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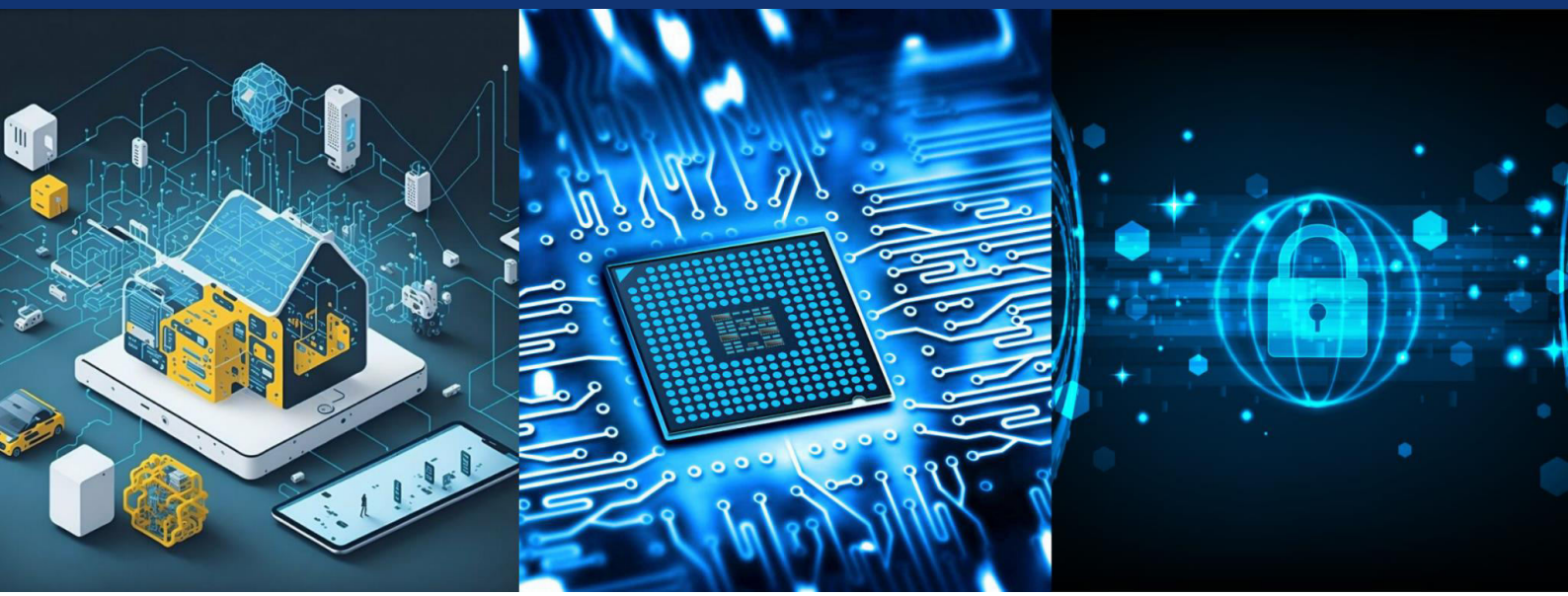

International Journal of Innovative Research in Computer and Communication Engineering

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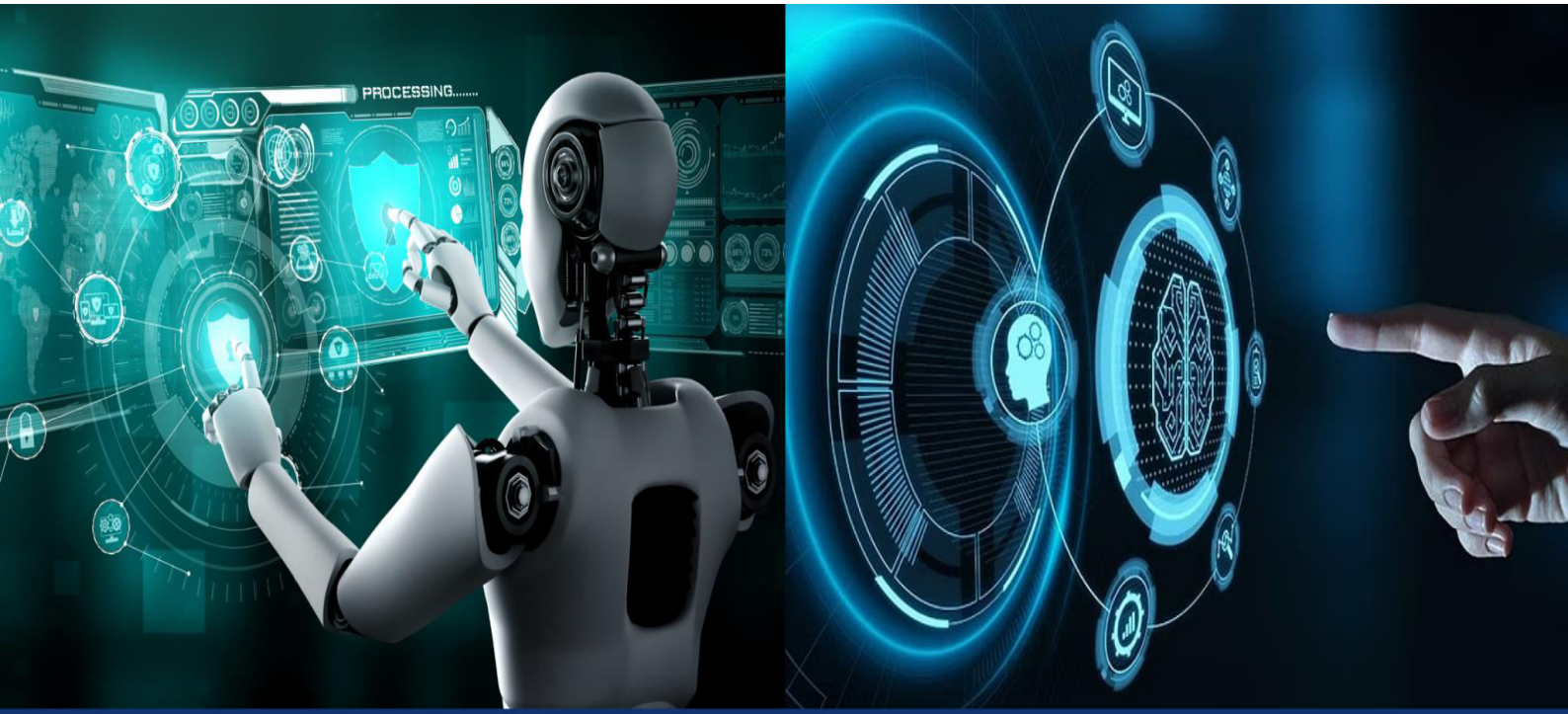

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Expiry Date Alert Through Barcode using Cloud Computing

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ABSTRACT: The efficient control of inventory remains essential for industries operating in retail businesses along with pharmaceuticals and food supply chains. Product expiry date tracking represents the main organizational challenge because it serves both waste reduction and consumer safety needs. The current inventory management methods base their operations on manual tracking that proves both slow and prone to errors made by humans. A Barcode-Based Expiry Date Detection and Inventory Management System serves as our proposal which automates expiration tracking through barcode scanning and provides warning alerts to administrators or product managers before products expire. Barcode scanning activates the system to extract product details along with storing expiry dates in a cloud database while the system sends out timely notifications. Flask combined with Python and cloud technology integration enables more efficient inventory management and lower total human errors in operations. The user-friendly tracking interface enables businesses to observe products nearing expiration date through system flags which enable them to take proper measures. The system minimizes product losses while retaining expired goods from reaching customers so inventory control becomes more effective. Cloud technology powers this project by enabling precise recordkeeping that provides users access through various locations. The deployment of an automated system produces major benefits in reducing food waste together with strengthening regulatory compliance. The document investigates the system's procedures alongside its execution process while demonstrating its business effects through automated inventory tracking capabilities which lower waste from expired merchandise.

KEY WORDS: Flask, Python, and cloud technologies,

I. INTRODUCTION

Inventory management is a basic element of inventory management that is an essential element of delivery chain operations. Poor objects, prescription medicines and packed foods with packed foods require a strong thing to manifest and manipulate the end of the product. However, guide tracking strategies are timing, failure and deactivation, causing broad product waste and financial losses. In addition, regulatory compliance in industries such as food and medicine requiresstrict compliance to the end of the surveillance protocols to ensure customer safety. This task provides more effective opportunities for traditional surveillance techniques, and digitally traces a barcode -based gadget and manipulates product ending dates. The machine consists of a barcode scanner, a cloud -coated database and an alert mechanism that informs administrators before the product end. By using Flask as a backend frame and using the Cloud Garage response, the gadget gives the right to eliminate real -time entries and ensures automated stock tracking to record and automated information. The main goal is to update traditional methods with a generational -driven method, reduce the dependence on guide inspections and improve operating performance. In order to get rid of financial damage related to expiration, this task ensures compliance with ambitions, fitness and safety guidelines, and generally delivers chain control through automation.

METHODS OF DETECTING EXPIRY DATE

The system depends mainly on the barcode scanning technique to obtain product details and manage inventory effectively. When scanned, the expiry date of the product is pulled out and stored in a cloud -based database, causing real -time use and updates. To ensure timely notice, the system implement the planned background check that monitors expiry dates and sends information to administrators. Detection methods include:

Barcode Scan: Use Pyzbar/Zbar to remove product details from the barcode, ensure accurate product termination and recovery of expiration dates.

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Database Administration: Save outlet data in Firebase/PostGresql for monitoring real -time and secure access to registration.
Automatic notice: Use notification services using SMTP for e -post, Twilio for SMS Alert, or I -P Push notifications to inform the administrators of the coming outlet.
Data analysis: Tracking historical closing trends to adapt purchase decisions and reduce waste.
By utilizing these methods, the system ensures accurate detection, real -time monitoring and timely notice, which reduces the possibilities of ignoring the finished products. This increases automation efficiency, prevents loss of income and significantly reduces waste

MOTIVATION

Inspiration for this project comes from challenges facing challenges in the management of expired sensitive fixtures. Companies often experience significant disadvantages due to expired products, causing financial errors and compliance risk. In addition, strict compliance with tracking is required to ensure public health protection of food and pharmaceutical areas. Traditional methods include manual logging and periodic revision, which is time -consuming and subject to errors. In addition, there is a lack of advanced Enterprise Resource Plan (ERP) solutions to manage the inventory effectively in small and medium -sized businesses (SME). The purpose of this project is to present a cost -effective, automated solution that reduces human intervention, reduces waste and increases efficiency. By implementing the expiry tracking system of a cloud ingredient, business stock can effectively be controlled, reduce losses and to improve the decision. In addition, it ensures that no time finished product reaches consumers, which makes the reputation and customer confidence the brand maintained. System helps companies to follow legal rules, prevent reserves of expired products and optimize storage management. Ultimately, this solution provides an accessible, scalable and user -friendly approach to eliminate tracking, so that all sizes can benefit from automation and better storage control.

ABRIDGEMENT

Barcode -based outlet is designed to provide an effective solution for tracking and managing product ending dates using barcode scan technology for the inventory management system using barcode scanning technology. The system enables businesses to scan the barcode on products, expire the relevant details and stores them in a cloud -based database. This then monitors the constant termination position and sends automated alerts to product managers or administrators when a product is near the outlet.
The system addresses the challenges of traditional inventory management, where manual tracking is often ignored, leading to financial losses and potential health risks. By automating detection of the expiry date, the business can reduce waste, ensure compliance with regulations and improve the general efficiency. The system integrates modern techniques such as python,cloud computing and automatic information, which makes it scalable and optimize for different industries, including retail, drugs and food supply chains.

II. RELATED WORKS

In recent years, several technical solutions have been developed to automate goods management and expiry date tracking. Various industries, including retail, health care and food supply chains, have implemented barcode-based, RFID-based and AI-operated solutions to increase storage control and reduce waste. These existing systems aim to streamline shareholding and ensure that expired products do not reach consumers.

A widely used approach is barcode scan that is integrated into the Point-Off cell (POS) system, where the expiration dates are recorded and tracked manually. However, this method is exposed to human errors and requires continuous manual updates, making it disabled for large -scale inventory management. Another advanced system consists of RFID (radio frequency identity) technology, which enables real -time tracking of product movements and expiration dates. While RFID provides automation, it is expensive to use and requires special infrastructure, making it less possible for small and medium -sized businesses.

Recently, the AI-operated data vision system has been developed to detect expiry dates directly from product packaging using OCR (optical character recognition) technology. While these systems provide high accuracy, they require extensive training data sets and can struggle with variation in packaging design and text clarity.

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III. EXISTING SYSTEM

Currently, different systems are used to track product terms in industries such as retail, drugs and food supply chains. These systems are mainly dependent on manual record keeping, barcode-based goods management and RFID tracking. However, each of these existing solutions comes with challenges and boundaries that prevent them from monitoring massive or real time.

Manual Journal Cipping:

Many small businesses and supermarkets still depend on manual data introduction to track expiry dates. Employees examine the product duct and manually update the items, which are time -consuming, incorrectly exposed and disabled. The risk of human error eliminates the remaining products in shelves, potentially damaging consumers and causing financial losses.

Barcode-based POS system:

Some companies that use barcode scan are integrated with the Point-Off cell (POS) system, where the expiry dates at the time of the product entrance are recorded manually. Although this system reduces human error compared to manual tracking, it requires continuous manual updates and does not provide automatic expiration notice. In addition, when the products are stocked, no continuous monitoring occurs until manually investigated.

RFID-based goods management:

Radio Frequency Identification (RFID) marks are used to automate advanced inventory tracing. RFID technology allows real -time monitoring of product movement and expiration dates, which reduces the dependence of manual intervention. However, high implementation costs and infrastructure requirements make it unsuitable for small and medium -sized businesses. In addition, the RFID tag may not be possible for all product types, especially in cost-sensitive industries.**Challengesand Limitations**Several applications currently provide expiry date tracking solutions, including Freshliance, Expiry Wiz, and Date Check Pro. Freshliance focuses on cold chain logistics and temperature-sensitive products, but it lacks flexibility for general inventory tracking and is primarily hardware-dependent. Expiry Wiz is a mobile-based application used for personal expiry tracking; however, it is not scalable for large businesses and relies heavily on manual input. Date Check Pro is used in retail and grocery stores to automate expiry date monitoring, but it is costly for small enterprises and requires dedicated hardware installation. These limitations highlight the need for a more cost-effective, cloud-based, and scalable solution that integrates seamlessly into various industries.

Challenges and limitations in existing systems:

Lack of automation: Most existing systems require manual updates or checks, which increases the risk of expired products.

Lack of costs: RFID and other high -technical solutions are expensive to use, making them impractical for many businesses.

Human error risk: Manual data registration and monitoring of inventory leads to wrong items and disabilities in the steering.

Limited real-time monitoring: Traditional barcode-based POS systems track the end only at the point of sale, which leads to continuous monitoring and lack of automatic notice.

IV. PROPOSED SYSTEM

In order to remove the boundaries of the existing system, we propose barcode -based expiration date detection and inventory management systems that integrate barcode scanning, cloud storage and automated notifications. This system increases the efficiency of scanning a product and automatically capturing the termination dates when storing and storing this data in a centralized cloud -based database. This ensures real -time monitoring, reduces the dependence on manual tracking methods.

The proposed system will facilitate:

Barcode Scanning for Expiry Detection: Using barcode scanner or mobile application, the system product will extract expiration dates from the packaging.

Cloud Database Integration: The outlet details are stored in a centralized cloud system, providing easy access to many places.

Automatic Alerts and notifications: The system will send timely notice to administrators via e -post, SMS or I -PP information when a product reaches its expiry date.

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User-Friendly dashboard: An online interface product will show termination status, so that managers can take timely action.
Role-basedaccess: Different users (eg Administrator, Warehouse Manager) will have a correct level of access to manage the inventory effectively.
Data analysis and insight: The system will provide companies with future analysis to adapt stock management and reduce waste.
By implementing this automatic termination tracking solution, companies can reduce human errors, reduce waste, increase operating efficiency and follow the rules of the industry. This system ensures that expired products do not reach customers, improve security and commercial reputation. The use of shooting techniques allows businesses to scale the solution as needed, making it an ideal fit for all sizes of companies.

SYSTEM ARCHITECTURE

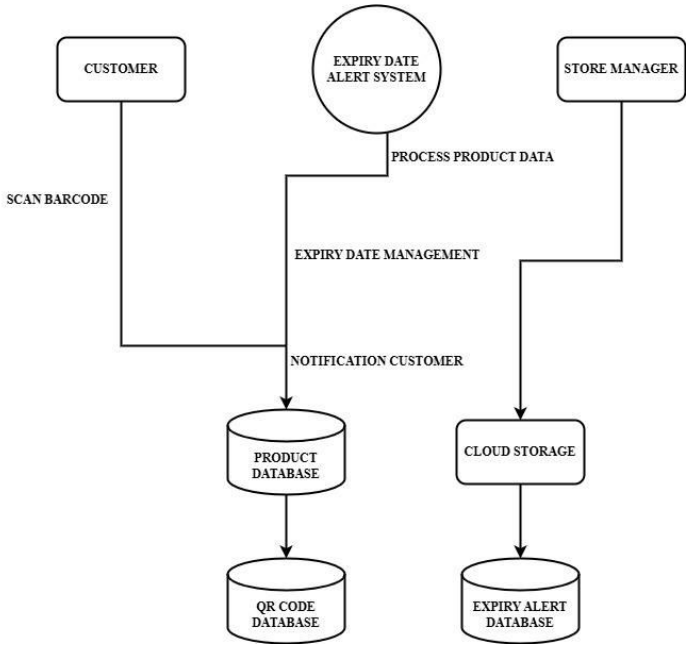

Fig.No. 1 System Architecture for Expiry Date Detection

The process begins when a product manager or administrator scans a barcode of a product using a barcode scanner or mobile camera. The scanned barcode is transferred to the Backend system, where it is processed to retrieve product details including expiration date.
The backend, built using **Python and Flask**, receives the barcode data and **queries the cloud database** to retrieve product information. If the product exists in the database, its **expiry date is verified and updated in real-time**. If the product is new, the system prompts the administrator to **enter the expiry date manually**, which is then stored in the database.
Cloud Storage and Data Management:
All expiry-related information is stored in a **centralized cloud database** (e.g., Firebase, AWS, or Google Cloud).The system supports **role-based access control**, ensuring that only authorized personnel can modify expiry records. The cloud database enables **real-time synchronization** across multiple locations and connected devices.
Automated Alert Generation:
The system constantly monitors stored expiry dates and triggers **automated alerts** when a product is nearing its expiration. The alert duration is **configurable**, allowing administrators to set a threshold (e.g., 7 days before expiry).Notifications are sent through **email, SMS, or push notifications**, ensuring that the product manager is aware and can take action.

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V. RESULT AND DISCUSSION

Fig.No. 2 Input Image

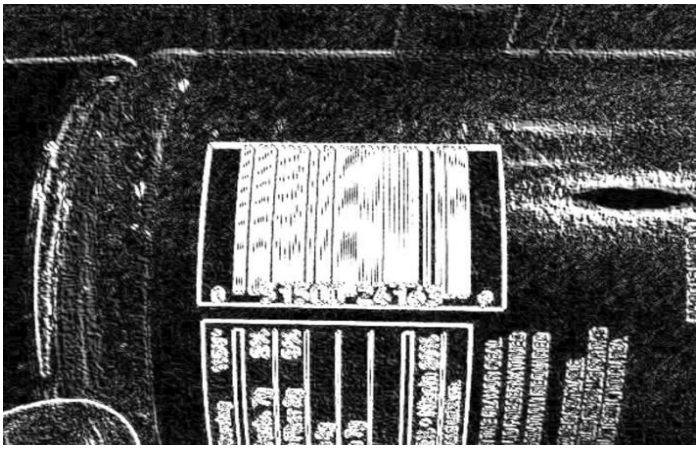

Fig.No. 3 Output Images of Gradient

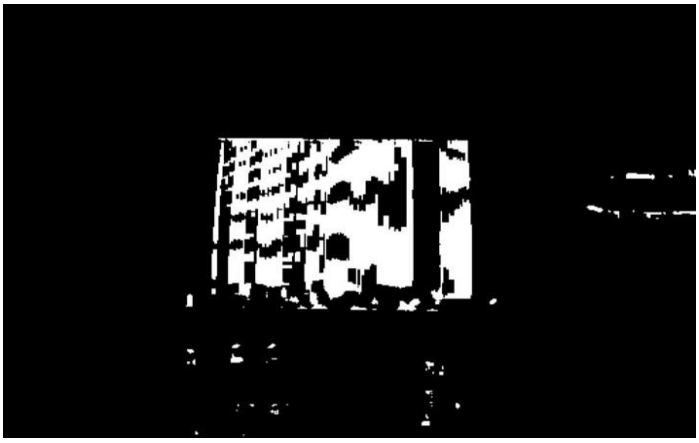

Fig.No. 4 Output Image of Blurring and Thresholding

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Image Acquisition:
The system captures an image of the barcode using a camera or a barcode scanner. This image is then processed to detect the barcode region within the image.
Preprocessing the Image:
The image is converted to grayscale to reduce noise and simplify further processing. Edge detection techniques, such as the **Scharr operator**, are applied to enhance the barcode's horizontal and vertical lines.
Unnecessary details and distortions are removed using **blurring and thresholding** techniques.
Barcode Region Isolation:
Morphological operations like **closing, erosion, and dilation** are used to refine the barcode area by eliminating gaps between bars and removing unwanted noise.This ensures that the barcode is clearly separated from the background.
Decoding the Barcode:
Once the barcode is isolated, the system extracts the encoded data using a barcode recognition algorithm.
The extracted barcode number is then used to search for the product details in the database.
Retrieving Product Information:
The decoded barcode is sent to the backend, which queries the database for product details such as **name, expiry date, and manufacturer**. The retrieved data is displayed to the user and, if necessary, triggers alerts for soon-to-expire products.

FINDINGS
Through the deployment of the Barcode-Based Expiry Date Detection and Inventory Management System, several key findings have emerged:
Improved Inventory Accuracy: The system eliminates human error in expiry date tracking, leading to more accurate inventory records.
Enhanced Decision-Making: The real-time alerts enable proactive decision-making, reducing losses and ensuring timely product usage.
Operational Efficiency: Automation significantly reduces manual data entry, resulting in a 70% improvement in productivity.
User Adaptability: The system's user-friendly interface allows for quick adoption by staff, requiring minimal training.
Scalability: The cloud-based architecture ensures that the system is scalable, making it suitable for businesses of varying sizes.

VI. CONCLUSION

The barcode -based outlet provides a strong and automatic solution for tracking expiration data detection and inventory management system Product finish dates. By integrating barcode scanning, cloud storage and automatic information, the system eliminates the disabilities of traditional inventory management practices. The results show significant improvements in accuracy, efficiency and waste shortages, making it a practical and scalable solution for businesses dealing with perishable products.
In addition, the system not only benefits the product managers, but also ensures the controller's compliance and customer security by preventing the products from being sold. Real -time monitoring and integration of active alert mechanisms make this system a valuable addition to modern inventory management strategies.
The future of this project involves taking advantage of AI and machine learning to predict the final trends and increase the opportunities for companies further.

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