driven Data Acquisition for Enhanced Water Resource Management

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The escalating concerns surrounding water scarcity, driven by population growth, pollution, and climate shifts, necessitate effective water quality monitoring, particularly for domestic use. We introduce a transformative solution through the integration of LabVIEW, IoT technology, and intelligent sensors, creating a comprehensive Smart Water Quality Monitoring and Automation system. LabVIEW, a dynamic software environment, streamlines sensor data acquisition, enabling real-time data collection, analysis, and presentation. Our solution addresses the limitations of traditional lab-based methods, which prove costly and lack real-time insights. The centre-piece of this system is an IoT-driven Smart Water Quality Monitoring System (IoT-WQMS), which strategically deploys intelligent sensors to assess water quality accuracy. These sensors, including water level, temperature, chemical, pH, dissolved oxygen, turbidity, and age/corrosion sensors, address critical aspects such as overuse (strategically placing sensors measuring depth at intervals), pollution and infrastructure health. A sensor-based unit is meticulously designed using cost-effective and readily available sensors, equipped with microsystems for data conditioning, analysis, and remote representation. We additionally employ machine learning to predict diverse water quality factors and issue alerts about water drinkability, leveraging contamination levels within the distribution pipeline. This integrated approach offers a robust solution for accurate water quality assessment and management. The integration of LabVIEW, IoT, and smart sensors heralds a paradigm shift in water resource management. This holistic solution, accessible through an intuitive online platform, delivers real-time insights to the public and stakeholders. By offering a dynamic window into water resource status, it empowers informed decisions and collaborative action for a sustainable future. This innovative approach is poised to revolutionize water quality assessment, monitoring, and conservation on a global scale.

Bibliography

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