iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** IV **Month of publication:** April 2025

DOI: https://doi.org/10.22214/ijraset.2025.69374

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue IV Apr 2025- Available at www.ijraset.com

ECOGROCERY

Dr. Parameswaran T[1], Aastha Das[2], Anusha R Shabadi[3]
[1]*Associate Professor, Department of Computer Science and Engineering, CMR University, Bengaluru*
[23]*Bachelor of Technology Computer Science and Engineering, CMR University, Bengaluru, India,*

Abstract: ***EcoGrocery is a dual-platform digital ecosystem that transforms how small-scale grocery stores operate and engage with nearby consumers. Built for simplicity and impact, the platform combines intelligent inventory management, real-time analytics, and proximity-based product visibility to streamline operations and drive local sales. Stores can list both regular and discounted near-expiry items, ensuring customers within a 7 km radius have access to timely, cost-effective purchases. With features like order tracking, sales monitoring, and integrated payment systems, EcoGrocery empowers local vendors to optimize stock movement, prevent financial losses, and enhance customer convenience through a modern, hyperlocal e-commerce experience.***

Keywords: Inventory Management, Proximity-based Shopping, Digital Grocery Platform, Local Store Connectivity, Real-time Order Tracking, Online Grocery Marketplace, Integrated Payments

I. INTRODUCTION

EcoGrocery: A localized e-commerce platform for grocery stores is a modern digital initiative designed to bridge the gap between small-scale local retailers and nearby customers through an intuitive and accessible web-based solution. As the demand for digital commerce continues to grow, this platform empowers neighborhood grocery and stationery stores to go online, enhancing their visibility and customer reach within a defined geographical radius.

This platform offers a dual-interface ecosystem—one for store owners and another for customers. Store owners can register their business, manage inventory, and track orders through a user-friendly dashboard. Meanwhile, customers can browse available products, add items to their cart, place orders, and track their deliveries seamlessly, all within their local area.

What sets this platform apart is its proximity-based product discovery, ensuring that customers only view and purchase items from stores located within a 7-kilometer radius. This geo-targeted functionality supports faster delivery times and fosters hyperlocal commerce. In addition, the platform integrates a secure payment gateway and real-time order status tracking, delivering a complete and efficient e-commerce experience.

II. LITERATURE REVIEW

The EcoGrocery platform is built upon a foundation of interdisciplinary research encompassing hyperlocal e-commerce, smart inventory management, digital retail platforms, and proximity-based product discovery. This literature review explores key advancements in the digital transformation of small-scale retail, highlighting how modern technological interventions have enabled traditional businesses to connect with consumers in real-time, improve inventory efficiency, and enhance the customer experience.

Hyperlocal E-commerce Platforms: Studies have shown the growing significance of hyperlocal platforms in bridging the gap between local sellers and nearby consumers by offering timely delivery and tailored product visibility (Sharma et al., 2021). Applications like Dunzo and Swiggy Instamart in India have leveraged geolocation services to fulfill rapid grocery deliveries, setting a precedent for proximity-driven retail ecosystems.

Smart Inventory Management:Digital inventory solutions using cloud-based databases and mobile-first interfaces have become essential tools for small retailers. These systems improve operational efficiency and reduce product stockouts or overstock scenarios (Chong et al., 2020). Automated restocking alerts, barcode scanning, and basic analytics help store owners track product lifecycles effectively.

Digital Retail and Consumer Behavior: Research highlights that localized e-commerce platforms not only improve convenience for consumers but also promote trust and loyalty by offering products from familiar neighborhood stores (Kumar & Rajan, 2022). By blending digital accessibility with the familiarity of local commerce, platforms like EcoGrocery can strengthen buyer-seller relationships within communities.

Proximity-Based Product Visibility: Geolocation-based filtering is an emerging trend in e-commerce that allows users to discover products available near them. Studies emphasize its role in enabling fast, relevant, and location-specific browsing experiences, reducing delivery times and increasing purchase intent (Li & Wang, 2019).

Integrated Payment Solutions and Order Tracking: Digital wallets and integrated payment gateways have become a standard in modern e-commerce, streamlining the purchase process while offering transaction security. Combined with real-time order tracking, these features significantly improve the post-purchase experience, as shown in consumer behavior studies across multiple online retail platforms (Patel et al., 2020).

III. SYSTEM ARCHITECTURE

For the project, "EcoGrocery", here's an overview of the system architecture. This architecture represents how different components of this platform interact across the frontend, backend, database, and third-party services.

A. Authentication

- JWT (JSON Web Token) authentication is used for secure login and role-based access control.
- Three types of users: Customer, Store Owner, and Admin.
- JWT tokens are validated before allowing access to protected routes and services.

B. User Module

- Customers interact with the dashboard to browse stores, view products, and place orders.
- Store Owners use their dashboard to manage inventory, view orders, update product status, and apply discounts.
- Admins can manage and monitor the platform but are not shown in the frontend in this version.

C. Frontend (React Native)

- Customer Dashboard: Displays available products based on geolocation, order tracking, and notifications.
- Store Dashboard: Allows store owners to add/update/delete products, manage discounts, and view analytics.
- REST API calls are made from frontend to backend for all operations.
- Push notifications are sent to customers and store owners based on status updates and discount alerts.

D. Backend (Node.js + Express.js)

- Acts as the central service layer for all business logic.
- Modules include:
    - Product Entry: Handles addition and update of store inventory.
    - Discount Management: Triggers alerts for products nearing expiry.
    - Order Tracking: Updates and monitors order status.
    - Analytics: Collects and displays user and order data insights.
    - Push Notifications: Sends real-time updates to users.

E. Geolocation (Nominatim API)

- Fetches latitude and longitude from customer's address input.
- Used to filter and display products from stores within a 7km radius.
- Reverse geocoding used for store registration and product display relevance.

F. Payment Gateway Integration

- Customers initiate payment through the frontend.
- Backend processes the transaction and interacts with third-party gateway.
- Status is updated and confirmation is sent back to customer and store dashboard.

G. Database (MongoDB)

- Stores all platform data using separate collections:
    - Users: Stores user credentials and profile data.
    - Products: Contains product details, expiry dates, discount status, and store references.
    - Orders: Manages order history, delivery status, and payment info.
    - Geolocation: Temporarily stores geocoded data for filtering and mapping.

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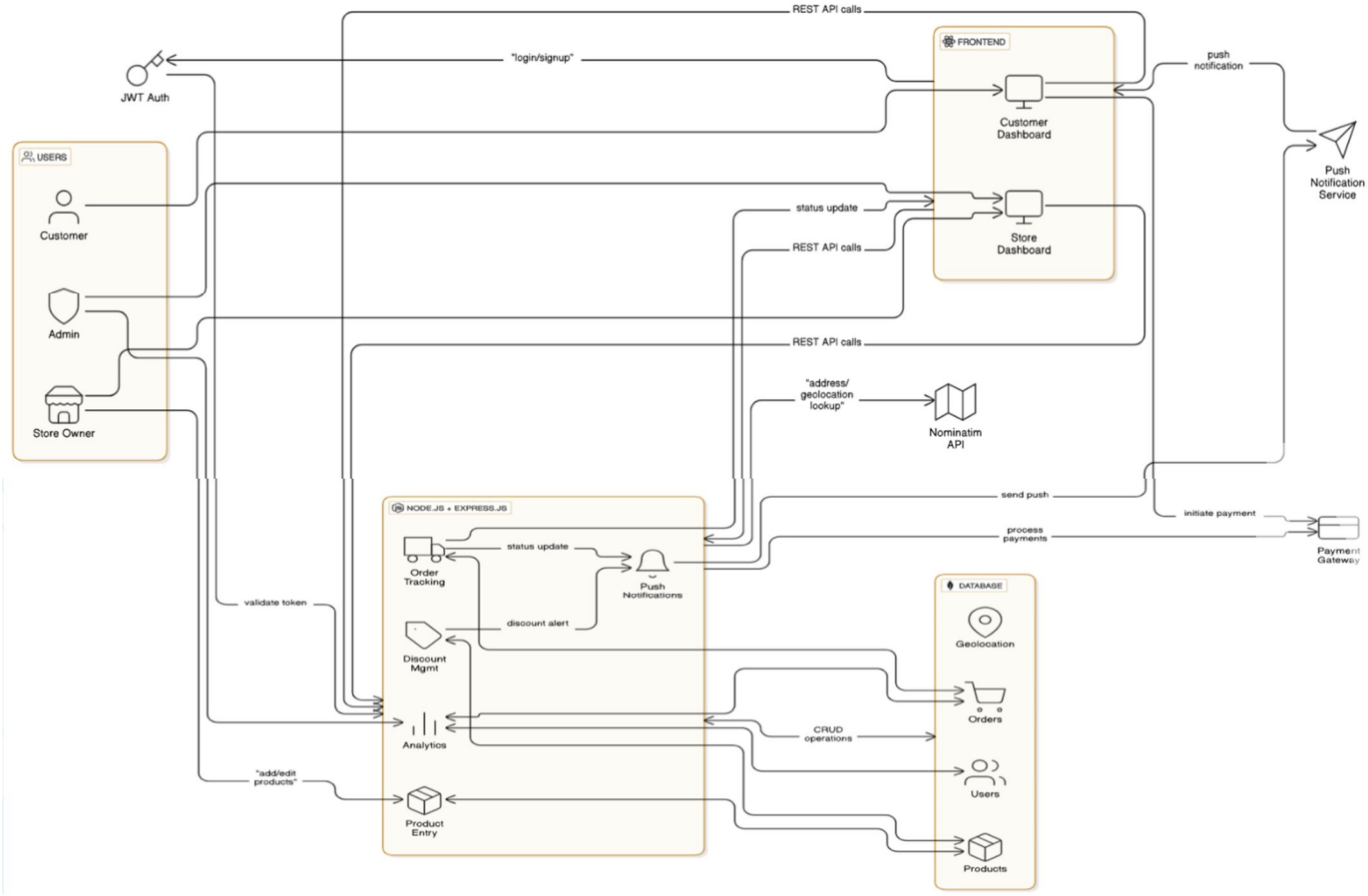


Fig. 1 System Architecture

IV. USER FLOW DIAGRAM

The user flow diagram illustrates the step-by-step navigation and interaction journey a user follows on the EcoGrocery platform. It highlights both the customer and store user paths from entry point to final outcomes, ensuring a smooth and intuitive experience for all users.

A. Entry Point

The platform immediately directs the user to the Login Page.

B. User Authentication

- Users input their email and password.
- If credentials are valid:
  - If the email belongs to a store → user is redirected to the Store Dashboard.
  - If the email belongs to a customer → user is redirected to the Customer Dashboard.
- If the user is not registered, they are prompted to:
- Choose to register as a Store or a Customer.

C. User Registration

- If the user is not registered:
  - The user chooses to register either as a Store or a Customer.
  - Based on the selection:
- Redirected to respective registration forms.

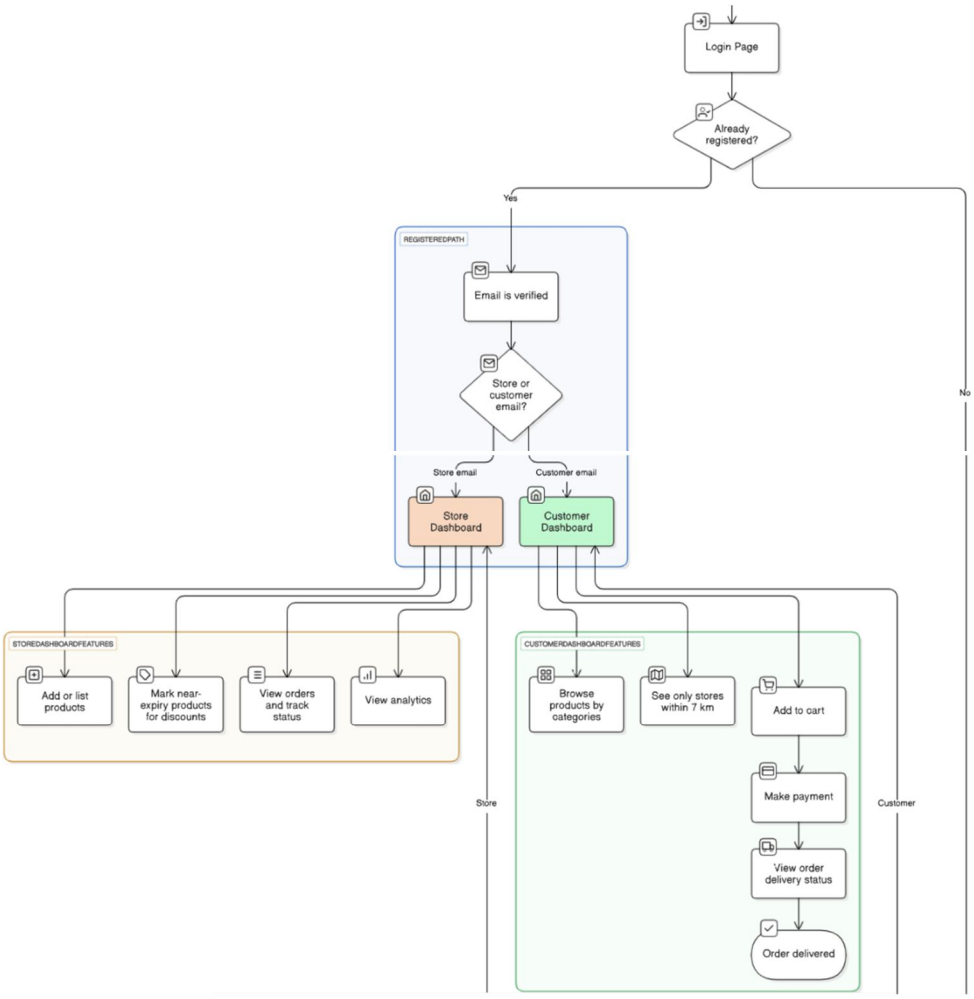
- During registration:
  - Users are required to input personal/store details.
  - Precise address location must be marked on an interactive map interface.
  - The latitude and longitude coordinates are captured and stored in the database for proximity-based filtering.

D. Store Dashboard

- Once logged in as a Store, users have access to:
  - Add/List Products manually.
  - Apply Discounts on near-expiry products.
  - Track Orders and view order details.
  - Analyze Sales and user behavior through analytics and charts.

E. Customer Dashboard

- Once logged in as a Customer, users can:
  - Browse Products categorized by type and availability.
  - View products only from stores within a 7 km radius based on geolocation.
  - Add Products to Cart for checkout.
  - Make Payments securely through an integrated payment gateway.
  - Track Order Status in real-time.
  - Receive delivery confirmation upon successful order fulfillment.



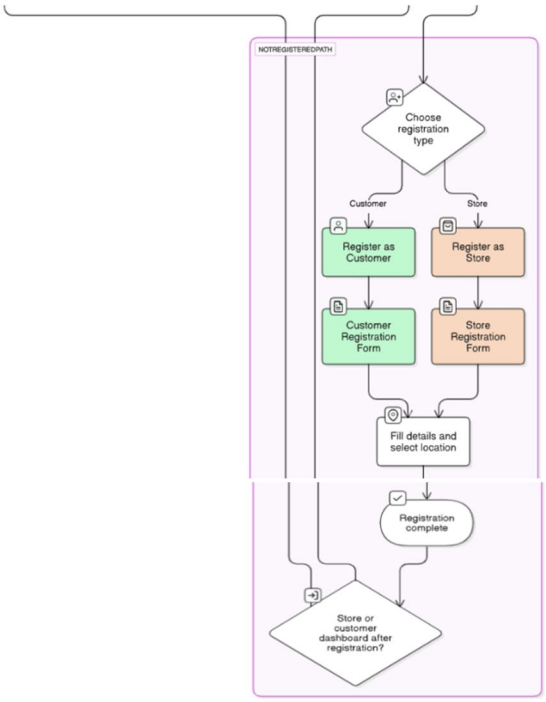


Fig. 2 User Flow Diagram

V. IMPLEMENTATION

A. Frontend Implementation (React Native)

The frontend is developed using React Native, simulating a mobile-first interface with a responsive and intuitive UI for both customers and store owners. The platform ensures smooth navigation across components and supports dynamic rendering of store and product data.

- Key Technology Used: React Native, React Navigation, Axios, useContext/useState, AsyncStorage.
- Working: Users (store owners or customers) interact with the app to register, log in, manage products, or browse nearby stores. Location data and product information are dynamically fetched and updated via API calls to the backend, ensuring real-time interaction and seamless user experience.

B. Backend Implementation (Node.js & Express.js)

The backend is built using Node.js and Express.js, managing core logic, authentication, product filtering, and secure user access with JWT tokens.

- Key Technology Used: Node.js, Express.js, JWT (JSON Web Tokens), Mongoose, Bcrypt, CORS
- Backend Services Implemented: Authentication Service, Product Management Service, Order Tracking Service, Location Service

C. Database Implementation (MongoDb Atlas – NoSQL Database)

MongoDB Atlas is used as the primary NoSQL database to handle flexible schema requirements for users, products, and orders.

- Database Schema & Collections: Users collection, Product collection, Orders collection, Interaction collection.
- Working: Each user interaction—such as registration, product listing, or placing an order—triggers efficient document-based operations. Mongoose ensures schema validation and relationships between entities.

VI. RESULT

For the project, "EcoGrocery", the following screenshots showcase the working flow of the platform. As shown in Fig. 1: Login Page, users can securely log in using their registered credentials. If they are new users, they can navigate to the registration options as shown in Fig. 2: Registration Option Page, where they can choose to register either as a Customer or a Store Owner.

Once selected, users are taken to respective registration forms — shown in Fig. 3: Customer Registration Page and Fig. 4: Store Registration Page — where they provide details and select their precise address on the map. The address plotting feature is illustrated in Fig. 5: Address Page, which ensures accurate location-based functionalities. After successful login or registration, users are redirected to their respective dashboards. Fig. 6: Customer Dashboard displays product categories and available listings from stores within a 7km radius. Fig. 7: Store Dashboard allows store owners to add/manage products, mark near-expiry items for discounts, and track orders efficiently.

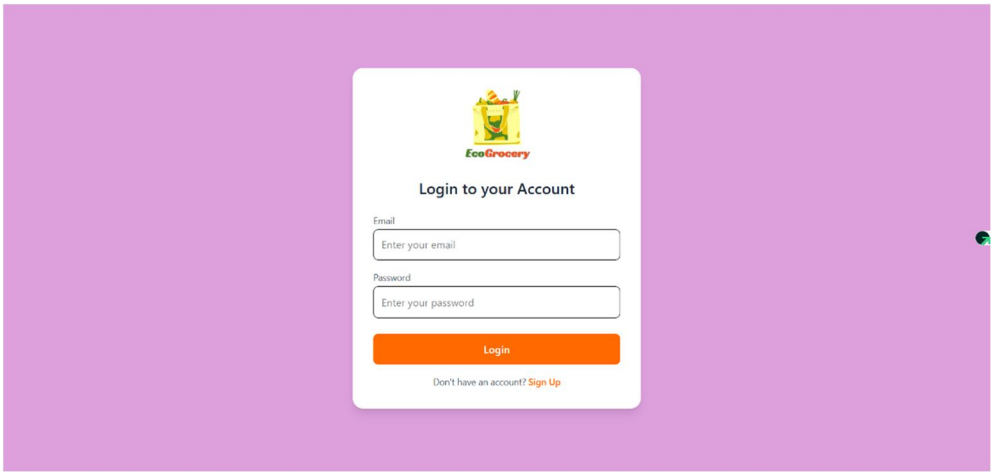


Fig. 3 Login Page.

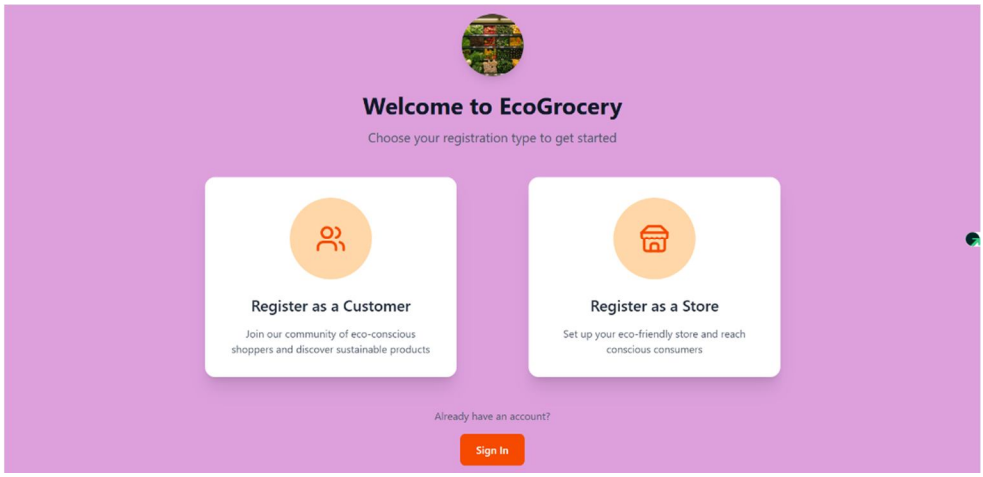


Fig. 4 Registration Option Page

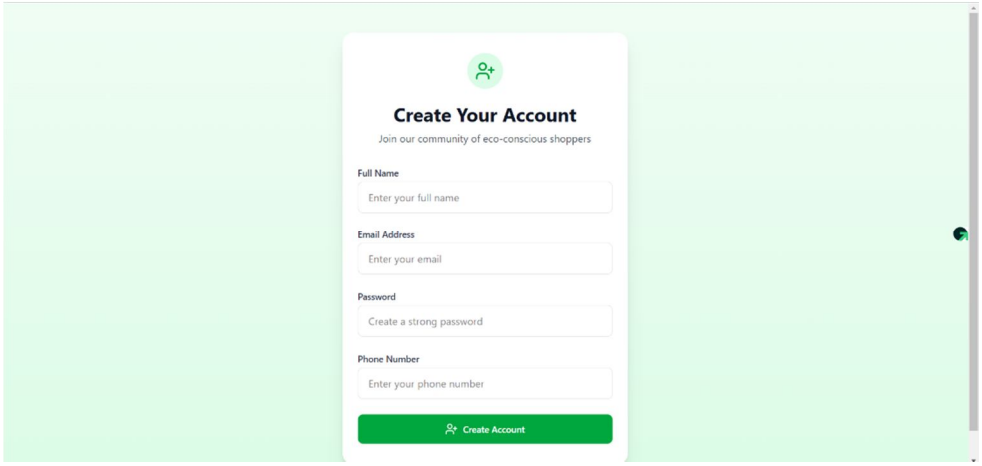


Fig. 5 Customer Registration Page

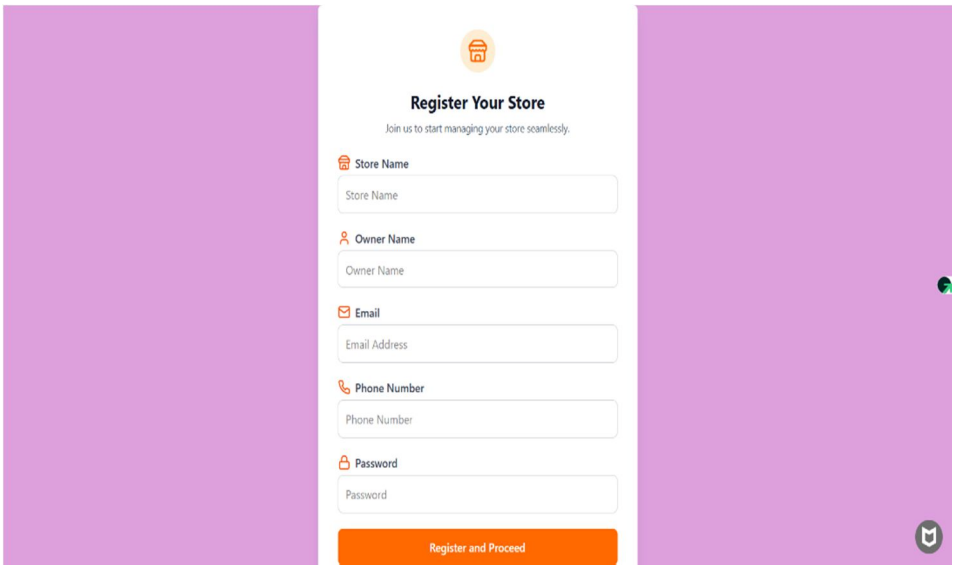


Fig. 6 Store Registration Page

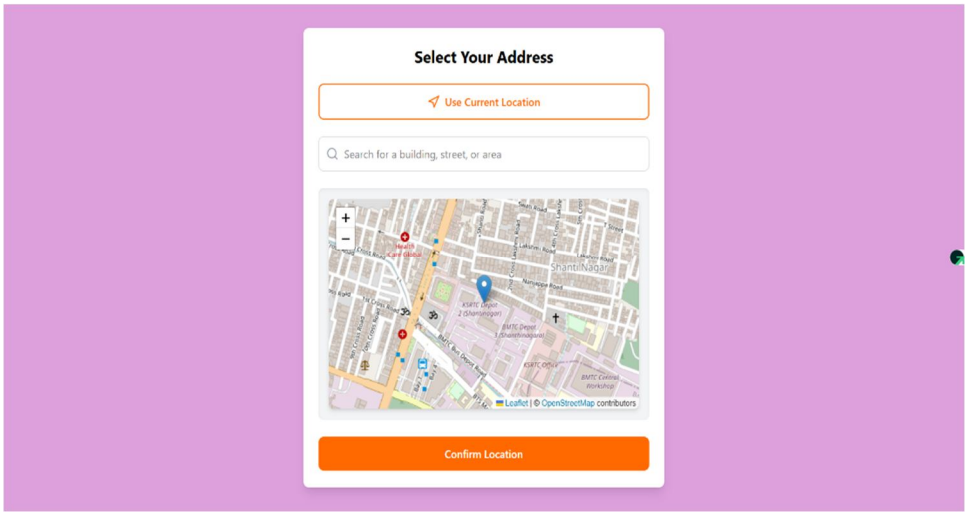


Fig. 7 Address Page

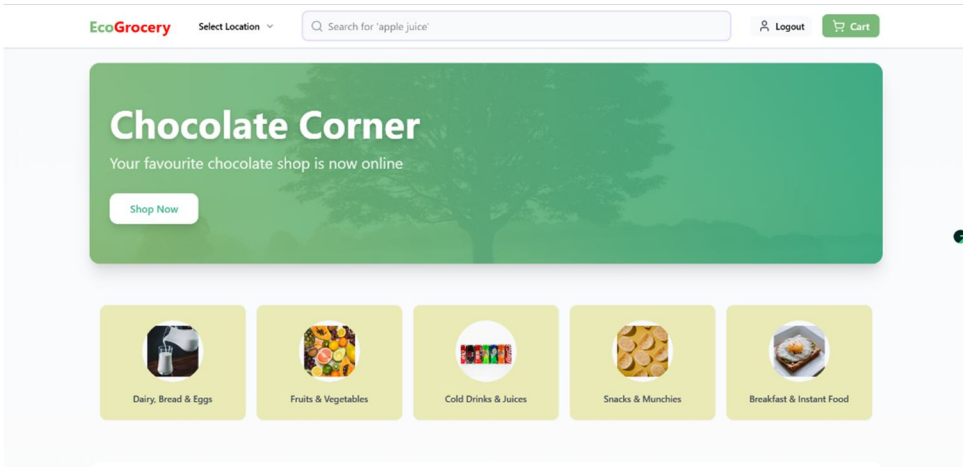


Fig. 8 Customer Dashboard

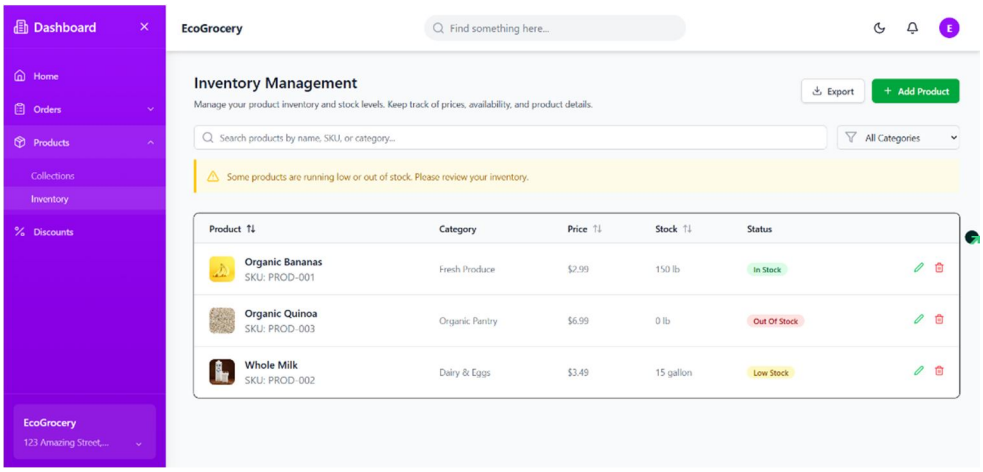


Fig. 9 Store Dashboard

VII. CONCLUSION

The EcoGrocery platform marks a transformative step in the e-commerce domain by integrating a suite of intelligent, user-centric modules that empower both customers and local store owners. This platform is meticulously designed to bridge the gap between neighborhood retail stores and modern online shoppers, ensuring a seamless, hyperlocal shopping experience. By combining intuitive interfaces, real-time geolocation features, and efficient backend operations, this platform balances convenience, scalability, and innovation.

The Inventory and Product Visibility Module allows store owners to manage their stock effortlessly while showcasing both regular and discounted near-expiry items to customers within a 7 km radius. This not only promotes smart purchasing decisions but also reduces product waste. Meanwhile, the Order Management and Tracking Module ensures transparent, real-time updates for customers, enhancing trust and engagement throughout the shopping journey. Secure payment integration and streamlined checkout processes further ensure smooth transactions, reinforcing the platform's commitment to a reliable and user-friendly e-commerce experience.

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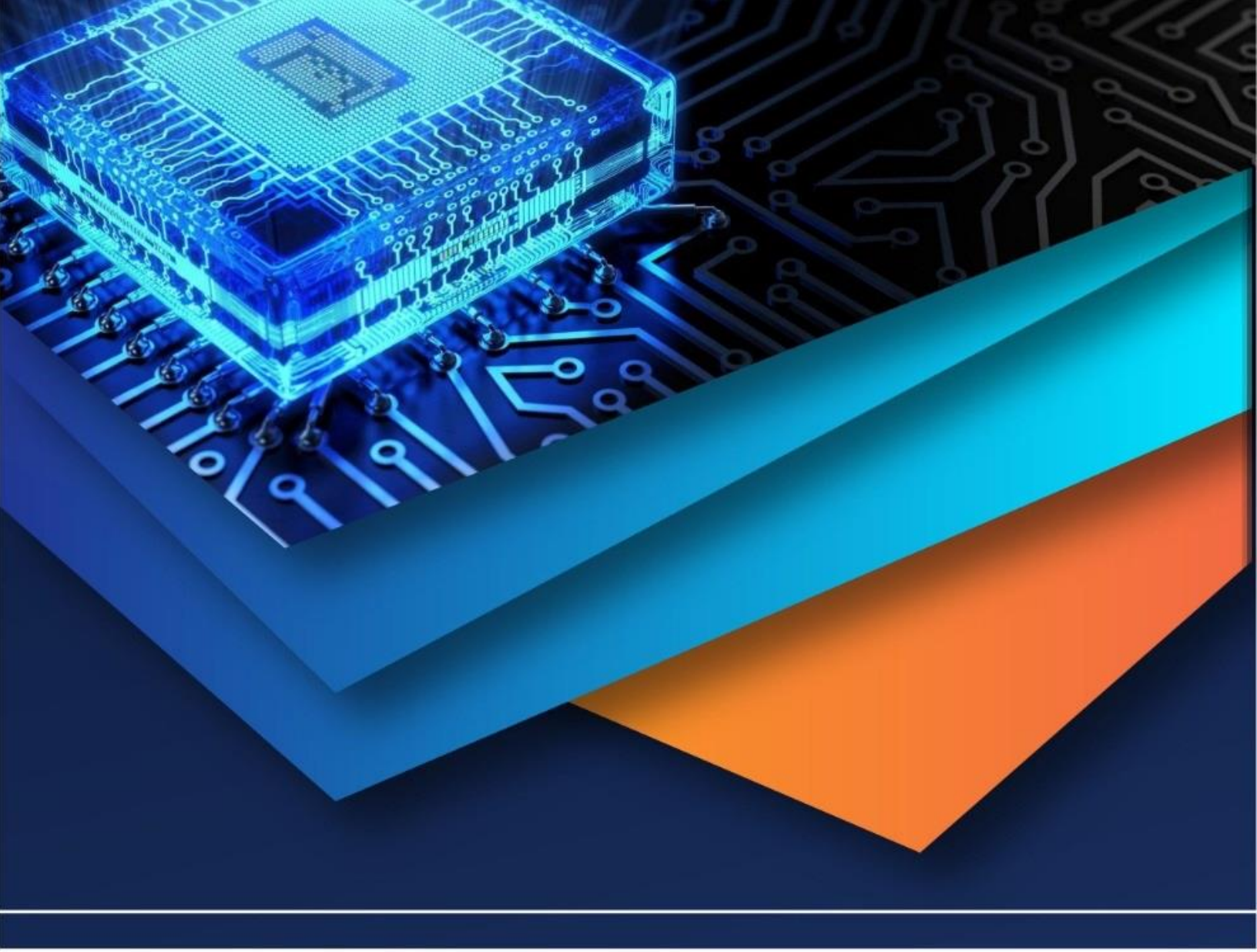

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