**Development of a low-cost ESP32-based real-time water monitoring system with hybrid power management and remote data accessibility.**

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**Abstract:**

Water pollution is a critical global issue that poses significant threats to aquatic ecosystems and human health. To address this issue, real-time monitoring of water quality is crucial to assess and manage the pollution levels effectively. To combat these challenges a standalone water monitoring system was developed using the ESP32 microcontroller, a low-cost, low-power system on a chip microcontroller with integrated Wi-Fi and dual-mode Bluetooth. The developed water monitoring system can monitor various water quality parameters, including total dissolved solids (TDS), turbidity, component area relative humidity, temperature, and pressure, in real-time. The system is equipped with a hybrid power management system that utilizes a solar panel during the day and a battery charged with solar power at night, ensuring the system's autonomy and prolonged operation. Furthermore, the system's real-time sensor data can be accessed remotely over the worldwide web using a graphic user interface-based interactive website. This real-time accessibility to the water quality data enables informed decision-making and effective management of water resources.