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IOT Based Smart Dish Counting System

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ABSTRACT:

In large scale kitchen's, restaurant's and cafeteria's counting dishes manually can take a lot of time and may lead to mistakes. To solve this problem, we are developing a Smart Dish Counting System for catering services to efficiently track the number of dishes served. It utilizes Infrared (IR) sensors to detect and count dishes as they pass through a specific point. The collected data is then processed and transmitted via the Internet of Things (IoT) to a central system (mobile) for real-time monitoring. And a digital display shows the live count, helping catering staff manage inventory and reduce waste. This system enhances accuracy, minimizes manual errors, and improves service efficiency. It increases transparency between customers and owners.

INTRODUCTION:

In the food service industry, efficient inventory management and operational accuracy are essential for maintaining quality service and minimizing losses. Traditional dish counting methods, which rely on manual tracking, are often time-consuming and prone to human errors. To address these challenges, the Smart Dish Counting System is designed to automate dish counting, ensuring accurate and efficient monitoring of dish usage in restaurants, hotels, and cafeterias.

The system aims to provide accurate, real-time counting and tracking of dishes, utensils, and glasses, enabling commercial kitchens and restaurants to optimize their operations, and improve customer satisfaction.The Smart Dish Counting System can be implemented in various food service environments to improve workflow efficiency and ensure better management of kitchenware. This report explores the design, implementation, and benefits of the system in detail.

METHODOLOGY:

In the IOT based smart counting system IR sensor and NodeMCU (ESP8266) are used .

when the dishes passes through the IR sensor ,it interrupt the beam and sends the signal to the microcontroller of the NodeMCU.

It will increase the count of used dishes and process it and display on LCD display and on the mobile application.

The count is also sent to an IOT platform (like Blynk or ThingSpeak) using Wi-Fi for real-time monitoring.

Users can view the count on a mobile app or web dashboard from anywhere.

The system is power-efficient and suitable for use in restaurants ,mess .hotels and canteens.

FEATURES INCLUDED

1. Automatic Dish Detection

   Uses weight sensors, or computer vision to detect dishes without manual input.

2. Real-Time Counting

   Instantly updates the count as dishes are added or removed.

3. Type Identification

Recognizes different types of dishes (plates, bowls, trays, etc.) using image recognition or tagging.

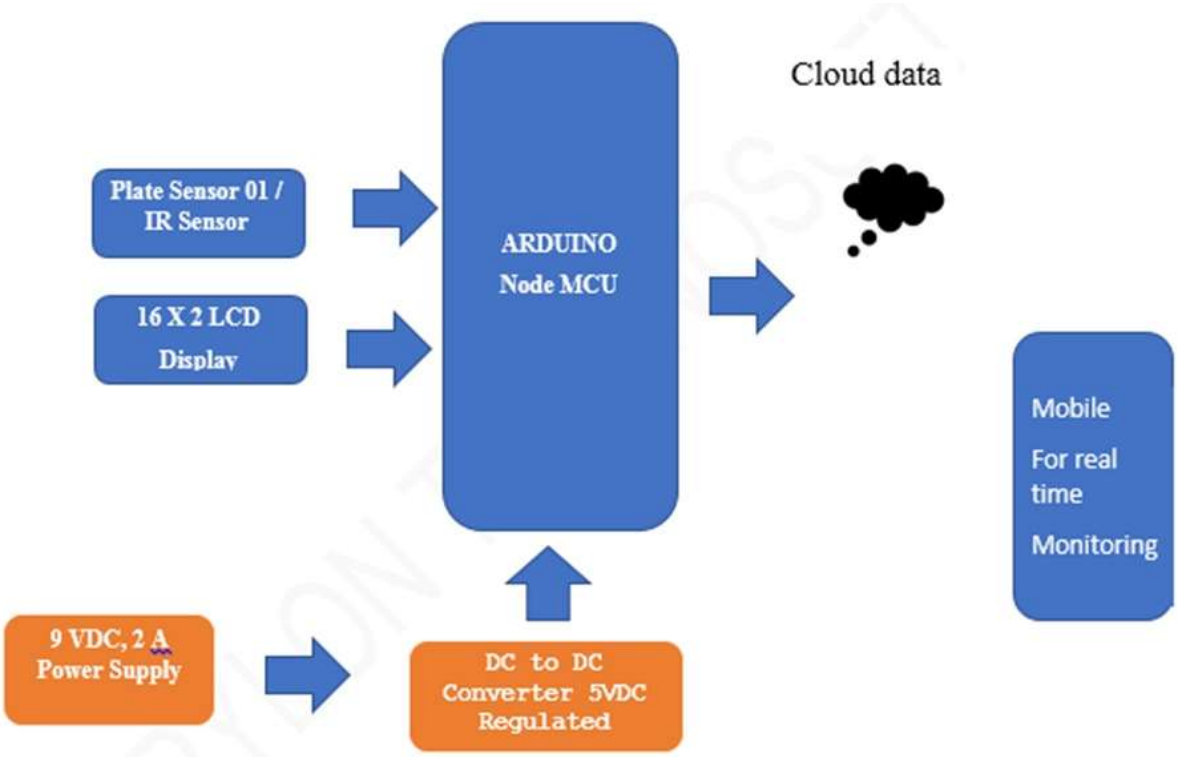
4. IoT Connectivity

Syncs with cloud platforms or apps for remote monitoring and alerts.

5. Mobile App Control

View data and get notifications on mobile devices.

BLOCK DIAGRAM



WORKING PRINCIPLE

The smart dish counting system functions through the integration of various electronic components that work together to detect and count dishes in real time, and communicate this data wirelessly. Below is a detailed explanation of how each component contributes to the working of the system.

The system requires a stable DC power supply to operate. A DC converter adapter is used to step down the higher voltage (e.g., 12V from an adapter or battery) to a lower voltage (e.g., 5V or 3.3V) suitable for the microcontroller and sensors.

The LM2596 buck converter is used for this purpose. It efficiently converts higher DC input to a desired lower DC output, ensuring stable operation of the circuit components

The ESP32 or NodeMCU (ESP8266) acts as the brain of the system .It receives input signals from the sensors (e.g., IR sensors), processes them, and performs operations like counting, storing, and transmitting data. It is IOT Circuit used to collect real time counting data on the mobile. It shows the output on mobile application, it don' t have any operating range we can see output anywhere It also controls the output to devices like LCD display and sends data to cloud servers via Wi-Fi.

IR sensors are placed at strategic points such as the entrance or exit of a dish .When a dish passes through the sensor's infrared beam, it interrupts the beam, which the microcontroller detects as a dish count event. Every interruption is counted, and the total dish count is incremented accordingly

The current dish count is shown on a 16x2 LCD display in real time. This display provides instant feedback to users, showing the number of dishes counted .

The system is connected to a cloud platform or custom server that stores dish count data.Users can access this data through a web dashboard or mobile application, enabling real-time monitoring, logging, and analysis This setup enables automation in monitoring dish usage.

Due to this system we can increase transparency with customer and it reduce food wastage , and it is ideal for smart kitchen or cafeteria applications.

RESULTS

The IOT -based Smart Dish Counting System was successfully developed and tested using an IR sensor and NodeMCU.

The system accurately counted used dishes at real time .

The dish count was displayed on the LCD screen and updated in real-time on the IoT platform (e.g., Blynk/ThingSpeak).

The data could be accessed remotely through a mobile app or web browser.

The system worked efficiently with minimal errors and responded quickly as dishes passed through the sensor area.

It proved to be useful for automating dish counting in restaurants ,mess ,hotels and canteens.

CONCLUSION

This paper introduced an IR sensor-based Smart Dish Counting System designed to provide a cost-effective and reliable solution for automating dish counting tasks in food service environments. By utilizing infrared beam interruption techniques, the system effectively detects and counts individual dishes as they pass through the sensing zone. The implementation demonstrated high accuracy in controlled settings, with minimum latency and low power consumption, making it suitable for real-time applications such as billing automation and inventory monitoring.

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