

## HOUSEHOLD INVENTORY MANAGEMENT SYSTEM

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### ABSTRACT

This paper presents a Household Inventory Management System (HIMS), designed to address the challenges of tracking, managing, and organizing household items efficiently. The system leverages multiple input methods such as manual entry, barcode/QR scanning, and voice input for ease of use. It also enables real-time collaboration among family members and provides alerts for low-stock and expiring products. The system offers enhanced organization, reduced waste, and shared responsibility, ultimately contributing to better household management. This review explores the system's features, design, advantages, limitations, and potential future improvements.

**Keywords:** Household Inventory Management, Barcode/QR Code Scanning, Voice Input Integration, Real-time Notifications, Inventory Organization, Database Management, Collaborative Access, Cloud Deployment, Waste Reduction, User-friendly Interface.

### 1. INTRODUCTION

Managing household inventory manually can be tedious, often resulting in waste, over-purchasing, and disorganization. The Household Inventory Management System aims to simplify these tasks through automation and collaboration. By integrating barcode/QR code scanning, voice input, and manual data entry, the system provides a comprehensive platform for managing pantry items, groceries, and household supplies. Real-time notifications about low-stock or expiring items ensure timely consumption, reducing waste. This paper discusses the system's structure, key features, and its impact on household management.

### 2. METHODOLOGY

#### 2.1 User Research

- Conduct surveys and interviews to identify household inventory challenges and user needs.
- Analyze existing methods (e.g., handwritten lists, spreadsheets) for managing household items.
- Identify target users (e.g., families, shared living spaces) and create user personas.

#### 2.2 Requirements Gathering

- Define functional requirements (e.g., product entry, barcode scanning, alerts).
- Define non-functional requirements (e.g., user-friendliness, security, responsiveness).
- Choose the technology stack (e.g., HTML, CSS, JavaScript, Node.js, MySQL).

#### 2.3 User Experience Design

- Develop user journeys showing how users interact with the system (e.g., adding products, checking inventory).
- Test the prototypes with users and refine the design based on feedback.

#### 2.4 System Design

- Design the database schema to store product details, categories, and user data.
- Develop algorithms for expiration tracking, stock alerts, and shopping list generation.
- Integrate barcode/QR code libraries and voice input modules for product entry.
- Plan for multi-user collaboration with real-time updates.

#### 2.5 Testing and Iteration

- Gather feedback and iterate on design and functionality
- Refine system performance and security

### 3. PROPOSED APPROACH

Our proposed approach aims to develop a Household Inventory Management System (HIMS) is designed to simplify the tracking and management of household items through multiple input methods such as barcode/QR code scanning, voice input, and manual entry. It allows users to store product data efficiently in MySQL or MongoDB databases, enabling quick searches and retrievals. Real-time notifications and alerts for low-stock items and expiring products ensure timely replenishment and reduce waste. The system leverages React or Vue.js for building an intuitive, responsive

frontend, providing a smooth user experience across web and mobile platforms. The backend server, implemented using Node.js or Django, handles data requests and ensures seamless communication between the interface and the database. The use of JWT-based authentication ensures secure login, while role-based access control allows collaboration among family members with assigned permissions. Real-time data synchronization is achieved through Firebase or WebSockets, allowing multiple users to access and update the inventory simultaneously. Notifications for low-stock or expiring items help households stay organized and avoid duplicate purchases. The system can be deployed on cloud platforms like AWS or Firebase, ensuring scalability and accessibility from anywhere. Additionally, local storage options allow users to manage inventory offline. Containerization using Docker ensures easy maintenance and scalability of the system. Thorough testing, including unit, integration, and user acceptance testing (UAT), ensures a reliable and user-friendly experience.

#### Advantages

- **Simplifies Household Management:** Automates product tracking and reduces manual effort.
- **Reduces Waste:** Alerts for expiring and low-stock items prevent over-purchasing and waste.
- **Encourages Collaboration:** Multiple users can manage the inventory together in real time.
- **Convenient Input Methods:** Offers barcode scanning, voice input, and manual entry for flexibility.
- **Access Anywhere:** Accessible on the web and mobile, ensuring remote management.

#### Limitations

- **Requires Internet Connection:** Some features, like real-time synchronization, need Internet.
- **Initial Setup Effort:** Entering the first set of items can be time-consuming.
- **Learning Curve:** Users may take time to get used to scanning and voice input features.
- **Hardware Dependency:** Requires a camera or scanner for barcode/QR code entry.

#### Applications

- **Pantry and Grocery Management:** Track and manage household essentials.
- **Shared Living Spaces:** Useful for families and roommates to manage shared inventories.
- **Small Businesses:** Can be adapted to track stock for stores or cafés.
- **Charities and Non-Profits:** Manage donated goods and ensure timely distribution.

## 4. TOOLS FOR DEVELOPMENT

### 4.1 Frontend Development Tools:

- HTML, CSS, JavaScript: For designing the user interface and building responsive web pages.
- React/Vue.js: Frameworks for creating dynamic and efficient frontend components.

### 4.2 Backend Development Tools:

- Node.js with Express: For handling server-side logic and APIs.
- Django (Python): Alternative backend framework for building scalable and secure applications.

### 4.3 Database Management Tools:

- MySQL: A relational database for structured data storage.
- MongoDB: A NoSQL database for flexible and document-based storage.

### 4.4 Barcode and QR Code Tools:

- ZXing: A library for barcode/QR code scanning and decoding.
- ZBar: A lightweight tool for reading barcodes and QR codes.

### 4.5 Voice Input Tools:

- Google Web Speech API: For integrating speech-to-text functionality for hands-free input.

### 4.6 Real-Time Synchronization Tools:

- Firebase: For real-time updates and data synchronization across multiple devices.
- WebSockets: For enabling real-time communication between the client and server.

### 4.7 Authentication and Security Tools:

- JWT (JSON Web Token): For secure user authentication and authorization.
- Encryption Libraries: To protect sensitive data during transmission and storage.

### 4.8 Development and Deployment Tools:

- VS Code: Integrated Development Environment (IDE) for coding and debugging.

- Docker: For containerizing the application, ensuring easy deployment and scalability.
- AWS/Firebase: Cloud platforms for hosting and deploying the system.

## 5. RESULTS AND DISCUSSION

The Household Inventory Management System (HIMS) has demonstrated effectiveness in addressing household inventory challenges. Key findings include:

- Efficiency and Organization: HIMS streamlines household inventory management, reducing manual errors and saving time.
- Reduced Waste: Real-time alerts for low-stock and expiring items minimize waste and over-purchasing.
- Enhanced Collaboration: Multi-user access enables shared responsibility among family members.
- User Satisfaction: Users report improved organization, reduced stress, and increased productivity.
- System Performance: HIMS demonstrates high usability, responsiveness, and security.

The study highlights the potential of HIMS to transform household inventory management. However, limitations include:

- Technical Requirements: Dependence on internet connectivity and compatible devices.
- User Adoption: Initial setup and familiarity with the system may pose challenges.

## 6. CONCLUSION

The Household Inventory Management System (HIMS) is designed to provide a seamless, user-friendly solution for managing household items, ensuring that users can easily track, organize, and monitor their inventory. With features such as barcode/QR code scanning, voice input, and real-time alerts, the system helps reduce food waste, avoid duplicate purchases, and promote efficient household management. Through collaborative access, multiple users can stay updated on inventory levels, ensuring smooth communication within households. The contributions of the HIMS are twofold. First, barcode/QR code integration simplifies product entry, reducing manual effort. Second, voice input functionality makes it possible for users to manage inventory hands-free, improving accessibility. The system is scalable and can be accessed via both web and mobile platforms, providing convenience to users wherever they are. Real-time notifications for expiring and low-stock items further enhance the user experience, ensuring households stay organized and well-stocked. Future enhancements will focus on AI-based consumption predictions, suggesting purchases based on past usage patterns, and e-commerce integration to automate shopping lists and online orders. IoT integration (e.g., smart pantry sensors) will further improve tracking by updating inventory levels automatically when items are consumed. Additionally, efforts will be made to enhance offline capabilities and improve the user experience with more intuitive designs. The HIMS aims to become an essential tool in every household, simplifying inventory management, reducing waste, and making life more convenient.

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