



SMART CAR PARKING SYSTEM

THE BEST WAY TO ENHANCE SECURITY FOR OUR CARS

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INTRODUCTION/DOMAIN DESCRIPTION:

- Welcome to our presentation on the Smart Car Parking System. With the increasing demand for efficient parking solutions in urban areas, traditional methods often fall short, leading to frustration, wasted time, and traffic congestion.
- Our project aims to revolutionize the parking experience with a smooth user interface that allows users to easily book a parking slot at their destination.
- In our project we have mainly focused on the **Machine learning** for the car detection, **Database Management System** for storing the user's data, the data of the locations and **Web Designing** to make a user friendly interface.

MOTIVATION:

Kolkata is 6th in the ranking of the car thefts in India. If the cars are parked only in the destined places we can reduce this number. That's why we found a smart design that can be applicable for parking the cars that can reduce this amount and this is the motivation for our project work.

News > India News > Vehicle Thefts In India Saw 2.5 Times Spike In 2023. Delhi Tops The Chart

Vehicle Thefts In India Saw 2.5 Times Spike In 2023. Delhi Tops The Chart

The report revealed that the national capital witnesses a vehicle theft every 14 minutes, resulting in 105 cases each day in 2023.

India News | Edited by NDTV News Desk | Updated: March 14, 2024 8:08 pm IST

On the other hand, Kolkata has appeared to be the safest city in terms of car thefts among the six metropolitan cities. Chennai ranked second, and Bengaluru third as cities prone to vehicle thefts. While Hyderabad bagged fourth spot, Mumbai fifth and Kolkata sixth in cities prone to vehicle thefts.



REQUIREMENT ANALYSIS SPECIFICATION:

Frontend

React

Backend

Node.js version 20.11.1

Express version 4.19.2

Mongoose version 8.4.0

Database

MongoDB

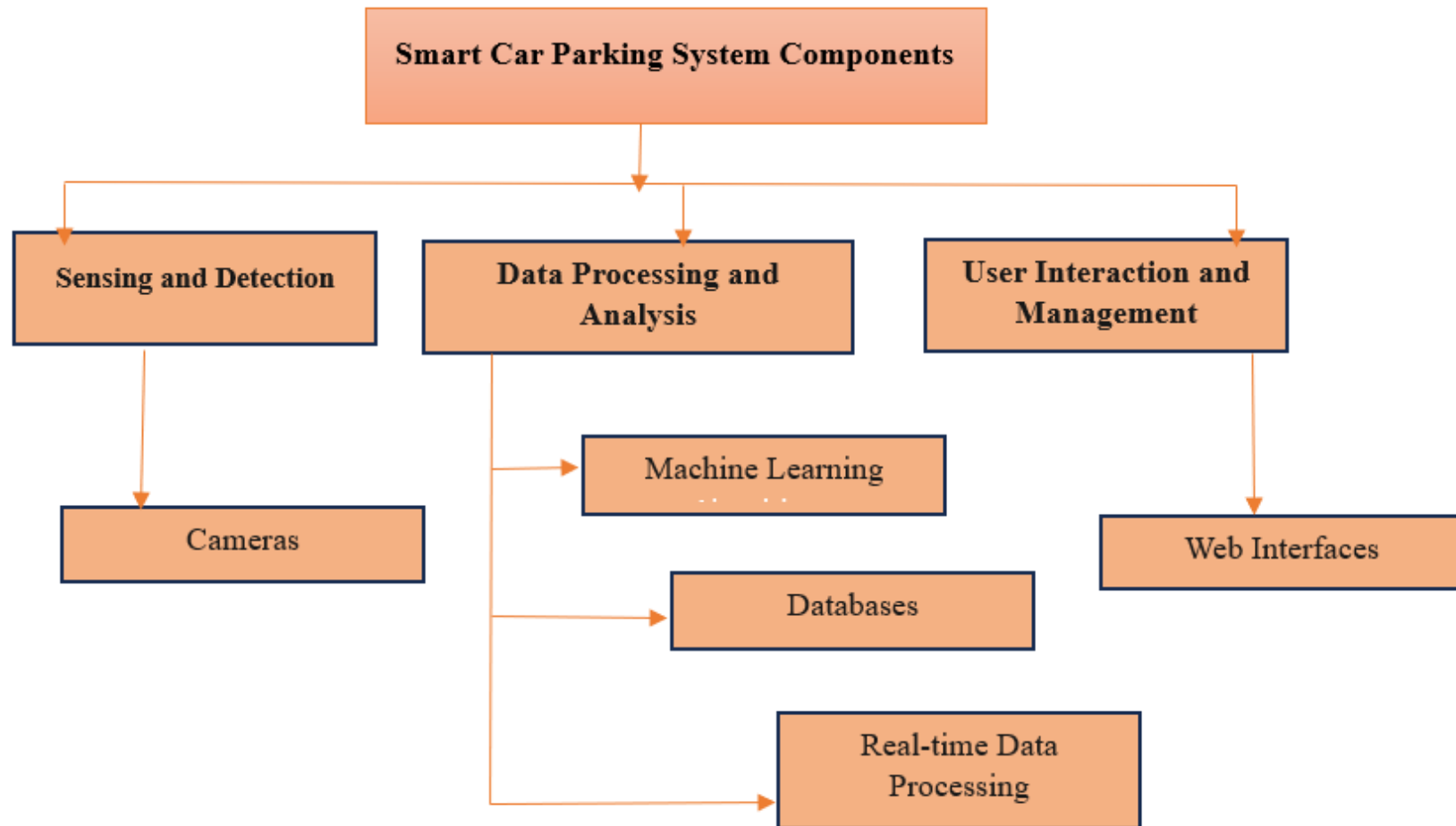
Browser

Internet Explorer and Others

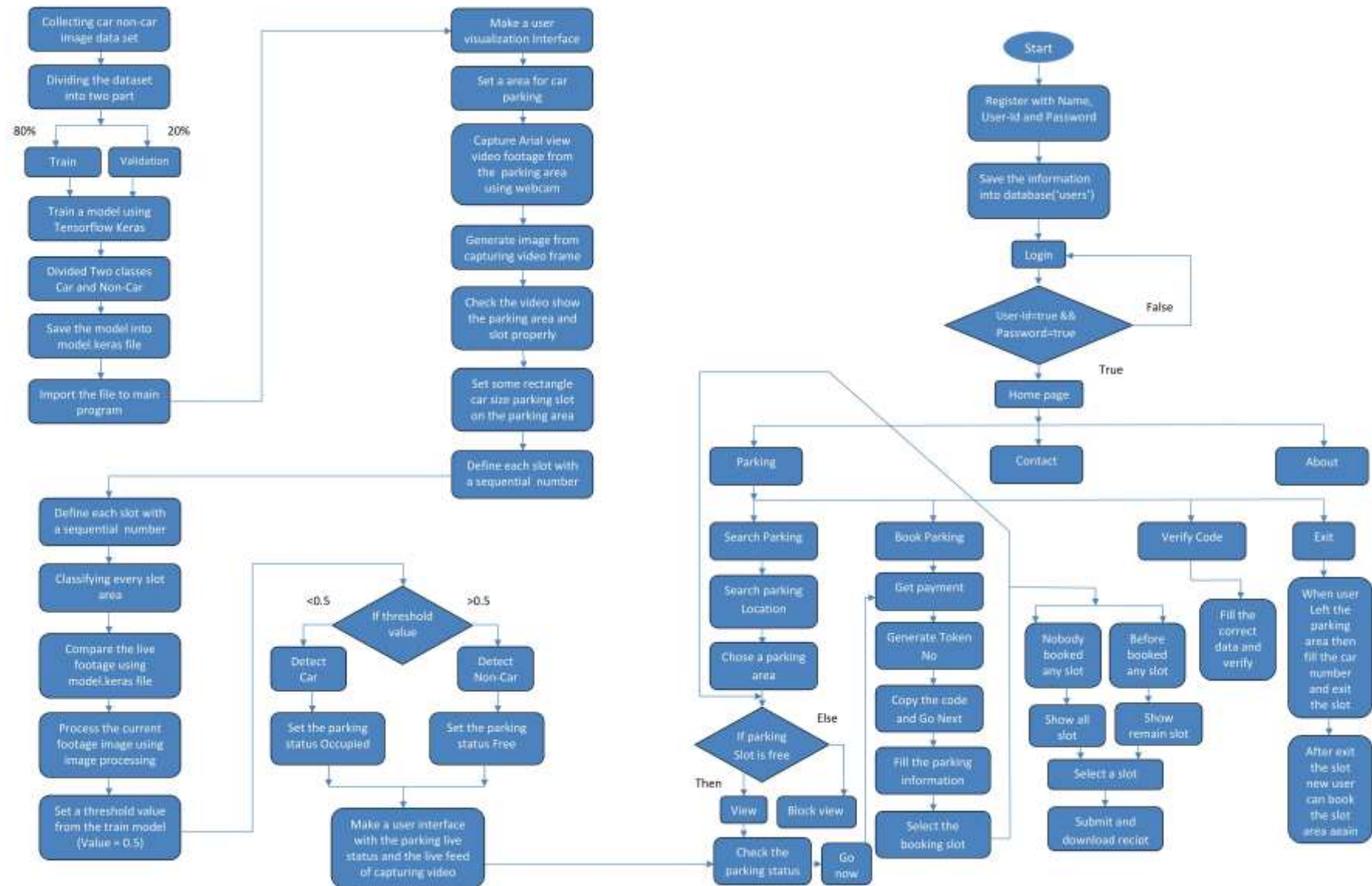
User Requirements:

Internet Browser
& Some knowledge of English

Components of our System:



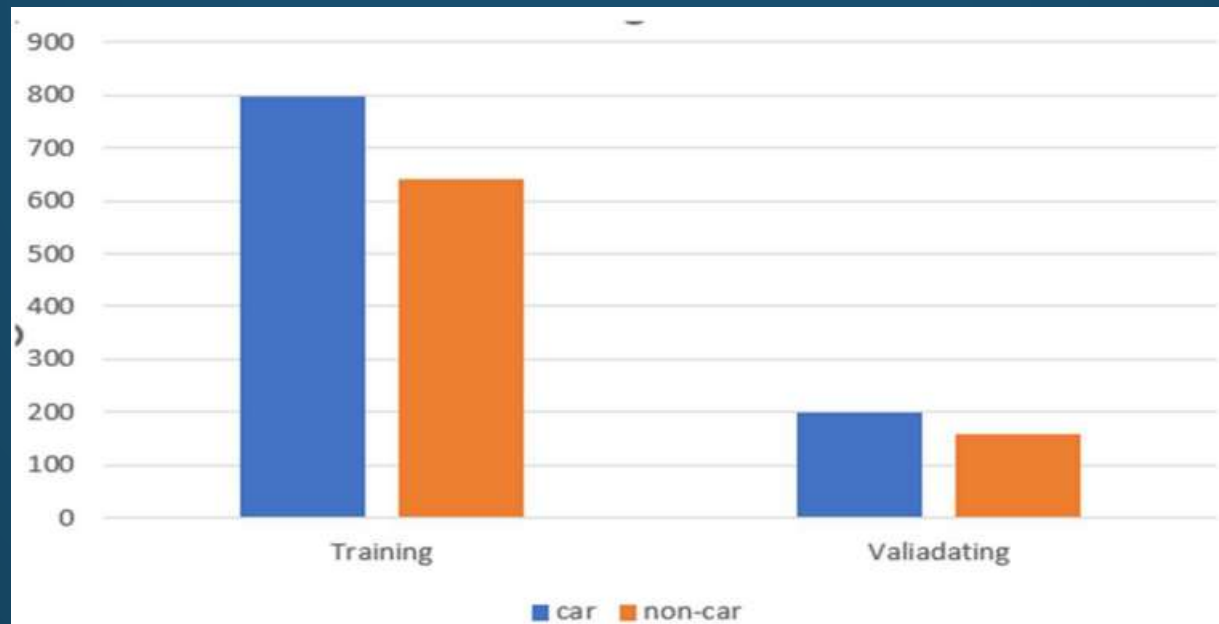
FLOW CHART



Data collection for the training purpose of car classification

We collect car and non-car image for two different dataset one for training purpose another for validations purpose . The training images are 1436 belong to two class(car,non-car).the validation images are 360 belongs to two class(car,non-car).

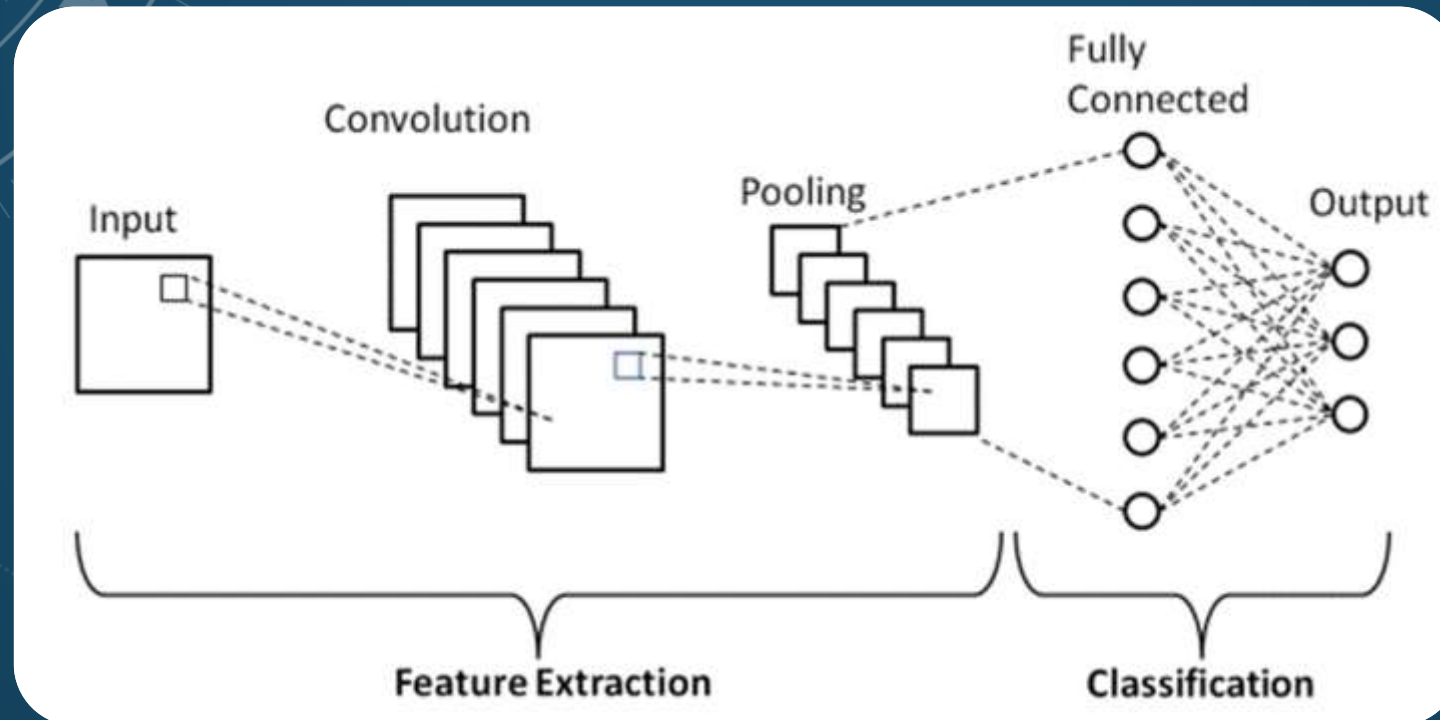
Serial No.	Class	Training Set	Validation set
01	Car	796	200
02	Non-car	640	160



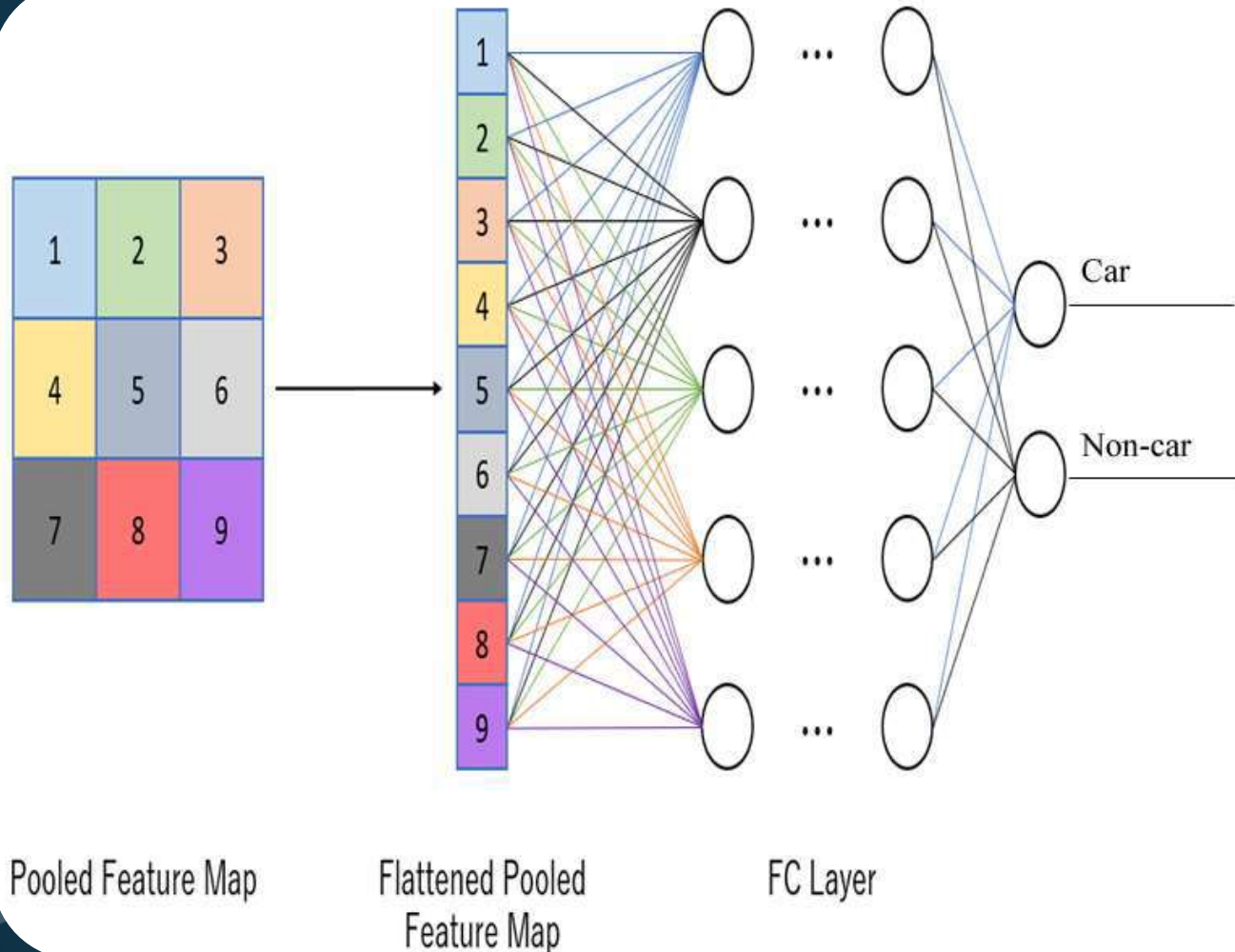
Car classification environment:

For the classification of car we have used the **Convolutional Neural Network (CNN) Model**

- A **Convolutional Neural Network (CNN)** is a type of Deep Learning neural network architecture commonly used in Computer Vision. Computer vision is a field of Artificial Intelligence that enables a computer to understand and interpret the image or visual data.



Car Non car classification by CNN model:

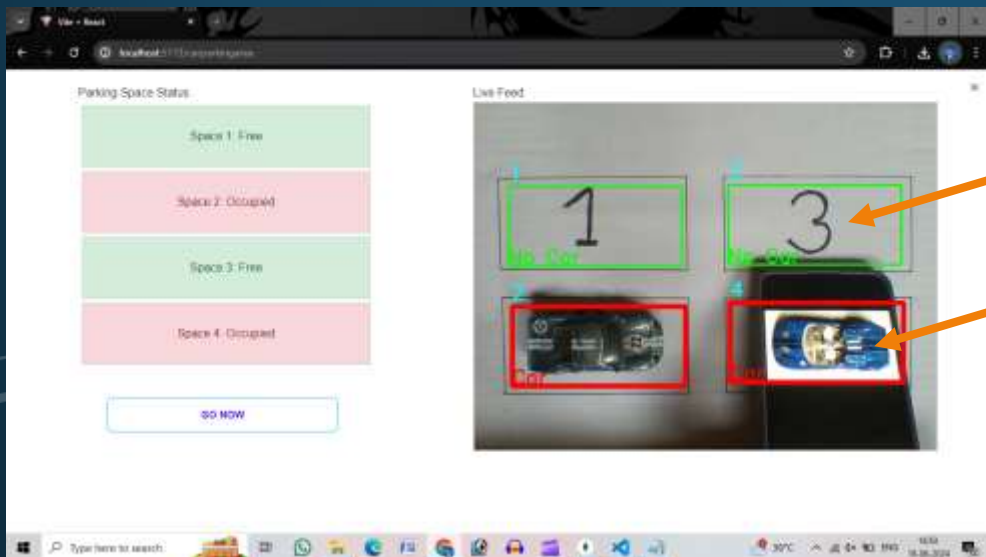
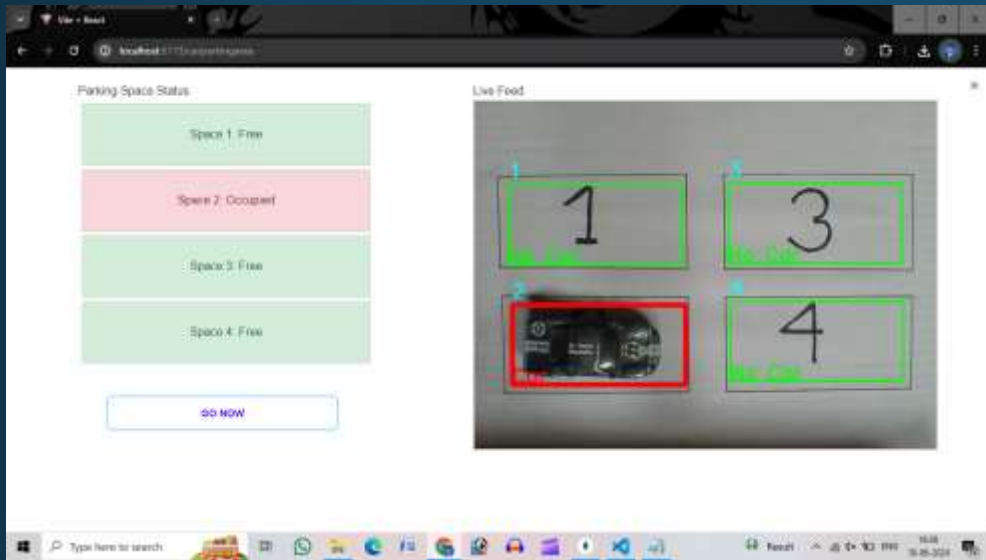


- First we trained the model with real time data augmentation to generate batches of training and validation.
- Then we built the CNN mode, Add convolutional layers with activation functions (ReLU), followed by max-pooling layers.
- Flatten the output and add dense layers with ReLU activation.
- Include dropout layers for regularization and a final dense layer with sigmoid activation for binary classification.

IMPLEMENTATION:

Machine Learning for car classification

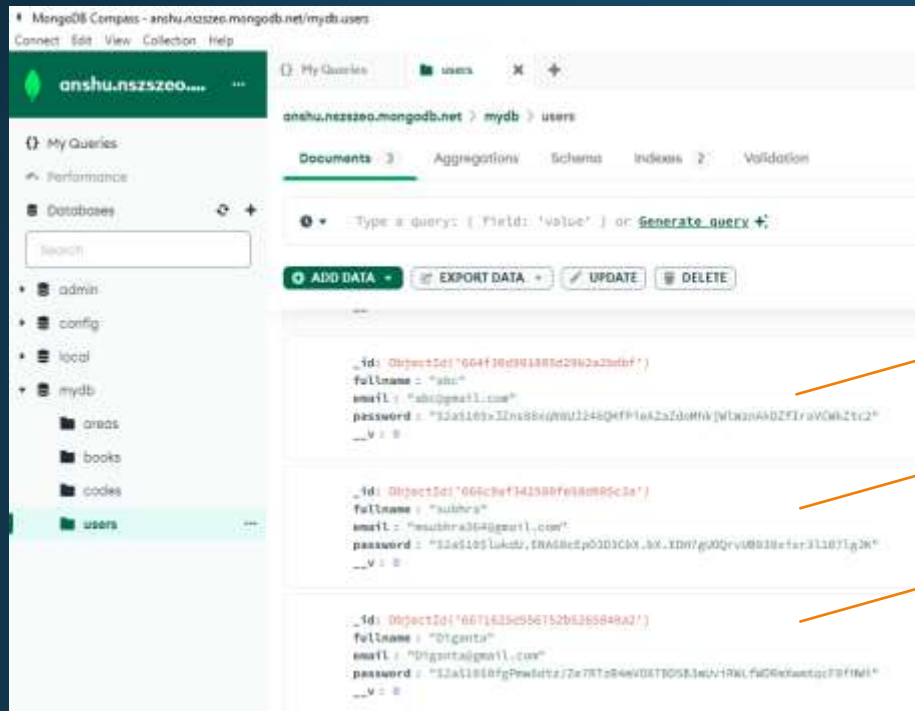
We have trained our model such that it can recognize the car, so when in the parking slot it can recognize a car then in the live feed view it shows that there is a car so when a user views the parking slot he becomes aware about the free and occupied parking area.



Free Space, user can book

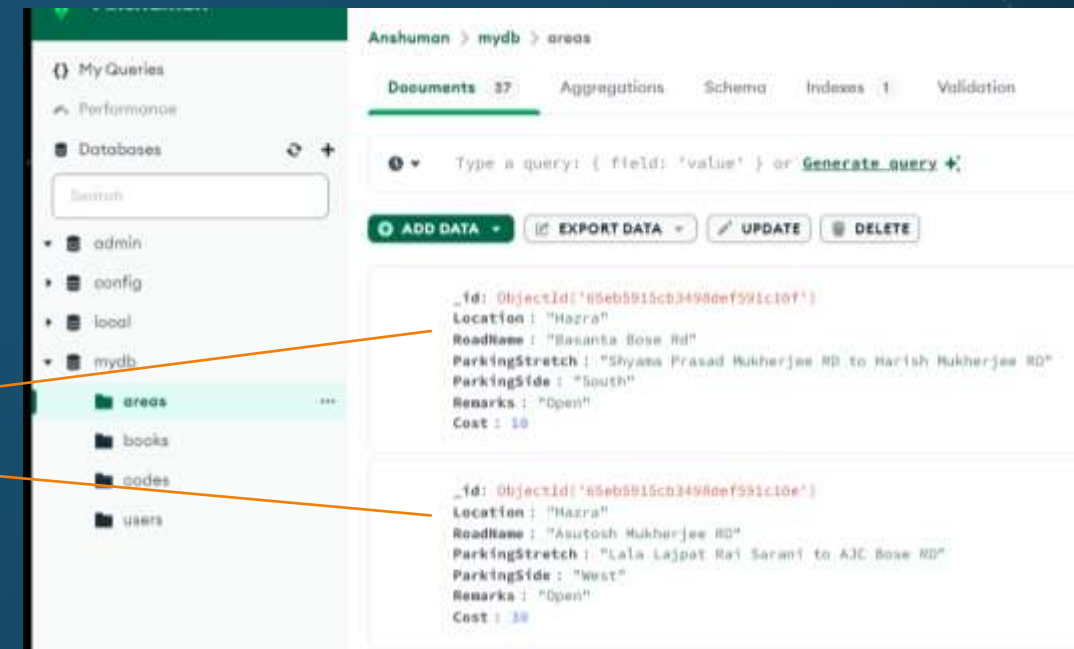
Occupied Space, already booked by another user. One can book it when the existing user exits.

Data and how they are stored in the database

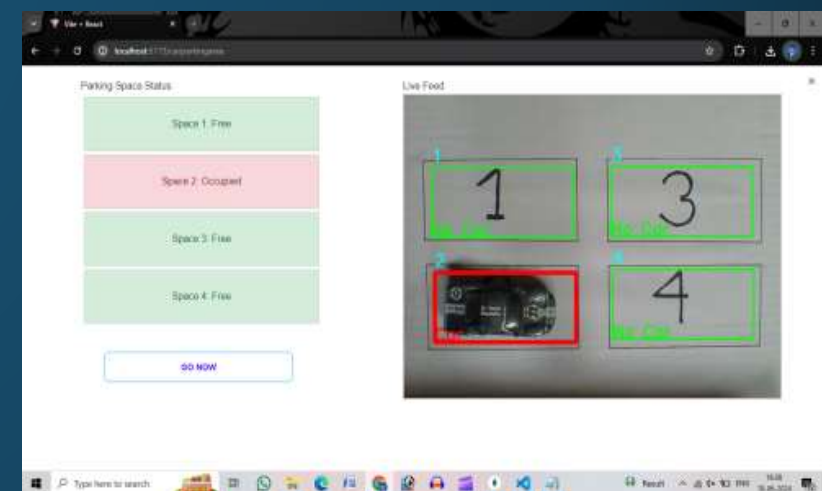
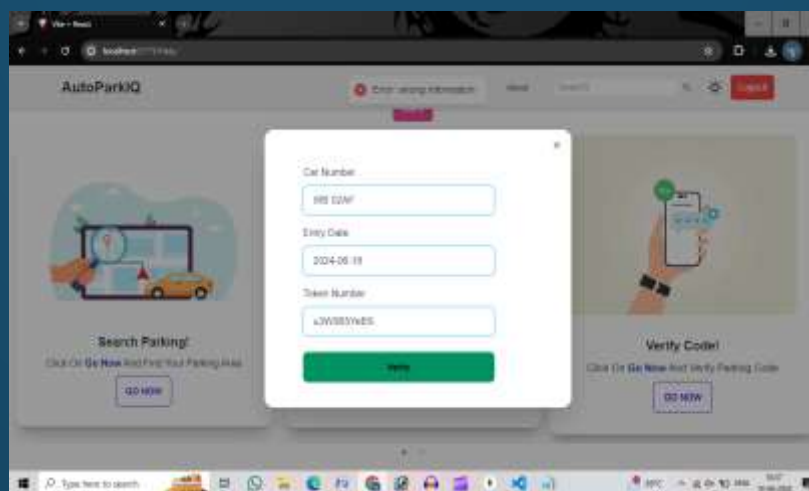
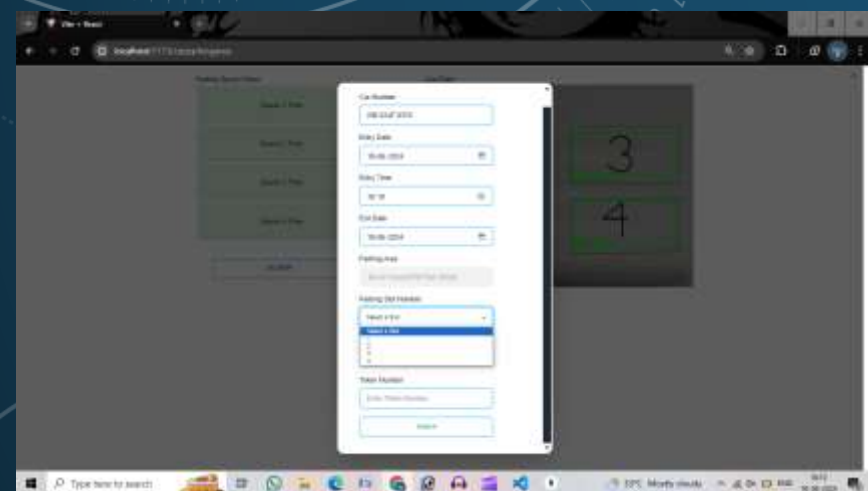
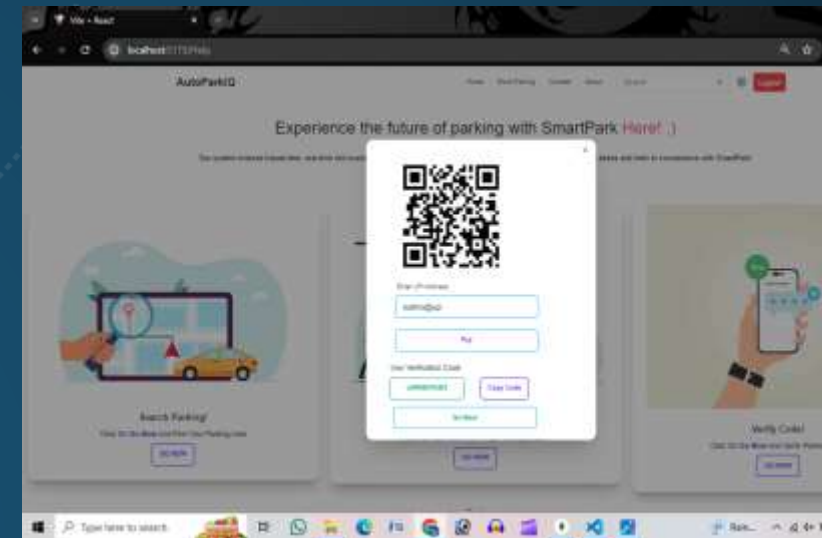
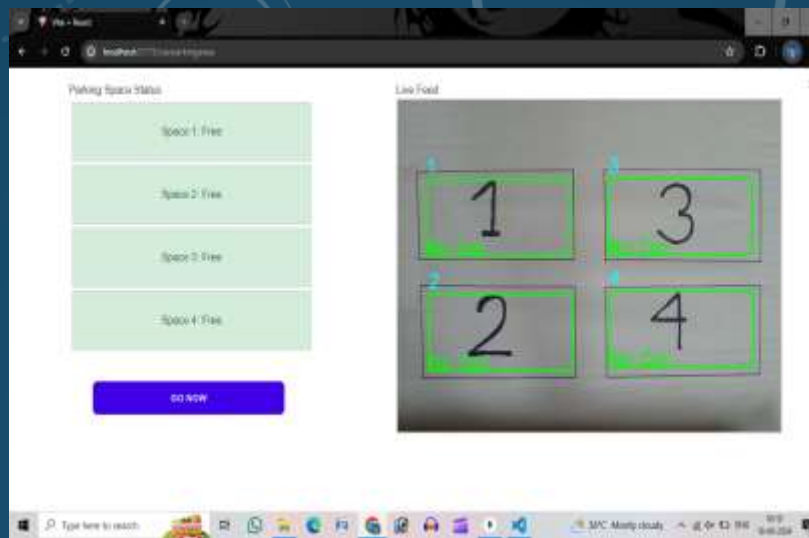
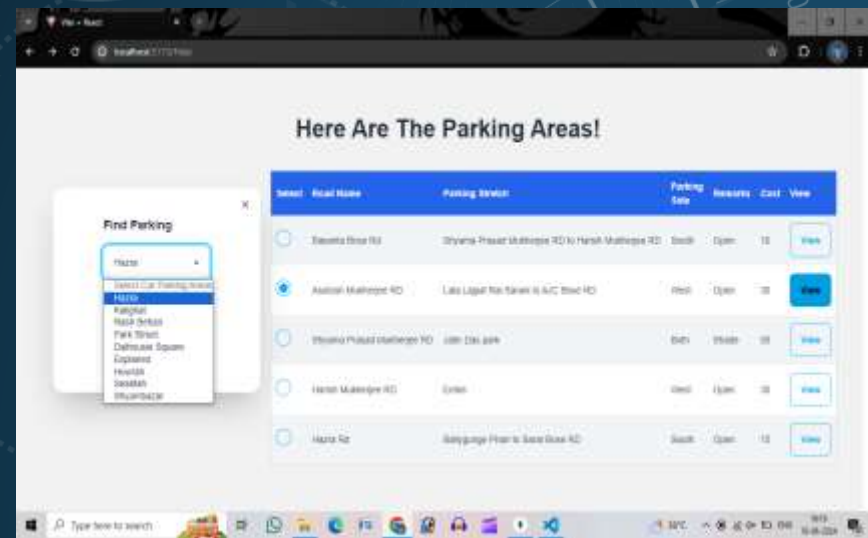


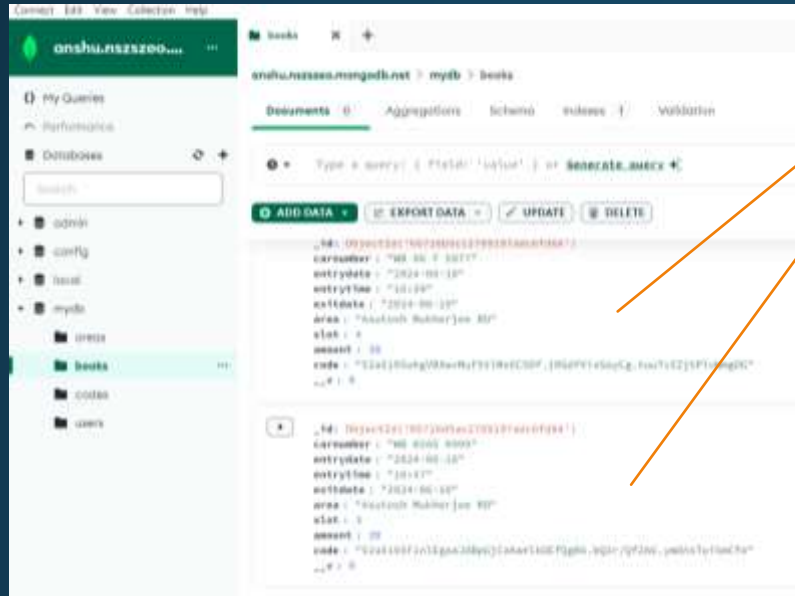
Here are the details of the users that is stored in the database

These are the details of the parking areas that are stored in the database

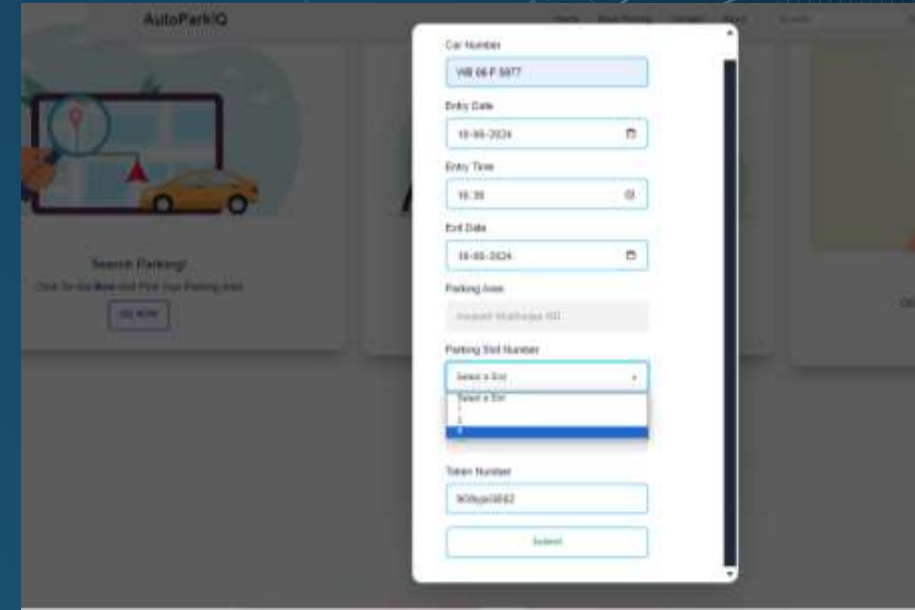


Example:

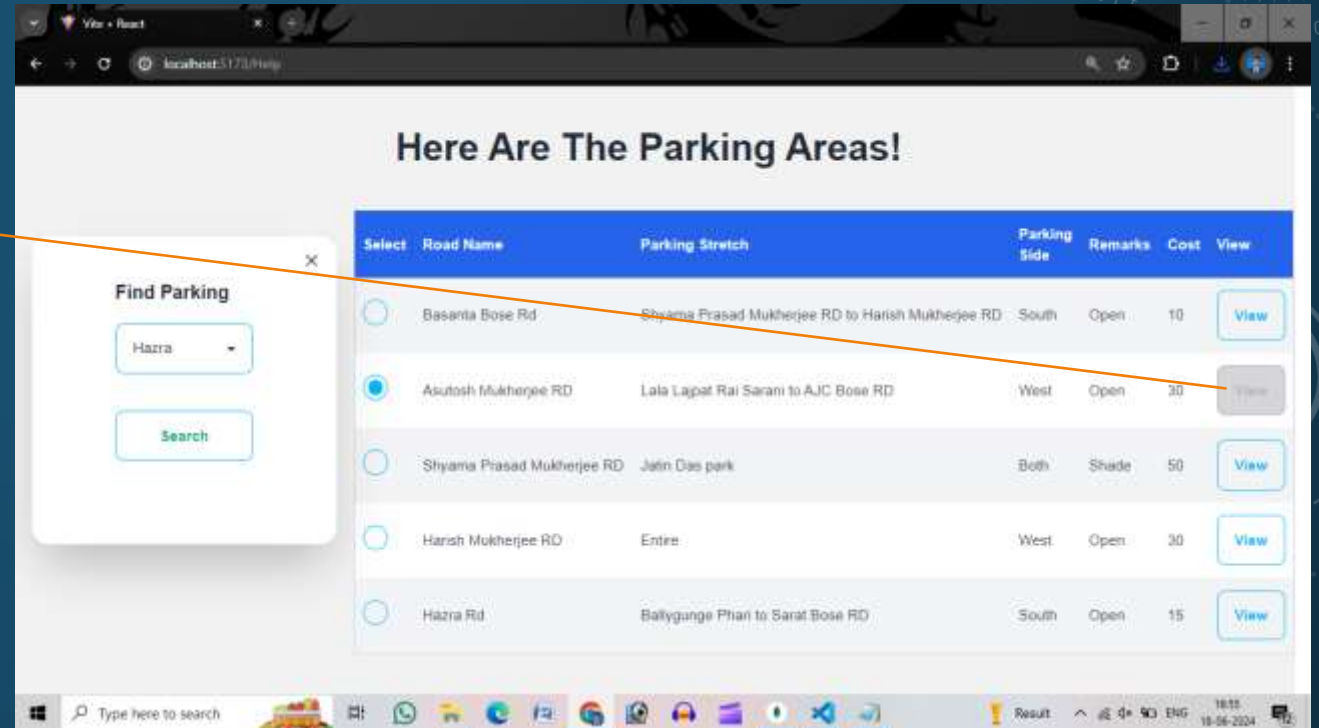




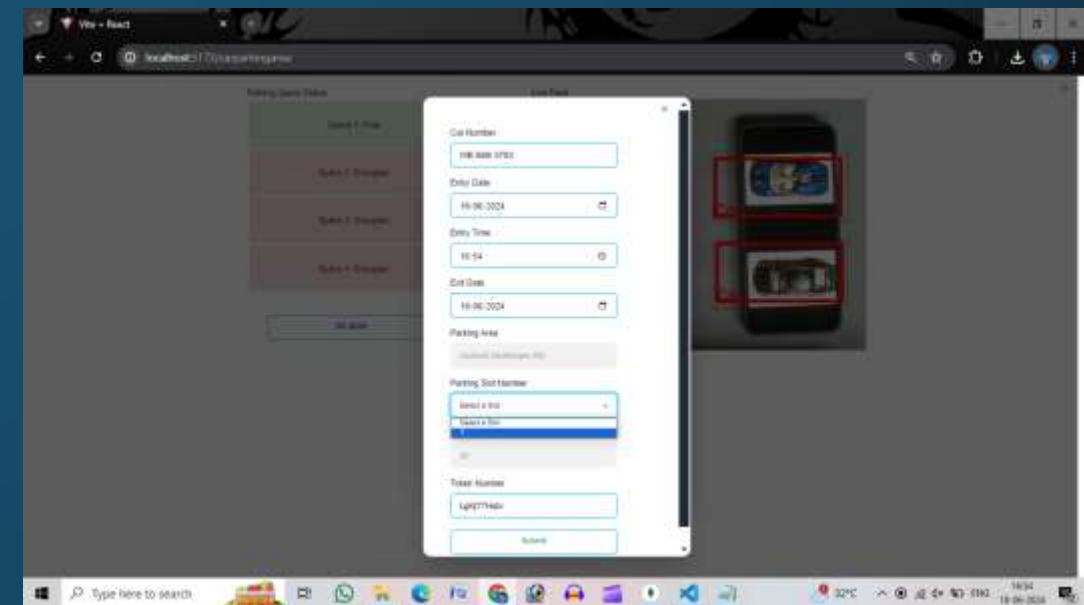
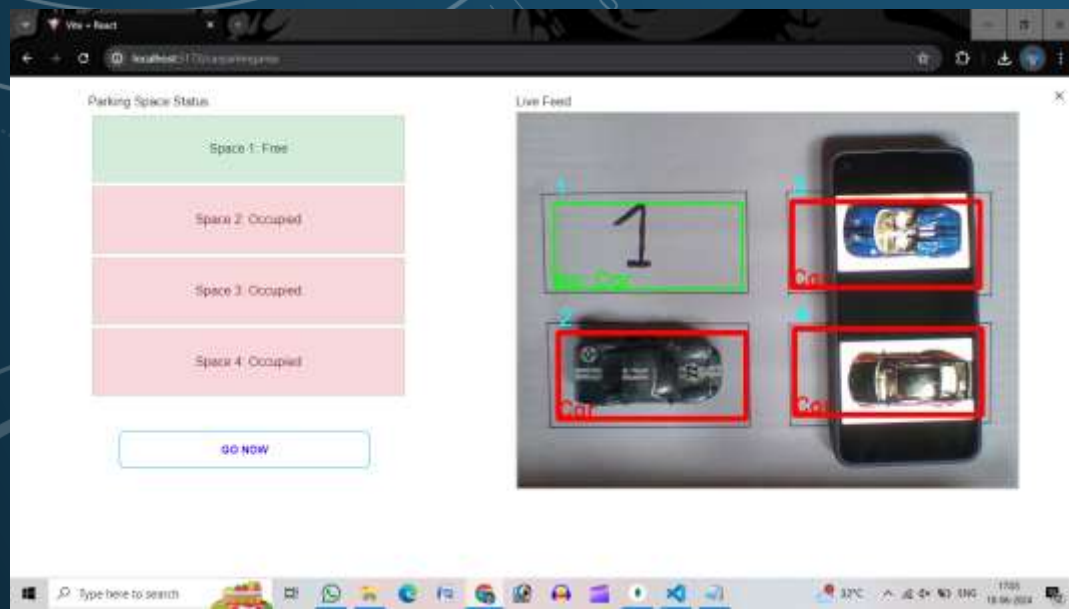
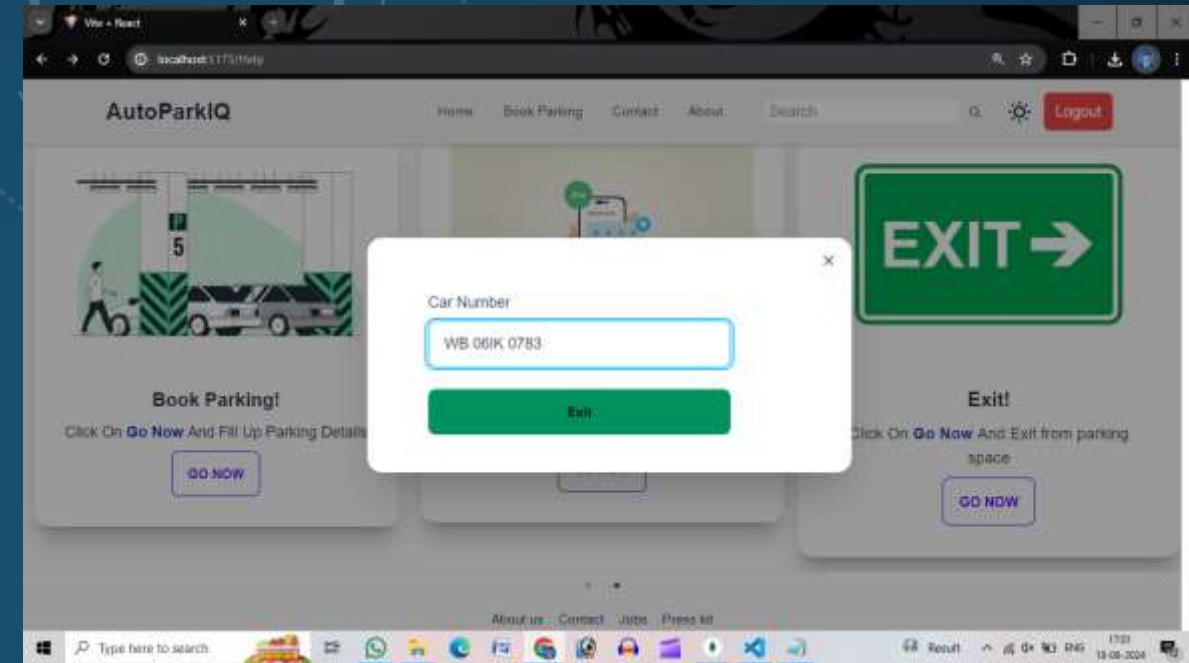
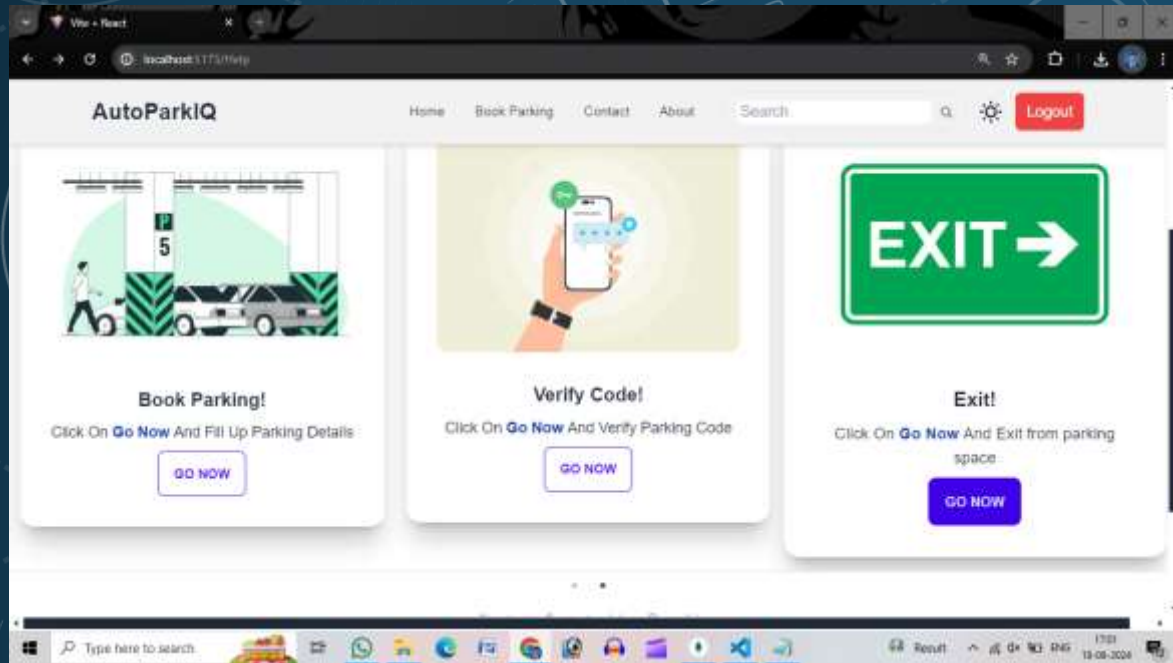
When a user books a slot all the details (the slot, the parking area, parking time, car number etc.) are stored in the database.



This part is connected with our frontend interface that when a slot is booked no other driver can book that place and also when all the slots of a parking area is currently full other users cant view that area for booking.



Example(When a user want to exit from the parking area):



CONCLUSION AND FUTURE WORK:

- In Future we will add a feature that if a user don't come in proper time his booking will be cancelled, and the slot will be freed.
- In the future, we plan to implement a two-step verification process using number plate recognition. This will ensure that only the booked car is parked in the designated slot, preventing security issues where a different car occupies the reserved space.
- Additionally, we aim to integrate a feature that suggests parking areas based on weather predictions. For example, if rain or thunderstorms are imminent, our system will recommend shaded parking slots to the driver.
- The dynamic change of cost by passing time and other required decisions will be added in future.
- By incorporating these features and more, we can further improve the convenience and reliability of our parking system for users.

ACKNOWLEDGEMENT:

I take this opportunity to express profound sense of gratitude and respect to all those who helped me throughout the duration of this project.

First and foremost, I would like to thank my supervisor of this project, **Shilpa Saha**, and also **Prof. Sk. Mohiuddin** for their valuable time and guidance. Their willingness to motivate me has contributed tremendously to my project.

I would also like to thank **Prof. Antika Sinha**, Head of Department of Computer Science, for providing with a good environment and facilities to work on this project.

I regret any inadvertent omissions.

REFERENCES:

- Kong, Longin, et al. [1]:This paper presents a comprehensive survey of Convolutional Neural Networks (CNNs), highlighting their architecture, key components, and various applications.
 - Alam, M., Moroni, D., Pieri, G., Tampucci, M., Gomes, M., Fonseca, J,... . Leone, G. R. (2018). Real Time Smart Car Parking System Integration in Distributed ITS for Smart Cities. Journal of Advanced Transportation, 2018.[2]
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- www.google.com
 - docs.opencv.org
 - www.youtube.com
 - numpy.org
 - www.geeksforgeeks.org

The background is a solid dark blue color. It features several faint, light blue geometric patterns. In the top right corner, there is a large circular motif with concentric circles and radial lines, resembling a compass or a stylized sun. In the bottom right corner, there is another circular motif with concentric circles and a dashed line. In the bottom left corner, there is a partial circular motif with a dashed line. The text "Thank you" is centered in the middle of the image in a white, sans-serif font.

Thank you