# GaadiPark

## A Vehicle Parking App

A Project Report

## Author

Name: Litesh
Roll Number: 24f2003468
Email: 24f2003468@ds.study.iitm.ac.in

## About Me

My name is Litesh. I developed this full-stack vehicle parking application as my first major development project. This process has been fundamental to building my skills in both front-end and back-end technologies.

## Project Details

***GaadiPark*** is a comprehensive vehicle parking management system designed for multiple users and administrators. It supports efficient parking lot management, vehicle tracking, and **electric vehicle (EV) regulation**. Both users and admins can view summary charts for parking analytics

I have used AI/LLM for my frontend and to learn the new things in the backend.

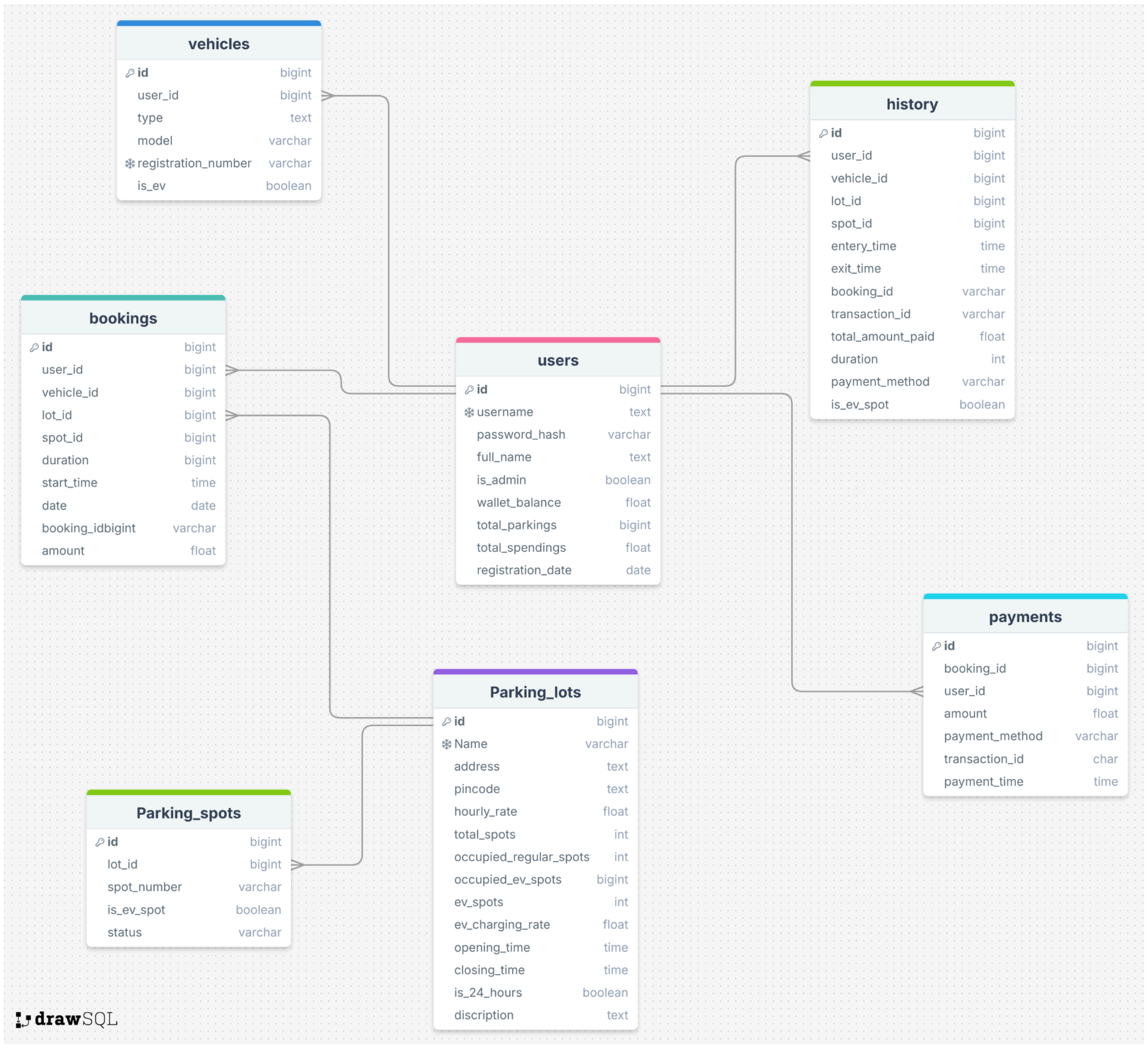
## Technologies Used

**Backend:** Flask,
**Frontend:** Jinja2 templating, HTML, CSS
**Database:** SQLite
**Charts:** Chart.js

## DB Schema Design

The database is designed with seven tables to manage the entire parking lifecycle. The **`Users`** and **`Vehicles`** tables store customer and car details separately to avoid repeating information.

**`Parking lots`** and **`parking spots`** define the physical parking infrastructure. The process is handled by three interconnected tables: **`Bookings`** for active sessions, **`Payments`** for transaction details, and **`History`** to archive completed parking sessions for long-term records. This normalized structure ensures data is clean, organized, and easy to manage.



| vehicles | |
|---|---|
| id | bigint |
| user_id | bigint |
| type | text |
| model | varchar |
| registration_number | varchar |
| is_ev | boolean |

| history | |
|---|---|
| id | bigint |
| user_id | bigint |
| vehicle_id | bigint |
| lot_id | bigint |
| spot_id | bigint |
| entery_time | time |
| exit_time | time |
| booking_id | varchar |
| transaction_id | varchar |
| total_amount_paid | float |
| duration | int |
| payment_method | varchar |
| is_ev_spot | boolean |

| bookings | |
|---|---|
| id | bigint |
| user_id | bigint |
| vehicle_id | bigint |
| lot_id | bigint |
| spot_id | bigint |
| duration | bigint |
| start_time | time |
| date | date |
| booking_idbigint | varchar |
| amount | float |

| users | |
|---|---|
| id | bigint |
| username | text |
| password_hash | varchar |
| full_name | text |
| is_admin | boolean |
| wallet_balance | float |
| total_parkings | bigint |
| total_spendings | float |
| registration_date | date |

| payments | |
|---|---|
| id | bigint |
| booking_id | bigint |
| user_id | bigint |
| amount | float |
| payment_method | varchar |
| transaction_id | char |
| payment_time | time |

| Parking_lots | |
|---|---|
| id | bigint |
| Name | varchar |
| address | text |
| pincode | text |
| hourly_rate | float |
| total_spots | int |
| occupied_regular_spots | int |
| occupied_ev_spots | bigint |
| ev_spots | int |
| ev_charging_rate | float |
| opening_time | time |
| closing_time | time |
| is_24_hours | boolean |
| discription | text |

| Parking_spots | |
|---|---|
| id | bigint |
| lot_id | bigint |
| spot_number | varchar |
| is_ev_spot | boolean |
| status | varchar |

## Architecture & Features

### Structure:

```
GadiPark/
├── app.py
├── config.py
├── README.md
├── requirements.txt
├── instance/
│   └── database.sqlite3
├── models/
│   ├── booking.py
│   ├── history.py
│   ├── parking_lot.py
│   ├── parking_spot.py
│   ├── payment.py
│   ├── user.py
```

```
├── routes/
│   ├── admin.py
│   ├── auth.py
│   ├── booking.py
│   ├── decorators.py
│   ├── parking.py
│   ├── payment.py
│   ├── profile.py
│   ├── search.py
│   ├── user.py
│   ├── user_activity.py
│   └── __init__.py
├── static/
│   ├── css/
│   │   ├── admin_charts.css
│   │   ├── admin_dashboard.css
│   │   ├── admin_sidebar.css
│   │   ├── base.css
│   │   ├── booking_confirmed.css
│   │   ├── find_parking.css
│   │   ├── history.css
│   │   ├── index.css
│   │   ├── login.css
│   │   ├── modal.css
│   │   ├── parking_lot_details.css
│   │   ├── payment.css
```

```
│   │   ├── profile.css
│   │   ├── receipt.css
│   │   ├── signup.css
│   │   ├── user_dashboard.css
│   │   ├── user_navbar.css
│   │   ├── user_summery.css
│   │   └── vehicle.css
│   ├── images/
│   │   ├── login_final.svg
│   │   └── signup_final.svg
│   └── js/
│       ├── admin_dashboard.js
│       ├── find_parking.js
│       ├── parking_lot_details.js
│       ├── profile.js
│       └── user_dashboard.js
└── templates/
    ├── admin_charts.html
    ├── admin_dashboard.html
    ├── admin_sidebar.html
    ├── base.html
    ├── booking_confirmed.html
    ├── find_parking.html
    ├── history.html
    ├── index.html
```

```
    ├── login.html
    ├── parking_lot_details.html
    ├── payment.html
    ├── profile.html
    ├── receipt.html
    ├── signup.html
    ├── users_summery.html
    ├── user_charts.html
    ├── user_dashboard.html
    ├── user_navbar.html
    └── vehicle.html
```

| **Feature** | **Implementation Summary** |
|---|---|
| **User Authentication** | Login system using Flask sessions with admin/user role-based access |
| **Admin Dashboard** | Manage users, parking lots, and track system activity |
| **Parking Lot Management** | Add, edit, delete lots with validations and spot auto-generation |
| **Booking System** | Real-time parking spot booking with duration & charge calculation |
| **EV Spot Support** | Separate EV spot tracking and EV charging rate configuration |
| **Payment Handling** | Booking and wallet top-up payments with dynamic amount handling |
| **Booking History** | View and download past booking records and receipts |
| **Spot Update Restriction** | Block spot count changes when active bookings exist in a lot |
| **Dynamic Spot Numbering** | Spot IDs auto-generated like `A1R1 and A1E1` based on lot ID & type |
| **Search in Admin Panel** | Search bookings by `user_id`, `booking_id`, `lot`, or `spot no.` |
| **Landing Page** | Static homepage with sections like Features, Pricing, How It Works |
| **Summary Charts** | Admin/user-wise charts using Chart.js for insights |
| **Modular Flask Structure** | Organized using Blueprints, models, static files, and templates |

## Video

https://drive.google.com/file/d/1WgnR7HVwi3zRaK9wxqfzpPgFC0SK3xMH/view?usp=sharing