Intelligent Vehicle-Based Parking Management

DSBA

Smart Parking System

Database Management System

by Ravi Manikandan

PROBLEM

THE PARKING DILEMMA

Current Challenges:

- Manual parking management leads to inefficiency
- No real-time slot availability tracking
- Inaccurate billing based on fixed rates
- Long queues during peak hours
- Security concerns with unmonitored parking
- No data analytics for optimization

STATEMENT

SOLUTION ↙

📱 REAL-TIME SLOT MONITORING

🚗 VEHICLE-BASED DYNAMIC PRICING

📊 ADMIN & USER DASHBOARDS

💳 MULTIPLE PAYMENT OPTIONS

Technical Architecture

Front End

- HTML5, CSS3, JavaScript
- Bootstrap 5 for responsive design
- Chart.js for data visualization

Back End

- Python Flask framework
- MySQL database

Key Modules

1. Authentication & Authorization
2. Slot Management System
3. Booking & Checkout Engine
4. Payment Processing
5. Analytics & Reporting

DATABASE SCHEMA

USER TABLE
- User ID
- Name
- Email
- Roll
- Password

SLOT TABLE
- Slot ID
- Number
- Area
- Type
- Status

BOOKING TABLE
- Booking, Slot ID
- User ID
- Vehicle Info
- Check in/out time
- Fee, Status

AREA TABLE
- Area ID
- Name
- Total Slots

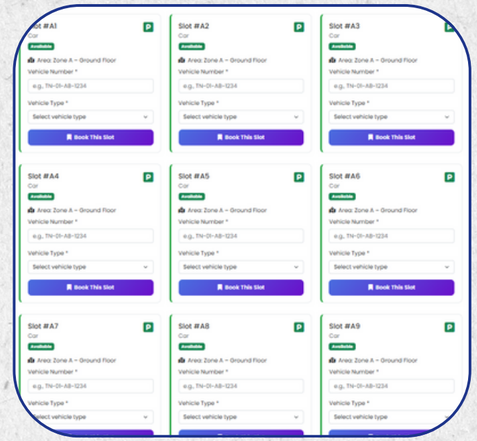
RELATIONSHIP

One User → Many Bookings

One Slot → One Active Booking

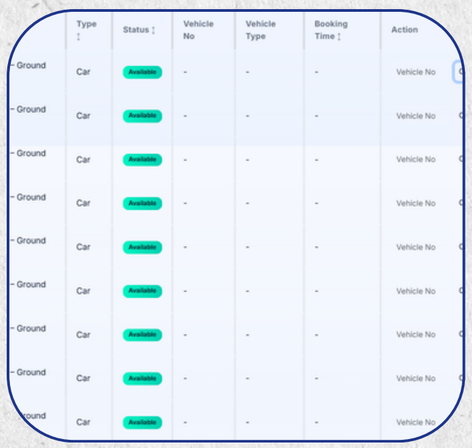
Many Slots → One Area

User Experience



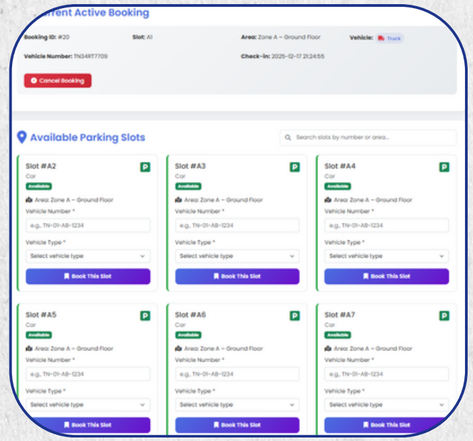
SLOT DISCOVERY

- Search and filter available slots
- View slot details and pricing



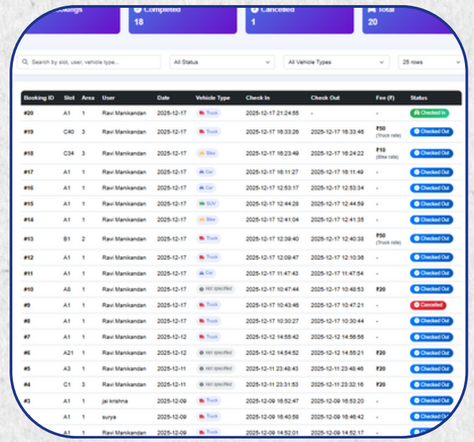
SMART BOOKING

- Select vehicle type (Car/SUV/Truck/Bike)
- Enter vehicle number
- Instant booking confirmation



ACTIVE BOOKING MANAGEMENT

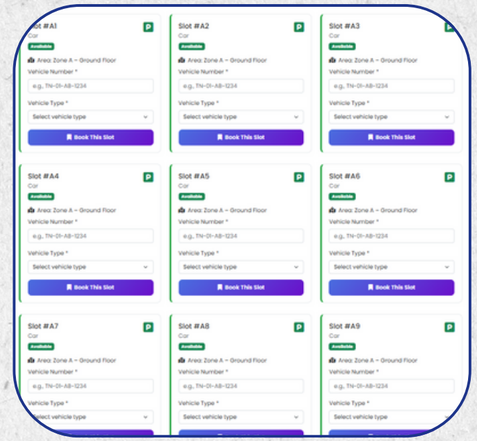
- View current booking details
- Cancel booking option
- Checkout process



BOOKING HISTORY

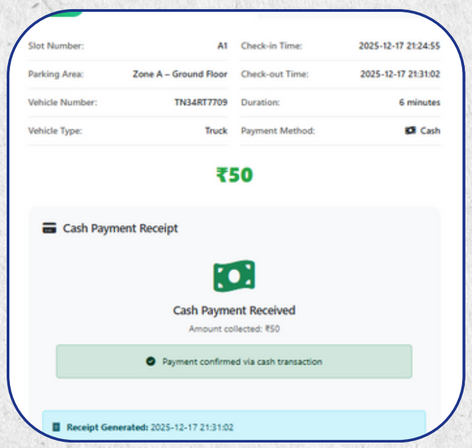
- Complete transaction history
- Fee details with vehicle type rates

Admin Management



Real Time Monitoring

- Live view of all parking slots
- Color-coded availability status

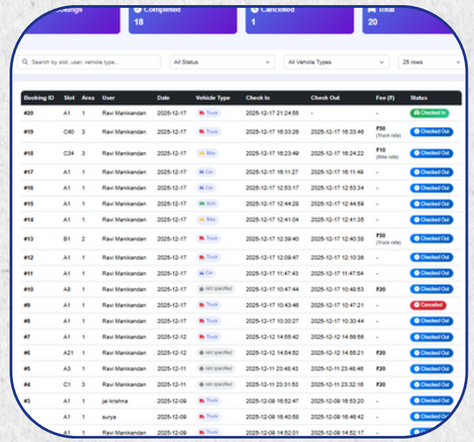


Vehicle Checkout

- Payment method selection (Cash/QR)
- Automated fee calculation
- Receipt generation

Analytics Dashboard

- Occupancy rate analytics
- Vehicle type distribution



Booking History

- Complete system-wide history
- Advanced filtering and search
- Export functionality

VEHICLE-BASED DYNAMIC PRICING

Vehicle Type	Rate per Minute
🚗 Car	₹3
🚐 SUV	₹4
🚚 Truck	₹5
🏍️ Bike/Scooter	₹1

Benefits:

✓ Fair pricing based on vehicle size

✓ Accurate billing by minute

✓ Clear minimum charges

✓ Transparent calculation display

EXAMPLE

Car parked for 2 hours = 120 × ₹3 = ₹360

SEAMLESS PAYMENT PROCESSING

PAYMENT OPTIONS

Cash Payment

- Traditional cash collection
- Counter payment system
- Printed/electronic receipt

Cash Payment

- Generate unique QR for each transaction
- UPI integration (PhonePe, GPay, Paytm)
- Instant payment confirmation

Conclusion

Project Achievements:

- Developed a complete smart parking solution
- Implemented vehicle-based dynamic pricing
- Created intuitive admin and user interfaces
- Achieved real-time slot monitoring
- Integrated multiple payment options

Key Takeaways:

- Smart parking systems significantly improve efficiency
- Vehicle-based pricing ensures fairness
- Real-time data enhances user experience
- Automation reduces operational costs

THANK *YOU!

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