SMART FRIDGE SHELF REMINDER USING IoT

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ABSTRACT: ***Food wastage due to expired and forgotten items is a common problem in many households and commercial environments. People often forget about food items stored inside refrigerators, leading to spoilage and unnecessary waste. To address this issue, this paper presents a Smart Fridge Shelf Reminder System using Internet of Things (IoT). The proposed system continuously monitors food items placed on refrigerator shelves using sensors and IoT-enabled components. It tracks parameters such as item presence, quantity, and expiry duration. When a food item is about to expire or when the quantity reduces below a predefined level, the system sends timely alerts to the user through a mobile application or notification service. The system uses a microcontroller, sensors, and wireless communication to ensure real-time monitoring and notification. By providing timely reminders, the smart fridge shelf system helps users manage food efficiently, reduce wastage, and promote smart living through automation.***

KEYWORDS: Internet of Things (IoT), Smart Refrigerator, Food Expiry Monitoring, Shelf Reminder System, Sensors, Automation

1. INTRODUCTION

With the rapid advancement of technology, smart home solutions have gained significant attention in recent years. The Internet of Things (IoT) plays a crucial role in connecting everyday objects to the internet, enabling automation and intelligent decision-making. One of the major problems faced in households today is food wastage caused by improper storage management and lack of awareness about food expiry dates. Refrigerators are commonly used to store food items, but users often forget the items kept inside, leading to spoilage and wastage.

To overcome this issue, a Smart Fridge Shelf Reminder using IoT is proposed. The system aims to monitor food items stored on refrigerator shelves and provide reminders to users regarding expiry dates and low stock levels. Sensors are used to detect the presence and quantity of food items, while IoT technology enables real-time data transmission to a mobile or web-based application. This system helps users keep track of stored items, consume food on time, and reduce unnecessary wastage. The proposed solution is cost-effective, easy to use, and suitable for both domestic and commercial environments.

2. FIRST-ORDER HEADING

System Architecture Overview :-

The Smart Fridge Shelf Reminder system consists of four major modules: sensor module, processing module, communication module, and notification module. These modules work together to monitor food items and provide timely alerts to the user. The system collects data from sensors installed on refrigerator shelves and processes the information using a microcontroller. Based on predefined conditions such as expiry time or quantity threshold, alerts are generated and sent to the user.

2.1 SECOND-ORDER HEADING

Sensor Module

The sensor module is responsible for detecting the presence and quantity of food items placed on refrigerator shelves. Weight sensors or load cells are commonly used to measure the weight of items on each shelf. This information helps determine whether an item is present and whether its quantity has reduced below a certain limit.

2.2.1. THIRD-ORDER HEADING

Microcontroller and Data Processing

The microcontroller acts as the central processing unit of the system. It collects sensor data and processes it according to programmed logic. The controller compares real-time values with predefined thresholds such as expiry date or minimum quantity. If any condition is violated, the controller triggers the notification system.

FOURTH-ORDER HEADING

IoT Communication and Notification System

The IoT communication module enables wireless data transfer between the fridge system and the user interface. Technologies such as Wi-Fi or Bluetooth are used for communication. The notification system sends alerts to users through a mobile application. These alerts inform users about expiring food items or low stock levels, allowing timely action.

3.METHODOLOGY

The development of the Smart Fridge Shelf Reminder system follows a structured methodology. Initially, sensors are installed on refrigerator shelves to monitor food items. These sensors continuously collect data related to item presence and quantity. The collected data is transmitted to the microcontroller, which processes it in real time.

Expiry information for food items is either manually entered by the user through a mobile application or predefined in the system database. The microcontroller compares sensor data and expiry details to determine the status of each food item. When an item approaches its expiry date or falls below a minimum quantity level, the system sends a notification to the user using IoT communication technology. The entire system operates automatically, ensuring efficient food management and reduced wastage.

4.MATERIALS AND METHODS

Materials

- **Microcontroller (Arduino / NodeMCU / ESP8266)**
- **Weight sensors / Load cells**
- **Wi-Fi module**
- **Power supply**
- **Refrigerator shelves (prototype setup)**
- **Mobile device for notifications**

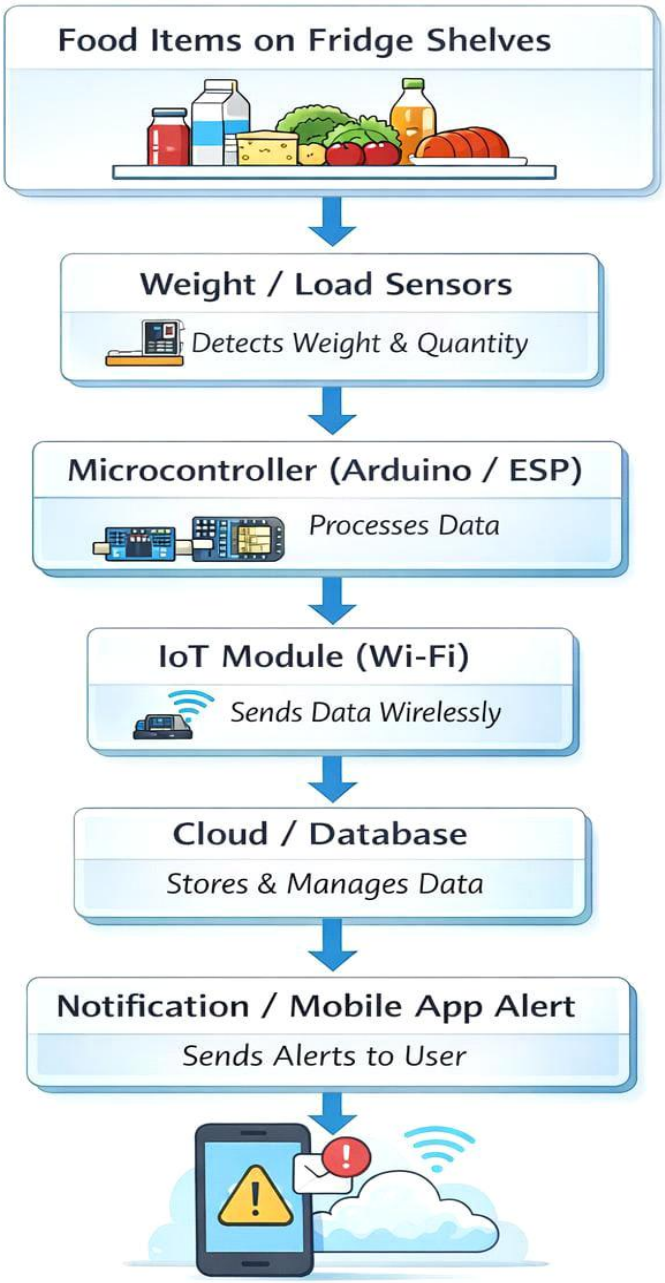
Methods

1. **The working of the system includes the following steps:**
2. **Sensors detect the presence and quantity of food items on shelves.**
3. **Sensor data is sent to the microcontroller.**
4. **The microcontroller processes the data and checks expiry and quantity conditions.**
5. **IoT module transmits information to the cloud or mobile application.**
6. **Notifications are sent to the user when required.**

Module Name	Input	Output	Processing Method &Technology Used	Real-Time Support
Sensor Module	Food item weight	Quantity data	Load cell sensing	Yes
Processing Module	Sensor data	Decision output	Microcontroller logic	Yes
Communication Module	Processed data	Cloud / Mobile data	Wi - Fi (IoT)	Yes
Notification Module	Alert trigger	User notification	Mobile app / SMS	Yes

Material Type	Tools / Components	Purpose
Hardware	Arduino / NodeMCU / ESP8266	Main controller to process sensor data
Sensors	Load cell / Weight Sensor	Detects presence and quantity of food items
Communication module	Wi - Fi Module	Enables IoT-based data transmission
Power supply	Adapter / Battery	Supplies power to the system

How the system works



5.RESULT AND DISCUSSION

The Smart Fridge Shelf Reminder system was successfully tested under various conditions. The system accurately detected the presence and quantity of food items on shelves. Notifications were generated in real time when food items approached their expiry date or when stock levels dropped below the set threshold. The results show that the system effectively reduces food wastage by providing timely alerts to users. Compared to traditional refrigerators, this smart system offers better food management and improved user awareness. The system is reliable, easy to use, and scalable for future enhancements.

6.CONCLUSION

The Smart Fridge Shelf Reminder using IoT provides an efficient solution to reduce food wastage and improve food management. By integrating sensors, microcontrollers, and IoT technology, the system offers

real-time monitoring and timely notifications. This smart solution promotes automation, convenience, and sustainable living. The system can be further enhanced by integrating mobile applications, voice assistants, and advanced analytics to make it more user-friendly and intelligent.

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