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Water Conservation in Ablution: An Evaluation of Mist Spray Devices and Their Financial Impact on Water Usage and Sustainability in Communal Facilities

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Abstract

This paper examines the efficacy of mist spray apparatuses in diminishing water consumption during the process of ablution, an activity that accounts for substantial water usage in religious sites and other communal facilities. The primary objective is to evaluate the potential of these mist spray devices for effective conservation of water in such settings. The methodology incorporates thermal camera image processing, paired with the use of mist spray devices, to monitor and quantify water usage during ablution at selected locations. The research design encompasses three (3) distinct objectives. In the empirical portion of the study, selected participants are mandated to perform ablution using both a conventional faucet and a faucet equipped with a mist spray device. Water consumption is measured for both methods. A comprehensive dataset is assembled, encompassing

both pre-and post-ablution thermal camera images, which serves as the basis for machine learning training and validation. Furthermore, each participant is interviewed to assess their comfort level while using the mist spray device. The findings of the study indicate that the utilisation of mist spray devices can considerably mitigate water consumption by an impressive margin of more than 97%, without compromising user comfort or the validity of the ablution, as verified through machine learning processed thermal images. The study observed a peak water conservation measurement of 56.6 ml, equivalent to 0.10 Mudd. The study's findings also validate previous research, affirming that conventional faucet water consumption during a typical ablution averages 5L per person. Theoretically, implementing the proposed solution in Sultan Haji Ahmad Shah Mosque could drastically reduce water consumption to roughly 23,000 litres per month. This could result in substantial cost savings of approximately RM1219 per month or RM14,628 per year. These significant findings have profound implications for water sustainability and conservation, particularly in regions with scarce water resources. © Authors, 2025.

Author keywords

Ablution; Machine Learning; Mist Spray; Water Consumption; Water Usage

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