Patent Search

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Abstract:

The present invention relates to an intelligent and eco-friendly smart dishwasher system designed to optimize dishwashing operations through artificial intelligence, sensc based automation, and Internet of Things (IoT) connectivity. Conventional dishwashers typically operate on fixed wash cycles with predefined water levels, temperature, ar duration, resulting in inefficient usage of water, energy, and detergent regardless of load size or degree of soiling. The proposed system overcomes these limitations by dynamically adapting washing parameters based on real-time sensing and intelligent decision-making. The smart dishwasher incorporates load sensors and dirt or turbidi sensors to determine the quantity of utensils and the level of contamination present within the washing chamber. Sensor data is processed by a microcontroller unit integ with AI-based control algorithms that intelligently regulate water intake, washing temperature, detergent dispensing, spray pressure, and cycle duration. This adaptive mec ensures optimal cleaning for heavily soiled dishes while conserving resources during light or partial loads. The system further includes IoT-enabled communication capabi allowing users to remotely monitor and control dishwasher operations through a mobile or web-based application. Features such as real-time status updates, operating m selection, energy consumption monitoring, and maintenance alerts enhance user convenience and operational transparency. An eco-mode is incorporated to further mini environmental impact by prioritizing energy-efficient and water-saving operation without compromising cleaning effectiveness. The proposed smart dishwasher system er operational efficiency, reduces resource consumption, and supports sustainable living practices. By integrating intelligent sensing, adaptive control, and smart connectivity invention provides an advanced solution suitable for modern smart homes and commercial kitchens, contributing to the advancement of sustainable household appliance technology.

Complete Specification

Description:Fig. 1 illustrates a comparative flow diagram between a conventional turbidity sensor–based dishwasher system and the proposed AI- and IoT-enabled smart turbidity sensor system.

In the conventional system, the dishwashing process begins with manual initiation, followed by filling of the wash tub with water. An infrared turbidity sensor measures t dirt content present in the wash water. Based on a predefined threshold, the system determines whether a high dirt level is detected. If high dirt is identified, the wash cy continues until the turbidity level decreases. Once the water is considered clean, the system automatically shifts to rinse and dry cycles. This approach relies on limited sensing and fixed decision logic, resulting in inefficient use of water and energy.

In contrast, the proposed smart system initiates operation through an intelligent start mechanism. The system performs simultaneous water intake and load verification AI-based multispectral sensing unit analyzes not only the dirt level but also the type and density of dirt present on the utensils. Based on this analysis, the system makes intelligent decisions regarding wash intensity. If a high dirt level is detected, wash parameters such as spray pressure, temperature, and cycle duration are dynamically adjusted. If the dirt level is low, the system optimizes the wash cycle by reducing water and energy usage while maintaining cleaning efficiency. The figure clearly demonstrates the evolution from rule-based control to adaptive, AI-driven optimization.

Fig. 2 illustrates a detailed structural and functional layout of the proposed smart dishwasher system, highlighting its internal components and their interconnections. Th figure shows the utensil loading chamber equipped with an optical sensor and a load cell, which together detect the number, placement, and weight of the utensils. This information is supplied to the control unit for intelligent decision-making.

The water intake system consists of a flow meter and a smart inlet valve that regulate and measure the water entering the dishwasher. A heating unit is provided to raise

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