📊 Price Optimization Tool

1. Project Overview

The Price Optimization Tool is a web-based application designed to help businesses optimize their pricing strategy through comprehensive analysis of product data, demand forecasts, and market conditions. The application offers a multi-functional interface that enables business users to determine optimal pricing strategies while maintaining ease of use and performance efficiency.

1.1 Technology Stack

- **Backend**: FastAPI (Python)

- **Frontend**: Angular

- **Database**: MySQL

- **Visualization**: Chart.js

- **Authentication**: JWT Token-based authentication

2. Key Features

2.1 User Authentication and Authorization

- Secure user registration with email verification

- Role-based access control with different permissions for:

Role	Access Permissions
Admin	Full access to all features: manage users, products.
Supplier	Manage own products: create, update, delete, view demand and pricing
Buyer	View-only access to product catalog and demand forecasts

Login/Registration Page:
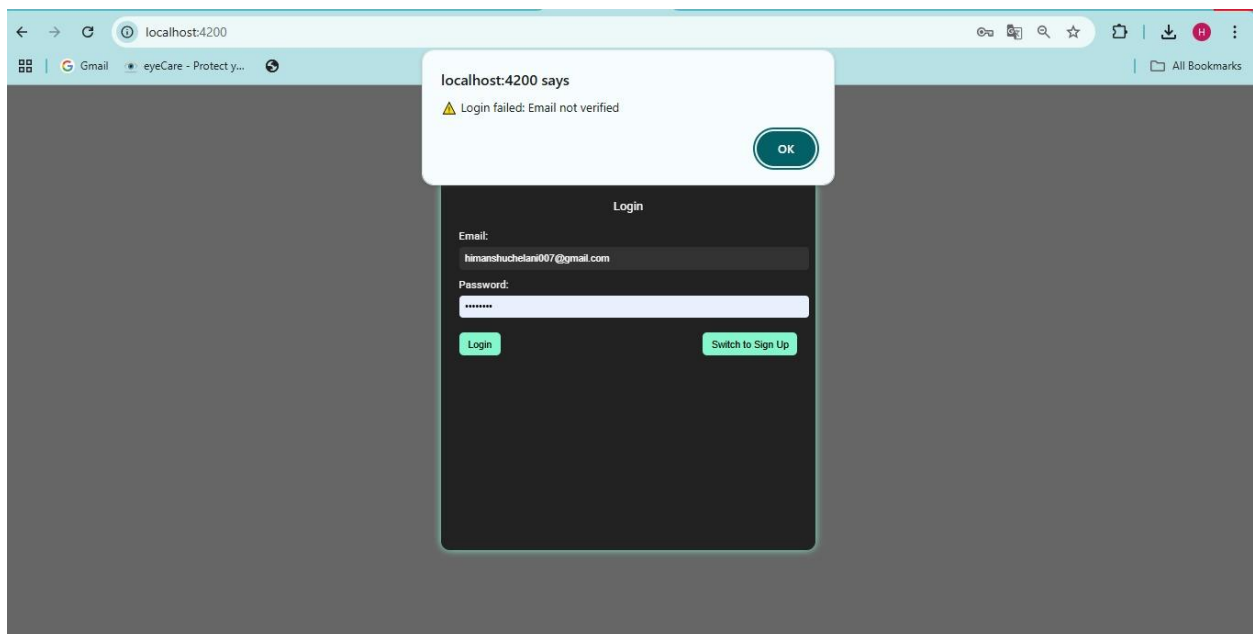
Email Verification Interface:
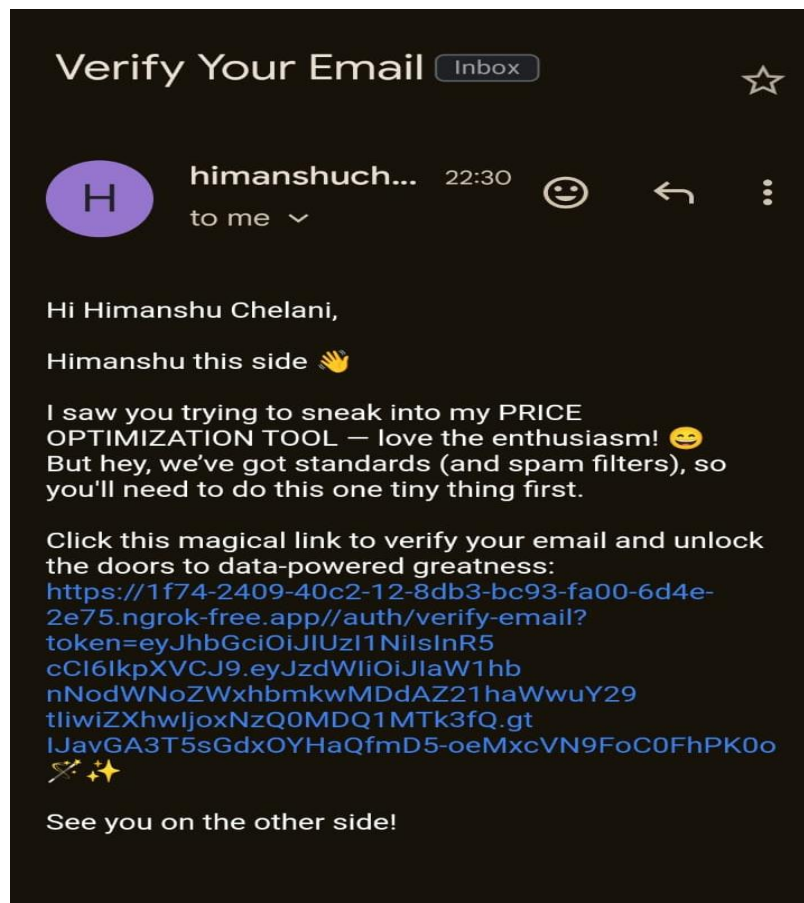
Login [without Verfication]:

2.2 Product Management

- Create, view, update, and delete products based on user role

- Comprehensive product details including:

  - Name, description, category

  - Cost price, selling price

  - Stock availability

  - Customer ratings

  - Units sold

  - Demand forecast , Optimized Price

Product Management Dashboard:

Add , View and Edit Product Form:

Price Optimization Tool

Welcome, Ritesh Chelani

← Back   Create and Manage Product   With Demand Forecast

View Product

Product Name :
Organic Cotton T-Shirt

Product Category :
Wearables

Cost Price :
10

Selling Price :
10

Description :
Soft, breathable t-shirt made from 100% organic cotton.

Available Stock :
480

Units Sold :
120

Close

Add New Products   Demand Forecast

Product Name   Product Catego

Organic Cotton T-Shirt   Wearables   209

Smartwatch   Wearables   160

Fitness Tracker   Wearables   200

its Sold   Demand forecast   Action

Cancel   Save

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Edit Products

Product Name :
Organic Cotton T-Shirt

Product Category :
Wearables

Cost Price :
10

Selling Price :
10

Description :
Soft, breathable t-shirt made from 100% organic cotton.

Available Stock :
480

Units Sold :
120

Close   Submit

Add New Products   Demand Forecast

Product Name   Product Catego

Organic Cotton T-Shirt   Wearables   209

Smartwatch   Wearables   160

Fitness Tracker   Wearables   200

its Sold   Demand forecast   Action

Cancel   Save

Delete Product:

Price Optimization Tool

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← Back   Create and Manage Product   With Demand Forecast

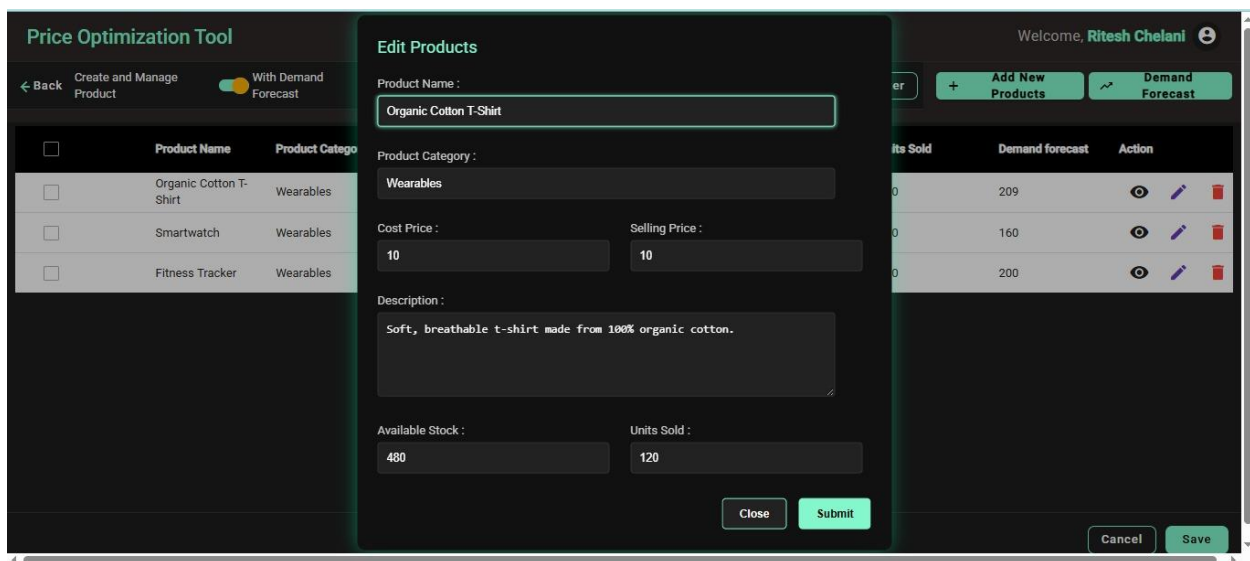Search   Category: Wearables   ≡ Filter   Add New Products   Demand Forecast

	Product Name	Product Category	Cost Price	Selling Price	Description	Available Stock	Units Sold	Demand forecast	Action
☐	Organic Cotton T-Shirt	Wearables	$ 10				120	209	👁 ✏ 🗑
☐	Smartwatch	Wearables	$ 70				130	160	👁 ✏ 🗑
☐	Fitness Tracker	Wearables	$ 30				180	200	👁 ✏ 🗑

Confirm Delete

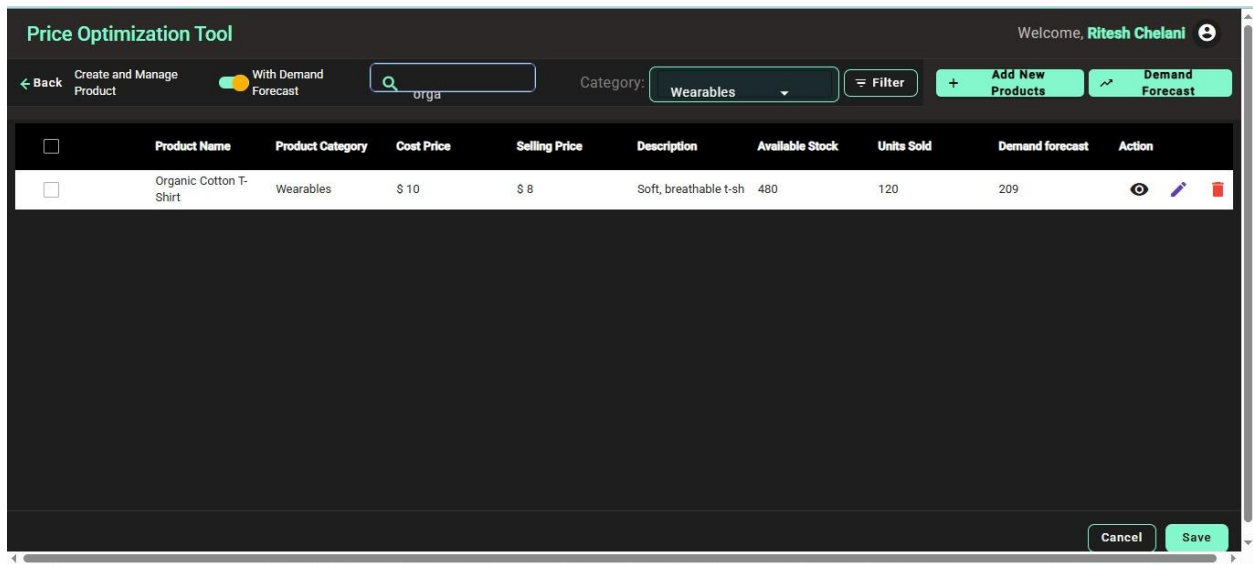Are you sure you want to delete **Organic Cotton T-Shirt**?

Cancel   Delete

Cancel   Save
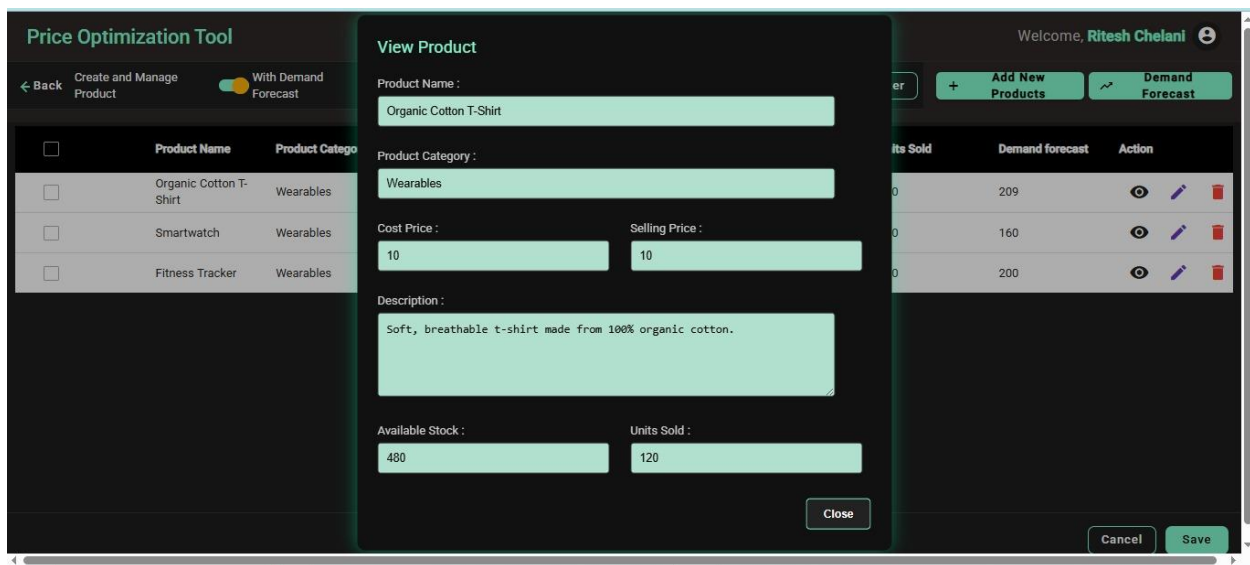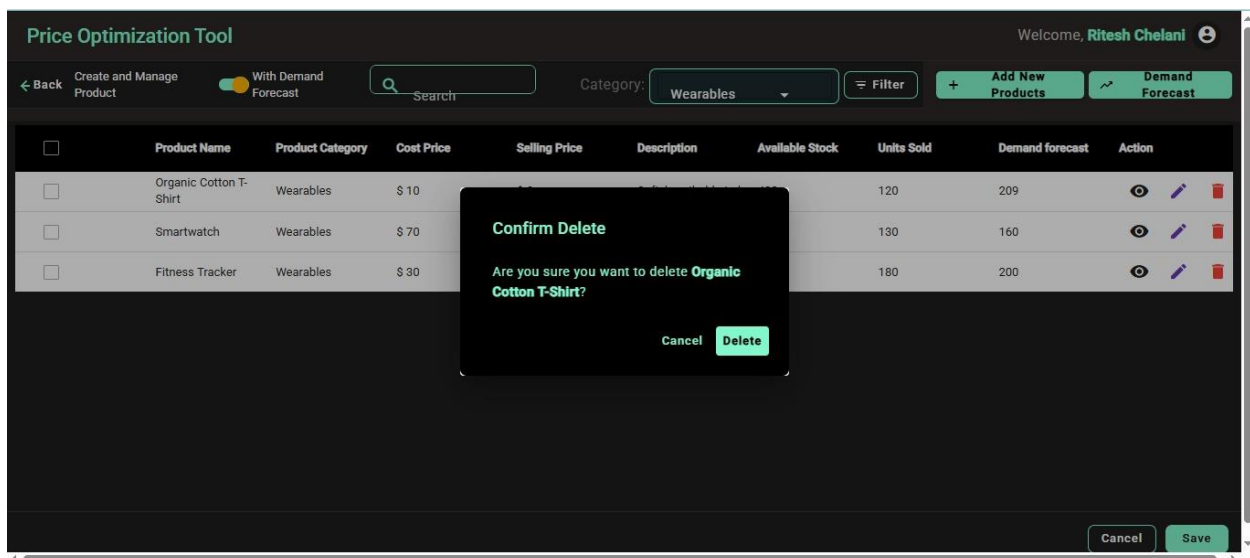
2.3 Search and Filter Capabilities

- Advanced search functionality to find products by name

- Filter products by categories

- Intuitive user interface for efficient product discovery

Search [Name]and Filter [Category] Product:

2.4 Demand Forecast Integration

- Visual representation of demand forecasts using Chart.js

- Linear plot showing relationship between demand and selling price

- Multi-product selection for comparative analysis

- Update demand forecast timely as user updates the product .

Demand Forecast Visualization:

2.5 Pricing Optimization

- Algorithmic determination of optimal product prices

- Display of optimized pricing recommendations in tabular format

- Comparison between current and optimized prices

- Update Optimized Prices timely as user updates the product .

Pricing Optimization View:

Product Name	Product Category	Description	Cost Price	Selling Price	Demand forecast	Cost / Optimized Price
Eco-Friendly Water Bottle12	Outdoor & Sports	A sustainable, reusable water bottl	$ 5	$ 5	250	5 11.5
Organic Cotton T-Shirt	Wearables	Soft, breathable t-shirt made from	$ 10	$ 8	209	10 8
Smart Home Hub	Home Automation	Control all your smart home device	$ 40	$ 99.99	90	40 95
Electric Scooter	Transportation	Lightweight electric scooter with a	$ 150	$ 299.99	50	150 285
Noise-Canceling Headphones	Electronics	Over-ear headphones with active n	$ 50	$ 129.99	110	50 125
Smartwatch	Wearables	Feature-packed smartwatch with h	$ 70	$ 149.99	160	70 145
Portable Solar Charger	Outdoor & Sports	Compact solar charger for outdoor	$ 20	$ 39.99	170	20 38
Fitness Tracker	Wearables	Wearable fitness tracker with sleep	$ 30	$ 59.99	200	30 57
Bluetooth Speaker	Electronics	Portable Bluetooth speaker with ex	$ 15	$ 45.99	240	15 43

3. User Workflows

3.1 New User Registration and Verification

1. User navigates to registration page

2. User enters details and selects role (Admin/Supplier/Buyer)

3. System sends verification email

4. User verifies email through the provided link

5. User can now log in with credentials

3.2 Product Management Workflow

1. User logs in

2. Navigates to Product Management section or Price Optimization Section

3. Can view existing products

4. Can add new products (restricted for Buyers)

5. Can edit product details (restricted for Buyers)

6. Can delete products (restricted for Buyers)

7. Selects one or multiple products.

8. Views the demand forecast visualization.

9. Analyzes the relationship between price and demand.

3.4 Price Optimization Process

1. User navigates to Price Optimization section

2. Views recommended optimized prices for products

3. Compares current prices with optimized recommendations

4. Makes informed pricing decisions

4. Database Structure

The application uses a MySQL database with the following key tables:

Tables Overview

Table Name	Description
roles	Defines user roles (admin, buyer, supplier)
users	Stores user account details
categories	Categories of products with associated tax rates
products	Product details and pricing
verification_tokens	Stores tokens for verifying users (e.g., via email)

5. Security Implementation

- JWT token-based authentication for API security

- Password hashing for secure user authentication

- Email verification to prevent unauthorized accounts

- Role-based access control to ensure appropriate permissions

6. Conclusion

The Price Optimization Tool provides a comprehensive solution for businesses to optimize their pricing strategies. By integrating product management, demand forecasting, and pricing optimization into a single platform, the application enables data-driven decision-making for maximizing profitability while maintaining a user-friendly interface.