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Aquatherm: A Smart Shower Control System for Eco-Friendly and Efficient Water Heating

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Abstract

Standard water heaters typically consume an excessive amount of electricity, not to mention the water wastage, as many users tend to leave the shower running while waiting for it to heat up to the desired temperature. This is where we introduce Aquatherm; it provides a waterproof smart system that enhances your shower experience while keeping in mind sustainability, efficiency, and comfort. Aquatherm integrates IoT sensors, a NodeMCU microcontroller, and automated valves that help regulate water flow while providing real-time updates on temperature. Aquatherm employs an intelligent algorithm that learns the user's shower patterns to predict optimal heating hours and ensures no water wastage, as water is only used when needed. This minimizes overall electricity and cold-water loss during heating. With Aquatherm's modular design, it can be installed on both standard and solar heaters, ensuring cost-effectiveness and scalable solutions for residential, hospitality, and similar sectors. Calculations estimate an average potential savings of 25–30% in electricity and up to 70% in water usage. It is Saudi-made and exemplifies the intersection of innovation, smart home integration, and sustainability—representing the future of intelligent, eco-friendly showers.

Keywords
Smart shower system, IoT, water efficiency, energy conservation, sustainability