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Courier Tracking System

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Abstract:
An **online courier delivery and tracking system** is a web- or mobile-based platform that enables the automated management of parcel booking, shipment processing, real-time tracking, and delivery confirmation. It integrates customers, courier service providers, and administrators into a centralized digital environment to streamline logistics operations and improve service transparency.
In such systems, users can create accounts, schedule pickups, generate shipping labels, calculate delivery costs, and make secure online payments. Once a parcel is dispatched, tracking information is updated at each transit point and made accessible through a unique tracking number. Modern implementations often incorporate technologies such as GPS tracking, barcode/QR code scanning, cloud databases, and notification services (SMS/email) to provide real-time status updates and estimated delivery times.

Keywords: Courier Tracking, GPS, Real-Time Monitoring, Cloud Database, Logistics Management, Android Application, Delivery Automation.

1.INTRODUCTION

The rapid growth of e-commerce and digital services has significantly increased the demand for efficient courier and logistics solutions. Traditional courier management systems often rely on manual processes, paper-based documentation, and limited tracking capabilities, which can lead to delays, errors, and reduced customer satisfaction. In today's fast-paced environment, customers expect real-time updates, transparency, and faster delivery services . An *online courier delivery and tracking system* addresses these challenges by integrating information technology with logistics operations. The system enables users to book shipments, schedule pickups, track parcels in real time, and receive automated notifications. By utilizing technologies such as cloud databases, GPS tracking, and barcode scanning, the platform improves operational efficiency and reduces human error.
As a result, online courier systems contribute to improved service reliability, cost efficiency, and customer satisfaction in modern logistics management.

2.RELATED WORK

Several researchers and commercial systems have contributed to the evolution of courier delivery and tracking systems, moving gradually from manual operations toward automated, real-time logistics solutions. Early academic work focused on basic tracking and shipment management. For example, the **"Automatic Courier Management System"** project by Durai et al. explored fundamental parcel registration, tracking, and status update functionalities typical of early digital courier systems. Similarly, general web-based parcel tracking system designs have been proposed that focus on enabling users to check parcel status online and maintain electronic shipment records Beyond academic prototypes, commercial platforms like After Ship are widely used to aggregate tracking information from global carriers (e.g., UPS, FedEx, DHL) and provide unified shipment visibility for customers and businesses. Similarly, services such as Parcel hero support users in booking and comparing delivery options across multiple courier carriers. Compared to earlier systems that offered *static status updates* and manual data entry, modern tracking solutions integrate real-time GPS tracking, cloud databases, and mobile interfaces to enhance transparency and customer experience. However, challenges remain in optimizing routes, improving indoor or dense urban tracking accuracy (as discussed in research on UWB-based tracking), and scaling systems for high volume operations.

3. METHODOLOGY

Algorithms Used

• Tracking ID Generation Algorithm:

This algorithm generates a unique tracking ID for every parcel to ensure accurate identification and tracking throughout the delivery process. The ID is created using a combination of date, time, and a unique random or incremental value.

Tracking ID = DDMMYYYY + HHMMSS + Random Number

Example

If a parcel is booked on **25/03/2026** at **10:45:30** and the random number generated is **247**, then:

Tracking ID = 25032026 + 104530 + 247

Tracking ID = 25032026104530247

This generated ID can then be used by customers and administrators to check the parcel status and shipment details in the system.

• Parcel Tracking Algorithm:

This algorithm is used to monitor and update the real-time status of the parcel. It retrieves parcel details using the tracking ID and updates location and delivery status at each stage.

This algorithm is used to monitor and update the current status of a parcel during the delivery process. It works by using the Tracking ID to retrieve parcel details from the system database and then updating the parcel's current location and delivery status at each stage of the shipment process.

Formula:

$$PTS = TID + L + S + T$$

Where:

- **PTS** = Parcel Tracking Status
- **TID** = Tracking ID
- **L** = Current Location of Parcel
- **S** = Current Status of Parcel
- **T** = Updated Time/Date

Working of the System

Step 1: Parcel Booking and Data Storage

When a user books a courier:

- Sender and receiver details are entered
- Parcel information (weight, type, address) is stored
- A **unique tracking ID** is generated
- All details are saved in the database

Example database fields:

- tracking_id
- sender_name
- receiver_name
- source_address
- destination_address
- parcel_status

Step 2: Tracking ID Generation
- System generates a unique ID using:
  - Current date and time
  - Random number or sequence value

Example format: TRK20260323123456
- Ensures:
  - No duplication
  - Easy identification
  - Fast retrieval

Step 3: Parcel Dispatch
- Parcel is assigned to a courier agent
- Status updated to **"Dispatched"**
- Initial location is recorded

Step 4: Parcel Tracking Algorithm
When a user enters the tracking ID:
1. System searches the database using tracking_id
2. Retrieves parcel details
3. Tracks current location (via GPS or manual updates)
4. Updates parcel status at each stage:
   - Booked
   - Dispatched
   - In Transit
   - Out for Delivery
   - Delivered

Step 5: Real-Time Location Update
- Courier updates location using system/app
- Location stored as:
  - current_latitude
  - current_longitude
- Enables real-time tracking

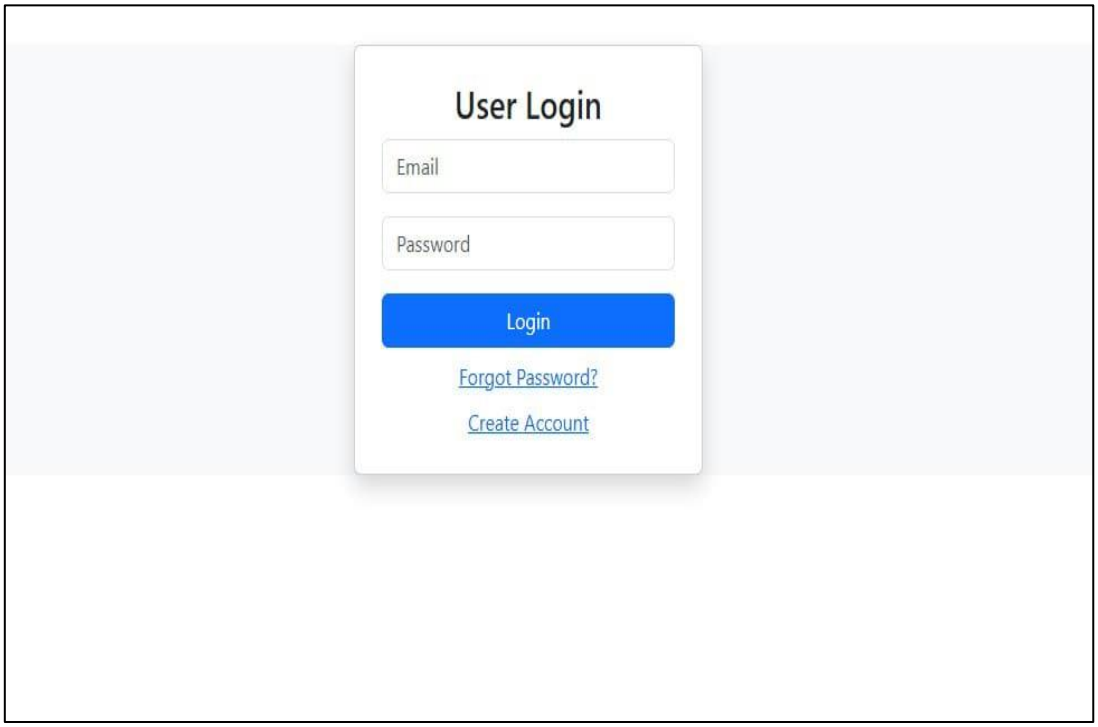
Step 6: Status Update Mechanism
- Automatic/manual updates based on delivery stage
- Status visible to both admin and user

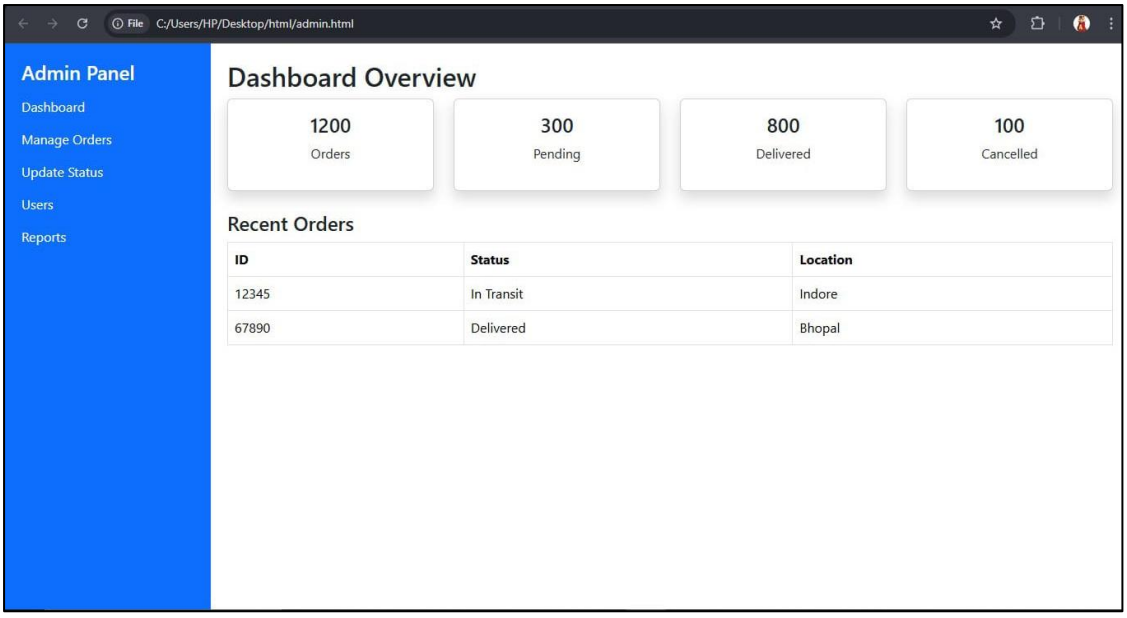
Step 7: User Tracking Interface
- User enters tracking ID
- System displays:
  - Current status
  - Current location
  - Estimated delivery time

Step 8: Notification System
- Notifications sent via SMS/Email:
  - Parcel booked
  - Dispatched

- Out for delivery
- Delivered

4. OUTPUT





5. CONCLUSION

The Courier Tracking Application offers an innovative and reliable approach to managing modern delivery systems. It successfully bridges the gap between customers and courier service providers by offering a real-time, accurate, and transparent tracking mechanism.

6. FUTURE SCOPE

- Integration of AI for route optimization and performance analysis.
- Use of IoT sensors to monitor parcel condition (temperature, vibration).
- Blockchain technology for secure and transparent tracking data.
- Implementation of 5G for faster and real-time updates.
- Reduction in fuel consumption and improved delivery efficiency.
- Development of a smarter and more sustainable logistics system.

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