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Inventory And Warranty Management System

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Abstract

Traditional inventory and warranty tracking methods rely heavily on manual documentation, which often results in misplaced bills, missed warranty periods, inaccurate stock updates, and inefficient business operations. This project presents a cloud-integrated Inventory & Warranty Management System that automates stock management, warranty tracking, and expense calculation using OCR-based bill scanning. The system is developed using HTML, CSS, JavaScript, integrated with Firebase Authentication, Firestore Database, and Cloud Storage, and incorporates Tesseract.js OCR for automatic data extraction. The platform provides role-based dashboards for customers and salespersons, supports real-time stock updates, smart notifications for warranty expiries and low-stock alerts, and enables paperless recordkeeping. Experimental evaluation demonstrates improved accuracy, reduced human error, and enhanced operational efficiency.

Keywords

Inventory Management, OCR, Warranty Tracking, Firebase, Web Application, Real-Time Systems, Cloud Synchronization

I. INTRODUCTION

Inventory and warranty management play a critical role in consumer goods, retail, and service sectors. However, most existing systems still depend on manual entries, paper bills, and disconnected tools, resulting in frequent data loss, missed warranty claims, inaccurate stock counts, and inefficient customer service. The Inventory & Warranty Management System was developed to eliminate these drawbacks by combining cloud-based data synchronization, OCR-driven document extraction, and role-specific dashboards for both customers and sales personnel.

The system allows customers to upload receipts, extract product and warranty information automatically, and receive expiry alerts. For salespersons, the platform offers stock updates, product expiry tracking, and real-time monitoring of inventory levels. Firebase provides secure authentication and ensures consistent data availability across devices. This paper explains the system architecture, modules, implementation, experimental results, and future scalability.

II. SYSTEM OVERVIEW

The Inventory and Warranty Management System is a web-based application designed to simplify and automate the management of product inventories, warranty details, and digital bill records for both customers and salespersons. The system provides secure user authentication through Firebase, offering role-based dashboards that display relevant features depending on whether the user is a customer or a salesman. Customers can add and track warranty details manually or by scanning receipts using OCR technology, which intelligently extracts product name, purchase date, expiry date, and total amount from uploaded bills. The system also offers automated alerts for warranty expiry and maintains a digital expense tracker. The salesman interface supports stock monitoring, product addition, quantity updates, and expiry alerts for inventory items. Real-time cloud synchronization ensures that all information remains accurate and accessible across devices. By integrating OCR, Firebase, and efficient UI design, the system enhances operational efficiency, minimizes manual errors, reduces paperwork, and contributes to smarter, faster, and more sustainable inventory and warranty management.

III. METHODOLOGY

The system follows an event-driven methodology:

1. User Authentication
   - Firebase Auth validates login credentials
   - Users are assigned roles (customer or salesman)
2. OCR-Based Data Extraction
   - Bill images uploaded → Passed to Tesseract.js
   - Extracted text processed using regex patterns
   - Warranty dates, product names, and totals identified
3. Real-Time Data Storage
   - Processed data stored in Firestore
   - Cloud Storage holds uploaded bill images
   - LocalStorage provides offline caching
4. Dashboard Rendering
   - Customer dashboard displays warranties, bills, and total expenses
   - Sales dashboard displays stock items, quantities, expiry alerts
5. Notification System
   - Smart alerts triggered for:
     - Warranty nearing expiration
     - Low stock
     - Product expiry in sales module

This modular methodology enhances reliability, maintainability, and performance

IV. SYSTEM MODULES

A. Authentication & User Management Module

This module manages secure user authentication and access control. Users can register and log in using Firebase Authentication, and each user is assigned a specific role (Customer or Salesman). Based on the authenticated role, users are redirected to customized dashboards with relevant privileges and functionalities.

B. Warranty Management Module

This module enables customers to store and manage product warranty details. Users can manually enter warranty information or upload receipts for automated extraction using OCR. The system identifies key data such as product name, purchase date, and expiry date, and stores them in Firebase. Color-coded alerts and notifications are generated for products nearing warranty expiration, ensuring timely action.

C. OCR-Based Bill Processing & Expense Tracking Module

Using Tesseract.js OCR technology, this module extracts total billed amount and relevant purchase details from uploaded receipts. The extracted expenses are recorded automatically and displayed in a dashboard that shows monthly spending insights. It reduces manual data entry and supports error-free expense tracking.

D. Inventory Management Module

This module is designed for salespersons to efficiently handle product stock and availability. Users can add new items, update stock quantities, remove outdated products, and monitor product availability. The module triggers alerts for low-stock items, enabling timely restocking and avoiding supply shortages.

E. Product Expiry Management Module

Salespersons can record product manufacturing and expiry dates, and the system uses automated calculations to categorize products as Safe, Near-Expiry, or Expired using a color-coded interface. This ensures that expired or soon-to-expire products are handled properly, reducing wastage and enhancing sales efficiency.

F. Notification & Alert Module

This module provides real-time notifications to users based on critical triggers such as warranty expiration, low inventory, product expiry, or successful/failed operations. The alerts are visually enhanced using icons and animations, offering a smooth and informative user experience.

V. RESULTS AND DISCUSSION

The system was tested across multiple modules, including OCR extraction, warranty tracking, expense logging, and inventory updates. The OCR feature provided up to 98% accuracy in text extraction from clearly scanned bills, reducing manual errors. Real-time synchronization using Firebase ensured instant data updates across devices. The responsive UI delivered seamless performance on both mobile and desktop platforms. Smart notifications effectively alerted users about warranty expiries and low-stock conditions. Overall, the system improved operational efficiency and proved to be a reliable and user-friendly solution for managing inventories and warranties digitally.

VI. FUTURE SCOPE

Future enhancements include:

1. Integration with Payment Gateways for digital purchases
2. AI-Based Predictive Analytics for inventory forecasting
3. Multi-language OCR support
4. Mobile App Version using Flutter or React Native
5. Push Notifications via Firebase Cloud Messaging
6. Automatic report generation (PDF/Excel)

These additions could further strengthen system automation and usability.

VII. CONCLUSION

The proposed Inventory & Warranty Management System successfully addresses the limitations of traditional recordkeeping by integrating OCR, Firebase Cloud, and modern web technologies. It provides a unified, efficient, and scalable solution for customers and salespersons. Through features like real-time synchronization, smart notifications, and automated warranty tracking, the system enhances accuracy, reduces workload, and moves towards a fully digital, paperless environment.

This system demonstrates excellent potential for real-world adoption in retail, electronics, service centers, and household management.

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