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DEPARTMENT OF INFORMATION TECHNOLOGY

IT3811 - Project work

First Review

DATE: 21-03-2025

AUTOMATING INVENTORY MANAGEMENT

NMNT ID : NMNTSTD5122016

Team Name : SKP IT Riders

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Abstract

Manual inventory management in small warehouses causes errors, delays and inefficiencies. This project aims to build an Automated Inventory Management System with real-time stock tracking, automated order fulfillment, and error reduction.

Using QR code/barcode scanning and real-time stock tracking technology the system ensures accurate inventory tracking and efficient order processing, helping businesses reduce workload, improve accuracy and optimize warehouse operations

Introduction

Managing inventory manually in small warehouses causes errors, delays and inefficiencies. This project aims to create an Automated Inventory Management System for real-time stock tracking, automated order fulfillment, Demand Forecasting and error reduction. Using QR code scanning and stock tracking system will ensure accurate and efficient inventory management.

Background & Motivation

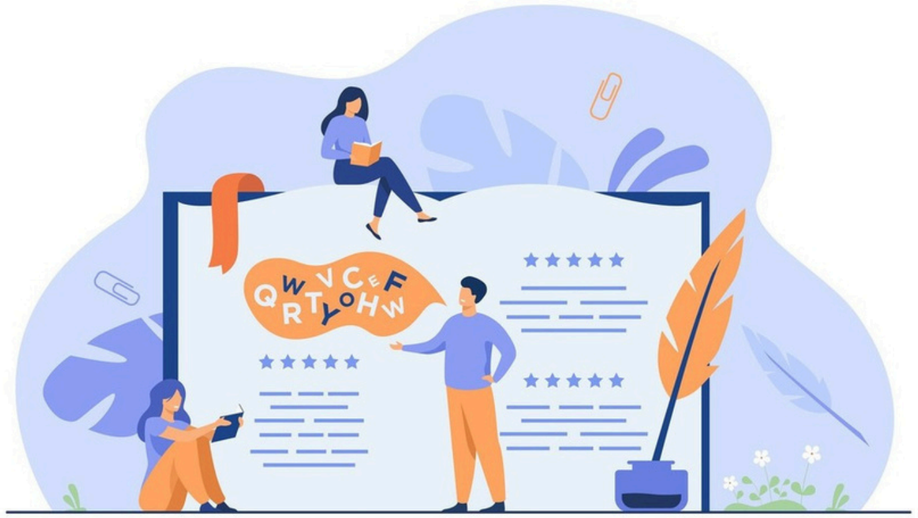
1. Manual Stock Tracking Causes Errors
   - **Issue:** Human mistakes in data entry lead to incorrect inventory records.
   - **Solution**: Barcode/RFID scanning ensures accurate stock updates without manual input.

2. Delayed Order Processing Affects Business
   - **Issue:** Manual order fulfillment takes time, causing shipment delays.
   - **Solution:** Automated order processing speeds up fulfillment and reduces human effort.

3. Lack of Real-Time Inventory Updates
   - **Issue:** Businesses often face stockouts or overstocking due to outdated records.
   - **Solution:** databases (MySQL, Firebase) provide real-time inventory tracking and live updates.

4. No Real-Time Inventory Insights
   - **Issue:** Business owners struggle to monitor stock levels and predict demand fluctuations.
   - **Solution:** A real-time dashboard provides live stock data, alerts for low inventory, and AI-driven demand forecasting

Literature Review

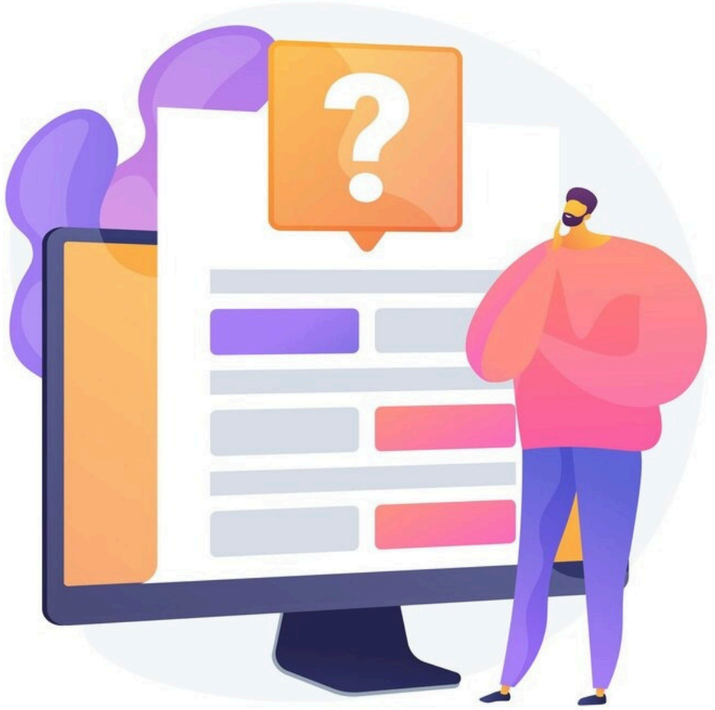


Author(s) & Year	Title	Key Findings	Relevance to This Project
V. Vijaya Lakshmi & K. Ranganath (2016)	Inventory Management: A Review of Relevant Literature	Inventory management is crucial for business survival, ensuring smooth production and cost minimization. Modern techniques like EOQ and JIT improve efficiency.	Highlights the importance of efficient stock tracking and cost reduction, aligning with real-time inventory management.
J.B. Munyaka & V.S.S. Yadavalli (2022)	Inventory Management Concepts and Implementations: A Systematic Review	Explores AI and IoT-driven inventory tracking. Discusses demand forecasting models for inventory optimization.	Supports the use of IoT, cloud-based tracking, and AI-driven automation, aligning with this project's methodology.
Capkun, Hameri & Weiss (2009)	Inventory and Financial Performance in Manufacturing	Shows a strong link between inventory performance and profitability. Raw material management significantly impacts financial success.	Emphasizes the financial impact of automated inventory management, proving that better tracking leads to higher profitability.
Nyabwanga & Ojera (2012)	Impact of Inventory Management on Small Businesses	Improper inventory management is a major reason for business failures. Budgeting and shelf-space management improve performance.	Aligns with the small warehouse focus of this project, showing how better stock control enhances efficiency and prevents losses.

Problem Statement

How might we develop a solution for automating inventory management in small warehouses, including real-time stock tracking, automated order fulfilment and minimising human error.

Manual inventory management in small warehouses causes errors, delays and inefficiencies.



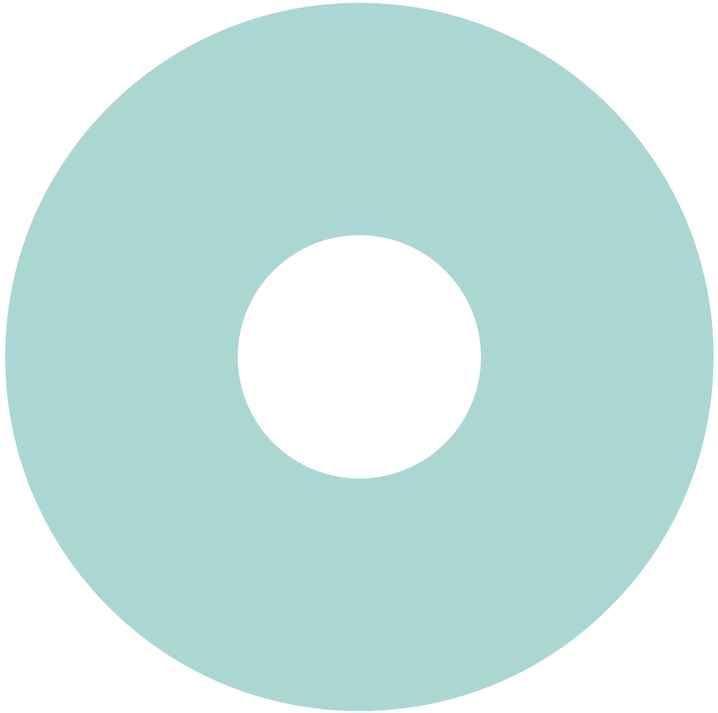
Proposed Solution

Real-time Stock Tracking

Implement QR code scanning systems & sensors for stock track inventory in real time updates. Ensures accurate stock updates without manual input.

Automated Order Fulfillment

An Automated Order Fulfillment System streamlines inventory tracking, order processing, and stock management to ensure efficient and accurate order handling



Forecasting demand

Data analytics, Tools or AI predicts demand based on historical sales, market trends, and customer behavior.

Just-In-Time (JIT) inventory techniques to avoid excess stock

Technology Stack

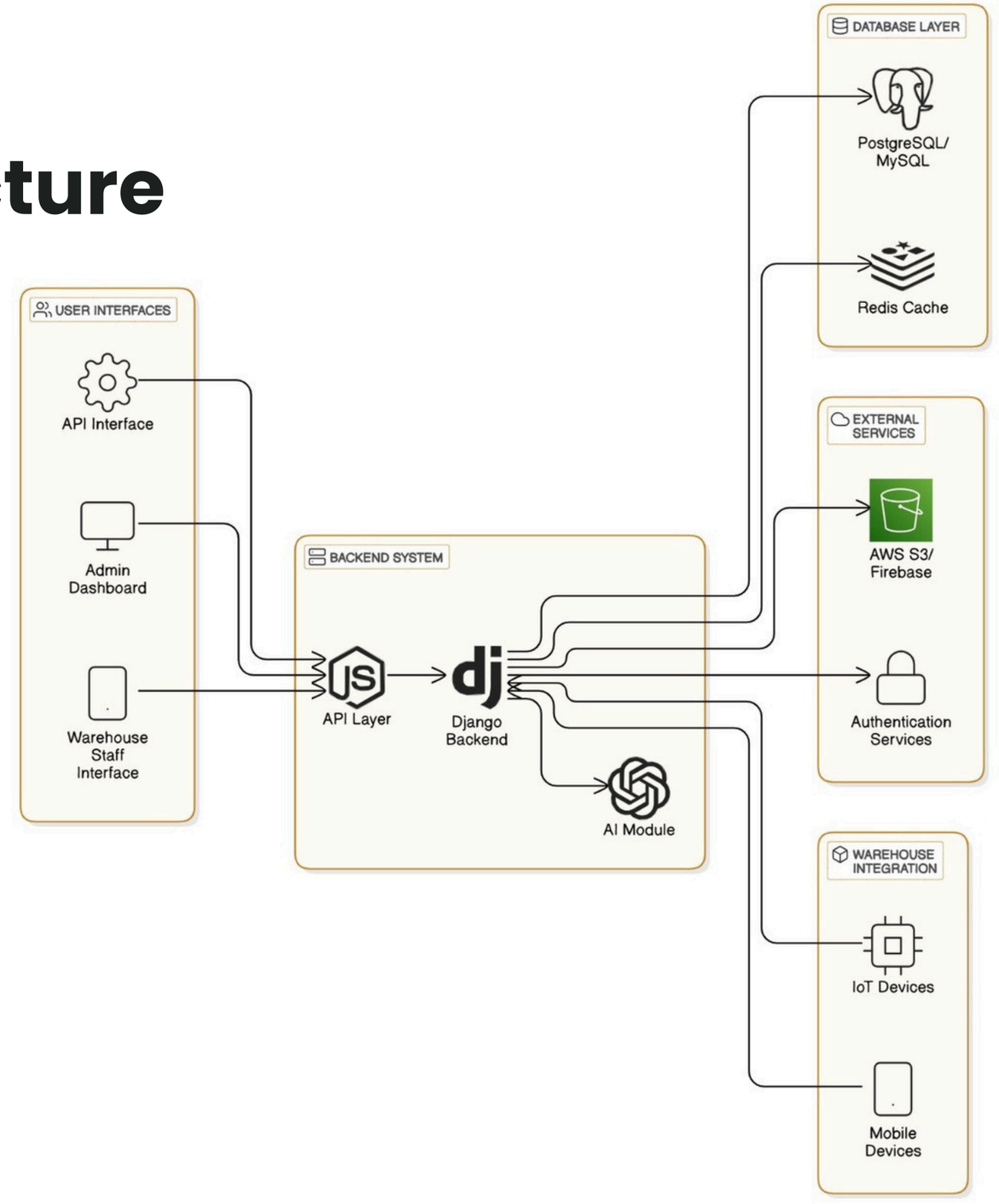
- Frontend: HTML, CSS,JavaScript.
- Backend: Django (Python),
- Node.js API Layer.
- Database: MySQL, Redis for caching.
- Authentication: JWT\OAuth.
- Deployment: Docker, AWS.

MAIN OBJECTIVE

Build a smart, automated solution to help warehouses efficiently manage inventory, reduce errors, and streamline operations.

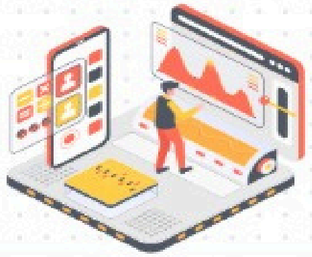
This project aims to build an automated inventory management system for small warehouses. It will use barcode/QR Code scanning and technology for real-time stock tracking and automated order fulfillment, demand forecasting. The goal is to reduce errors, improve efficiency, and streamline warehouse operations.

System Architecture



Automated Inventory Management Workflow

Login



Warehouse Staff Dashboard

Real-Time Stock Tracking

INVENTORY DATABASE

ORDER MANAGEMENT SYSTEM

Order Fulfillment Module

Error Detection Module

AUTOMATION & INTELLIGENCE

UPDATE

Implementation

1 **Requirement Analysis**
Initial phase of the implementation process.

2 **Design**
Creating the system architecture and user interface.

3 **Development**
Building the system with real-time inventory updates, automated reordering, and seamless stock tracking using QR codes.

4 **Testing**
Ensuring all components work correctly.

5 **Deployment**
Making the system available for use.

Code Quality and Adherence to Standards

Python Standards

Code follows PEP 8 (Python) and best practices in Django and React.js.

Architecture

Modular architecture with reusable components.

Security

Secure coding practices, including password hashing and data validation.

Demonstration of Software/Hardware Components

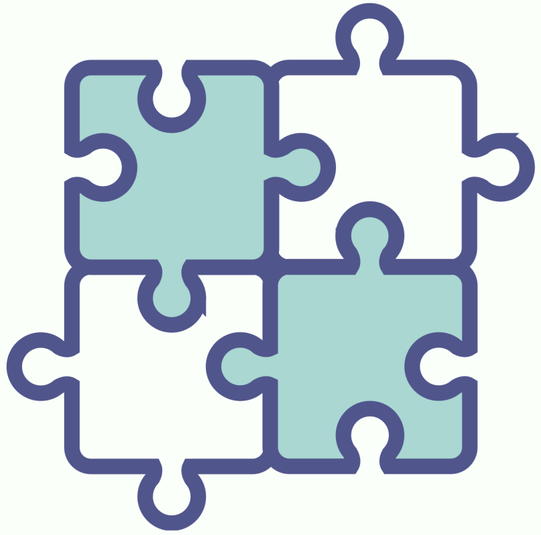
Software Components

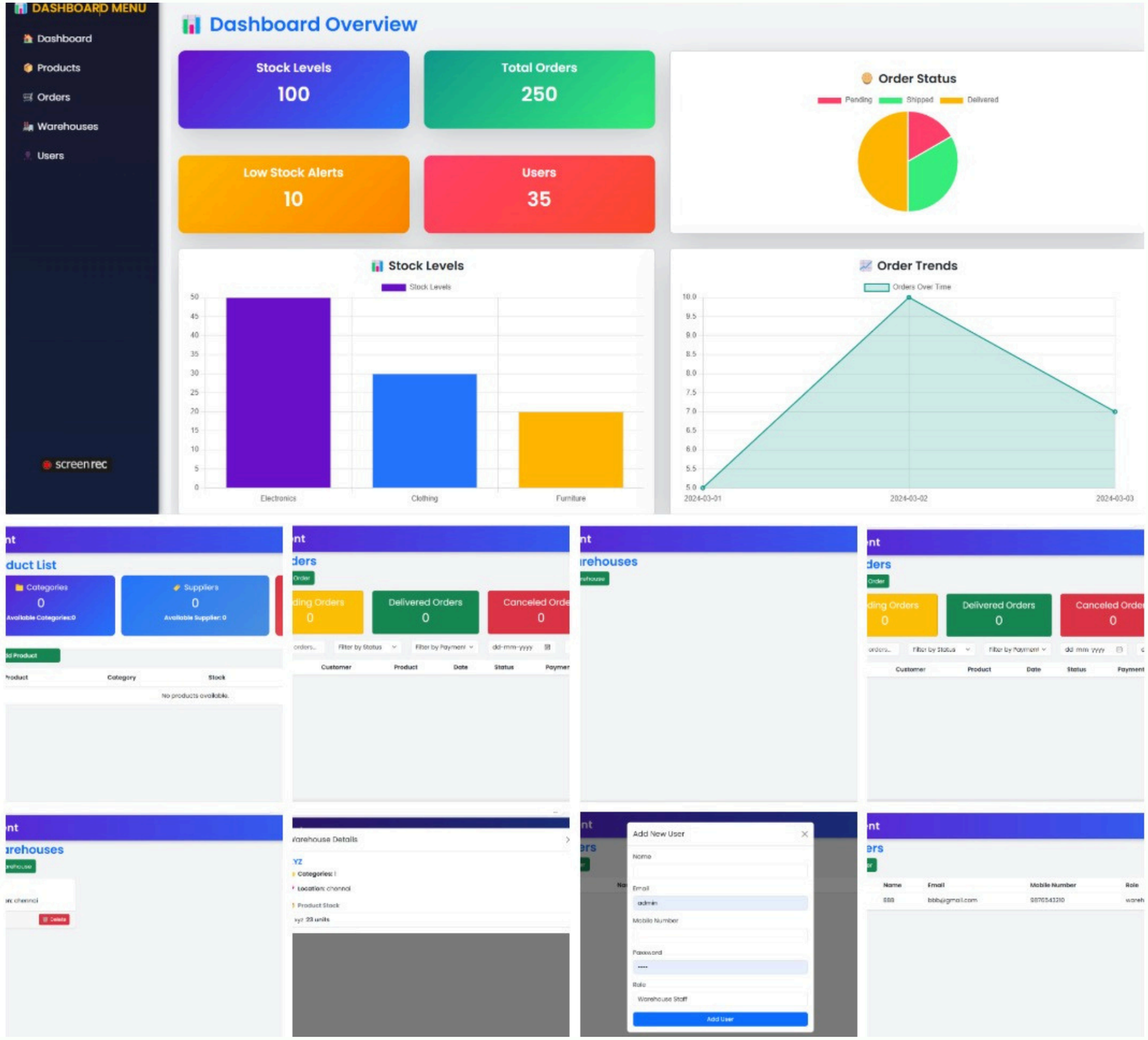
- Django-based inventory management system.
- QR code integration for stock tracking.
- Data analysis for demand reporting and insights.
- Deployment:Docker/AWS

Hardware Components

- QR/Barcode Scanner for automate stock entry and verification.
- Server hosting for backend processing - Optimized server performance supports large-scale inventory processing

Prototype




DASHBOARD MENU
Dashboard
Products
Orders
Warehouses
Users
Dashboard Overview
Stock Levels
100
Total Orders
250
Low Stock Alerts
10
Users
35
Order Status
Pending
Shipped
Delivered
Stock Levels
Stock Levels
Electronics
Clothing
Furniture
Order Trends
Orders Over Time
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2024-03-02
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Suppliers
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Email
admin
Mobile Number
Password
Role
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Thank you very much!