

System Design & Functional Documentation

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Project Title: Vehicle Rental System (Pathek)

1. System Overview

Pathek is a strong web-based vehicle rental application that was developed with the help of PHP (MVC architecture), MySQL, and Bootstrap 5. The system allows a peer to peer vehicle rental market place in which:

- Renters are able to window shop, search and make vehicle (car, bikes, scooters) reservations.
- Owners will have the ability to book cars, manage the bookings, and earn income.
- Admins manage the ecosystem, such as listing and user verification.

This paper identifies the basic functional flows of the system, CRUD operations, and technical logic that illustrates the overall implementation of the project.

2. Design & Structure

2.1 Styling & UI/UX

The application follows a contemporary and professional style that aims at developing trust and clarity and is called Pathek Green.

- **Color Palette**
Primary Brand Color:
#2E6F40 (Forest Green)
Used for Buttons, branding elements, and primary actions.
- Secondary Colors:
White and F8F9FA (Light Gray).
For clean readable backgrounds.
- Accent Color:
#FFC107 (Amber)
Leveraged to use warnings and high-state indicators.

- **Typography**
Font Family: Outfit, sans-serif (Google Fonts).
- **Framework**
Bootstrap 5
Applied to responsive grid layouts, modals, forms & reusable UI components.

2.2 Key System Pages

The system is divided into various well-maintained functional pages:

Public Views

- Home
- Browse Vehicles
- Contact Us

Renter Views

- My Bookings
- Wishlist
- Profile

Owner Views

- Owner Dashboard and all the same services as a renter

Admin Views

- Admin Dashboard
- Operations
- Management
- Systems
- Profile

3. Core Functional Flows & Logic

3.1 Authentication & Security Flow

The system follows a secure authentication system through session handling and email based OTP verification.

- User Registers (Create)
- Registration form is submitted including (Name, Email, Password, Role).
- Password is safely hashed with passwordhash ().

- An OTP of 6 digits is generated and is secure.
- A pending user record is established in the database.
- OTP is sent through email.

Data Flow:

Controller → EasyMailer → SMTP Server → User Inbox

OTP Verification (Logic)

The user enters the received OTP and the system compares the input with the OTP hash stored against the session.

On success, the status of the user is changed to active and initialization of the user session is complete.

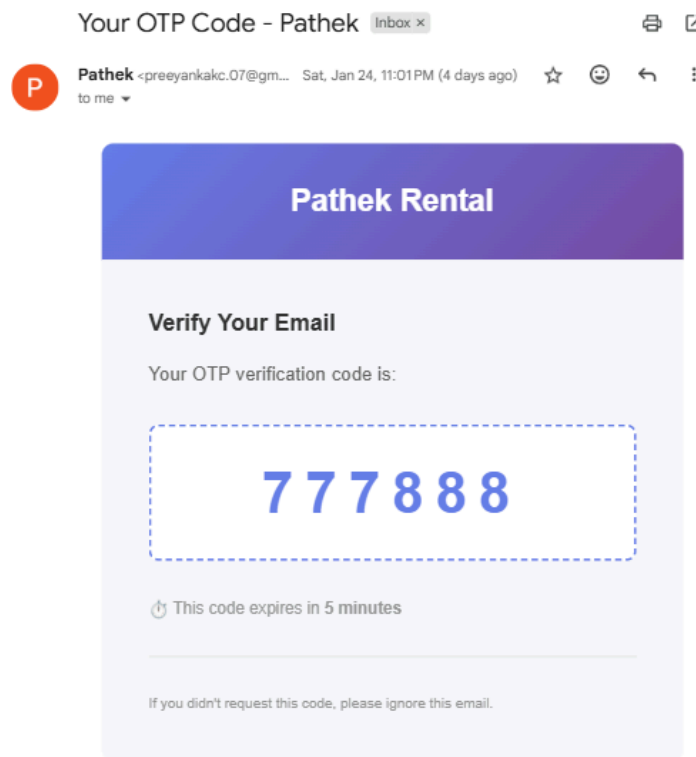


Figure 1: OTP sent successfully to the user's email address

3.2 Vehicle Management (Owner CRUD)

Owners operate their vehicle list using a special dashboard.

- **Listing a Vehicle (Create)**
The owner enters car information (Brand, Model, Pricing, Features) and vehicle images. The vehicles table has the data with the approvalstatus = pending. Listing will not be listed until the approval of the administration.

- **Inventory Management (Read / Update / Delete)**
Read: Tabular listing of vehicles through OwnerVehicleController.
Update: Edit form is available for updating and correcting the vehicles related details.
Delete: Deleting Vehicles for owners and Deleting users for admin.

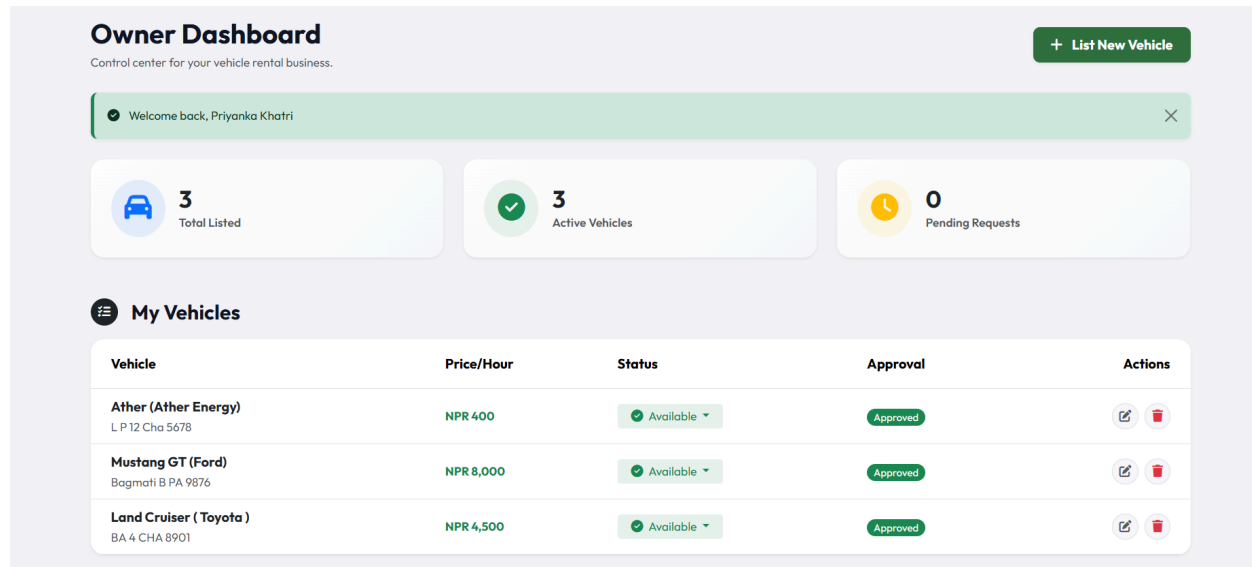


Figure 2: Owner's Dashboard CRUD operations

3.3 Booking System Workflow

The module is the business logic that forms the gist of the business between renters and owners.

Booking Process

- On the vehicle detail page, Renter chooses the date of booking.
- Within the database date conflicts are checked using overlap logic in the database.
- Provided this is possible, a booking record is created and its status is set to = pending.

Status Management

- The booking can be seen in the Bookings Dashboard of the owner.
- The booking can be Confirmed or rejected by the Owner.
- Renter also views the status updates in real-time in My Bookings.

My Rentals

Booking request submitted successfully!

Vehicle	Dates	Total Price	Owner	Status	Actions
<div> <div></div> <div>Royal Enfield (Reborn Series) Classic 350</div> <div>Bike</div> </div>	<div>Jan 28</div> <div>to Jan 29, 2026</div>	NPR 1,200	<div>Sarala Basnet</div> <div>9848193160</div>	Pending	<div>Cancel</div>

Figure 3: My Rentals booking pending Status

3.4 Admin Administration (System Control)

The control panel serves as the control centre to the system.

Major Functionalities

- Verification Queue:**
 Validate and Accept the forms from owners.
- Vehicle Approval:**
 Ensures that owners are following rules while listing the vehicles.
- System Statistics:**
 Live number of users, vehicles, reservations, messages and requests.

AdminPanel

Dashboard

Operations

Management

System

System Administrator

Dashboard Overview

Welcome back, System Administrator

Manage Vehicles

VEHICLES

6

OWNERS

2

RENTERS

3

PENDING REQUESTS

0

Verifications

NEW MESSAGES

2

User inquiries

Recent Vehicles

View All

VEHICLE DETAILS	PRICE	STATUS	ACTION
<div> <div></div> <div>Royal Enfield (Reborn Series) Classic 350</div> <div>Sarala Basnet</div> </div>	NPR 600	APPROVED	
<div> <div></div> <div>Mahindra Scorpio-N ZBL</div> <div>Sarala Basnet</div> </div>	NPR 1,800	APPROVED	

Pending Verifications

View All

APPLICANT	SUBMITTED	REVIEW
<div></div> <div>No pending verifications.</div>		

4. Technical Implementation Highlights

- **MVC Architecture:**

- Models are used to deal with database interactions.
- Logics are controlled by controllers.
- Views render HTML output.

- **Security Measures:**

- SQL Injection Prevention through statements (bind_param).
- XSS Prevention with htmlspecialchars() on user submitted data.
- Role-based access control based on middleware-style route checks.

- **Database Design:**

- Normalized schema.
- User-vehicle and user-booking foreign keys.
- The system ensures referential integrity and scalability.

5. Images References

<https://cars.usnews.com/cars-trucks/ford/mustang/photos-interior>

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<https://www.instagram.com/p/C9SL5PnKPM9/>

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<https://sparkcar.org/>

6. Appendices

