Secure Cloud-based IoT Water Quality Gathering for Analysis and Visualization

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Water quality refers to measurable water characteristics, including chemical, biological, physical, and radiological characteristics usually relative to human needs. Dumping waste and untreated sewage are the reasons for water pollution and several diseases to the living hood. The quality of water can also have a significant impact on animals and plant ecosystems. Therefore, keeping track of water quality is a substantial national interest. Much research has been done for measuring water quality using sensors to prevent water pollution. In summary, those systems are built based on online and reagent-free water monitoring SCADA systems in wired networks. However, centralized servers, transmission protocols, and data access can present challenges and disadvantages for those systems. This paper proposes a secure Cloud-based IoT water quality gathering architecture for water quality analysis and visualization to address the limitations of the current systems. The proposed architecture will send, analyze and visualize water quality data in the Cloud by utilizing specialized sensors and IoT-based gateways to capture water measurements (Dioxygen concentration, and temperature, among others). Then, they communicate securely to the Cloud-based server through a high-speed wireless network. We evaluated the performance of the proposed framework on a process-oriented approach to success metrics for cyberinfrastructures. The experiments were conducted in a laboratory and focused on network security and resiliency, the IoT prototype performance in dropping real-time data transmission, and remote access. The results demonstrate higher data collection and transmission effectiveness with minimal data loss and low energy usage over time. The accompanying cloud-based platform provided the flexibility needed for water quality monitoring and laboratory studies.

Key Word:

Water quality, cloud environment, IoT, security, minimal data loss.